YOU CAN DO
NOTHING TO
BRING THE DEAD
TO LIFE; BUT YOU
CAN DO MUCH TO
SAVE THE LIVING
FROM DEATH.

You can do nothing to bring the dead to life; but you can do much to save the living from death.

Proper knowledge in the prevention of disease is one of the greatest safeguards for the protection and preservation of the home.

Over a million copies of this LIBRARY have already been distributed and are in use in more than a million of our homes.

B. Frank Scholl. Ph. G. M. D.

LIBRARY OF HEALTH

Complete Guide to Prevention and Cure of Disease

CONTAINING PRACTICAL INFORMATION ON

Anatomy, Physiology and Preventive Medicine; Curative Medicine, First Aid Measures, Diagnosis, Nursing, Sexology, Simple Home Remedies, Care of the Teeth, Occupational Diseases, Garden Plant Remedies, Alcohol and Narcotics, Treatment by Fifteen Schools of Medicine, Beauty Culture, Physical Culture, the Science of Breathing and the Dictionary of Drugs.

FULLY ILLUSTRATED WITH HALF TONE AND COLORED PLATES

TWENTY BOOKS—ONE VOLUME

EDITED BY
B. FRANK SCHOLL, Ph.G., M.D.
Graduate of
Jefferson Medical College, and Philadelphia College of Pharmacy

1925 EDITION

HISTORICAL PUBLISHING CO.
PHILADELPHIA, PA.
U. S. A.

60

Entered at Stationer's
Hall, London
March, 1916

Made in U. S. A.

Wide Thanks to those that Have Gone Before

The use of home medical books has now become general and they are recognized as being just as essential to the protection of the family, the care of health, the prevention of disease, the care of the young child; in giving assistance in the absence of the doctor, and in preventing unnecessary sickness and suffering and the saving of life itself, as the scientific text books are essential to the physician.

This knowledge is not intended to make doctors out of laymen or to encourage self medication except in emergency. It aims to teach *prevention* rather than *cure*. It is a well-known fact that over fifty per cent. of the sickness that comes to the home is unnecessary and preventable if the people have the proper knowledge. The right kind of information in the hands of the mother will prevent unnecessary sickness, take care of accidents and emergencies, and save thousands of lives, when the doctor cannot be reached in time; it also teaches the care and nursing of the sick and the rearing of children in thousands of homes that cannot afford the professional nurse.

It may be said that during the past five years the treatment and cure of many diseases has entirey changed; that more important discoveries and new and successful methods for the curing of disease have been proven and adopted during this time than in any similar period during the past century. The old method of treating fever was by shutting the patient in a tight room, smothering him with bedclothing, allowing no ice water, and dosing with medicine. The latest treatment whether the fever is typhoid in its character, pneumonia, or malaria fever, is to have the patient covered lightly with a sheet, the room perfectly ventilated and the temperature largely controlled by external applications.

Measles is now treated by simple methods. The treatment for Scarlet Fever is materially changed and fatalities greatly reduced. So we might mention many others. It is not too much to say that the mortality of all diseases has been diminished greatly by the new treatments and nursing adopted within the last five years. The tendency of modern treatment is toward preventive medicine and careful nursing.

Of every 1,000 babies born in this country, 124 die before they are a year old. An average of three hundred thousand babies under a year old died yearly in the United States the past few years. Half of this number could have been saved if every mother in every home knew how to take proper precaution, and give proper care and nursing.

If a child should be exposed to any disease—for instance, the Measles—the "Library" tells you just how many days before the rash appears and how it can affect others exposed to it. By having this information the mother can call the doctor in time and can more intelligently assist and co-operate with him.

Then just think of the accidents that are happening every day and the doctor may be miles away. We give in the "Library" the quickest, best and the most efficient treatments in accidents and emergencies, in the absence of a doctor, and it is the duty of everyone to know what to do for the first aid to the sick and injured.

If someone should take poison—for instance, "Carbolic Acid" or "Lye," which are very common in the home—perhaps your child takes a drink of one of them by mistake. You call in a doctor and by the time he gets there it may be too late, but, by turning to "POISONS," you find, "For Carbolic Acid take Epsom Salts," and "for Lye take Oil." This information may save a life.

And so on with every kind of emergency. They happen every day, *especially* with children. There's never a wash-day that passes over the land but what there are numbers of cases of children getting hold of ammonia. If your little one took a swallow from the ammonia bottle, you couldn't grab it in your arms the moment it screamed and run two blocks to the doctor in time to do any good, but you could grab the vinegar bottle—that's always handy—and give it a good swallow of vinegar, which will immediately counteract the ammonia. No home should be without such information.

What would *you* do in the absence of a doctor? Ask yourself any question about health or life and turn to the "Library" for your answer.

Did you ever stop to think that one could bleed to death in three to seven minutes, before you could get medical help? Here is given the simplest and best information on just where to press, to stop the flow of blood from any part of the body; and if you know just how, you can stop it with your own thumb or finger or by using a simple tourniquet until you can procure assistance; then you can wait for the doctor—hours, if necessary.

It is only too true that a large majority of our women are raised in an atmosphere of false modesty that prevents them from having the necessary knowledge to take the proper care of themselves and avoid various diseases and disorders. Thousands of women have questions they would like answered that they will not ask their local physician on account of embarrassment, also expense, and this information is absolutely essential to their personal health. These minor troubles through neglect oftentimes become chronic and incurable, while, if taken at the start, they are easy to remedy.

Watch carefully every little headache, cough, chill, pain or fever—they may lead to something serious. Prevention is better than cure and *Prevention begins at home.* The index under the HEADINGS will direct you to the proper place, where you can obtain the information you need to guide you.

The mother is the one who looks after the health of the family. The mother is with the children twenty-four hours in the day and feels most responsible in case of sickness. That is why the "Library" is placed in the homes—IT IS FOR THE WIFE and FOR THE MOTHER.

If the husband comes home sick, or a child is ill, the wife is expected to do the nursing. How is she going to do this if she never had any experience with sickness? The Nursing Department will tell her. It teaches how to make poultices, ointments, plasters, syrups, etc.; how to change the sheets, making the patient comfortable, and how to feed the sick. Of the most value to the sick room is the nurse; she should understand how to prepare food and diet for the particular ailment of the patient, and to assist the doctor in battling with disease and restoring health. "Library of Health" gives you all this information in a plain, practical way that anyone can understand.

Knowing from our experience that the medical specialists and teachers who stand at the head of their profession write in language of technical expression, it has been necessary for the publishers to seek the services of a competent editorial staff, who have put the technical and scientific knowledge in a plain, practical form, so that anyone can understand.

We wish to extend wide thanks to the contributors to this work and to the professors, physicians, specialists and lecturers of Universities and Colleges throughout the world, some of whom have gone before, and the recognized standard home medical works published in England, Germany, France, Spain and America, from whom our editors have gleaned, as follows:

Seserano Lachapelle, M.D.,
Professor of Anatomy, Montreal, Canada.

Benito Bordas, M.D.,
Specialist in Febrile Diseases, Cuba.

Wm. L. Powell, M.D.,
Specialist in Internal Medicine.

George Noble, M.D.,
Professor of Chest Diseases, Vienna.

H. Webster Jones, M.D.,
Specialist in Diseases of Children, London.

Prof. Van Werth,
Specialist in Venereal Diseases, Dresden.

John Forsyth Little, M.R:,
Demonstrator of Anatomy, Philadelphia.

Silverio Dominguez, M.D.,
Specialist in Constitutional Diseases, Buenos Aires.

Prof. M. Hoff,
Specialist in Consumption and Germ Treatment of Disease, Vienna.

C. C. Vanderbeck, M.D., Ph.G.,
Formerly Lecturer on Hygiene, Philadelphia.

Domingo Orvananos, M.D.,
Specialist in Diseases of the Circulatory System.

A. O. Mencki, M.D.,
Experimental Medicine, Petrograd, Russia.

Aubrey W. Marchand, D.C.,
Chiropractice, Davenport, Iowa.

Anne McFarland Sharpe, B.A., M.D.,
Author of "Nervous Troubles Among Women."

Jose Peon Y. Contreras, M.D.,
Specialist in Tropical Diseases, Mexico.

Joseph G. Richardson, M.D.,
Professor of Hygiene.

A. M. Stafford, M.D.,
Specialist in Diseases of the Nose and Throat.

F. E. Miller, A.M., M.D.,
Consulting Physician, St. Joseph's Hospital, New York City.

Eugene Davis, M.D.,
Formerly Specialist in Polyclinic Hospital, Philadelphia.

L. E. Fortier, M.D.,
Ex-Surgeon Pennsylvania Railroad Co.

E. F. Roeber, M.D.,
Kneipp System of Natural Healing.

Jean Latauche, M.D.,
Lecturer on Clinical Diseases, Hospital of Charity, Paris.

S. Iwasaki, M.D.,
Nagasaki, Japan.

El Medico del Hogar.

Hering's Domestic Physician.

Warren's Household Physician.

Greer's Physician in the Home.

Chavasses' "Manual for Wives and Mothers."

Woods' Vitalogy.

American Family Physician.

Newell's Family Doctor.

Bilz's Natural Healing.

Kelley's Domestic Medical Practice.

Gunn's Revised Family Physician.

Medicology.

Standard Family Physician.

And many others.


LANGUAGE
A PICTURE OF GOOD HEALTH
COPYRIGHT 1916 BY E. J. STANLEY

CHART 1.

Gunn's Revised Family Physician

Medicology.

Standard Fami

And n

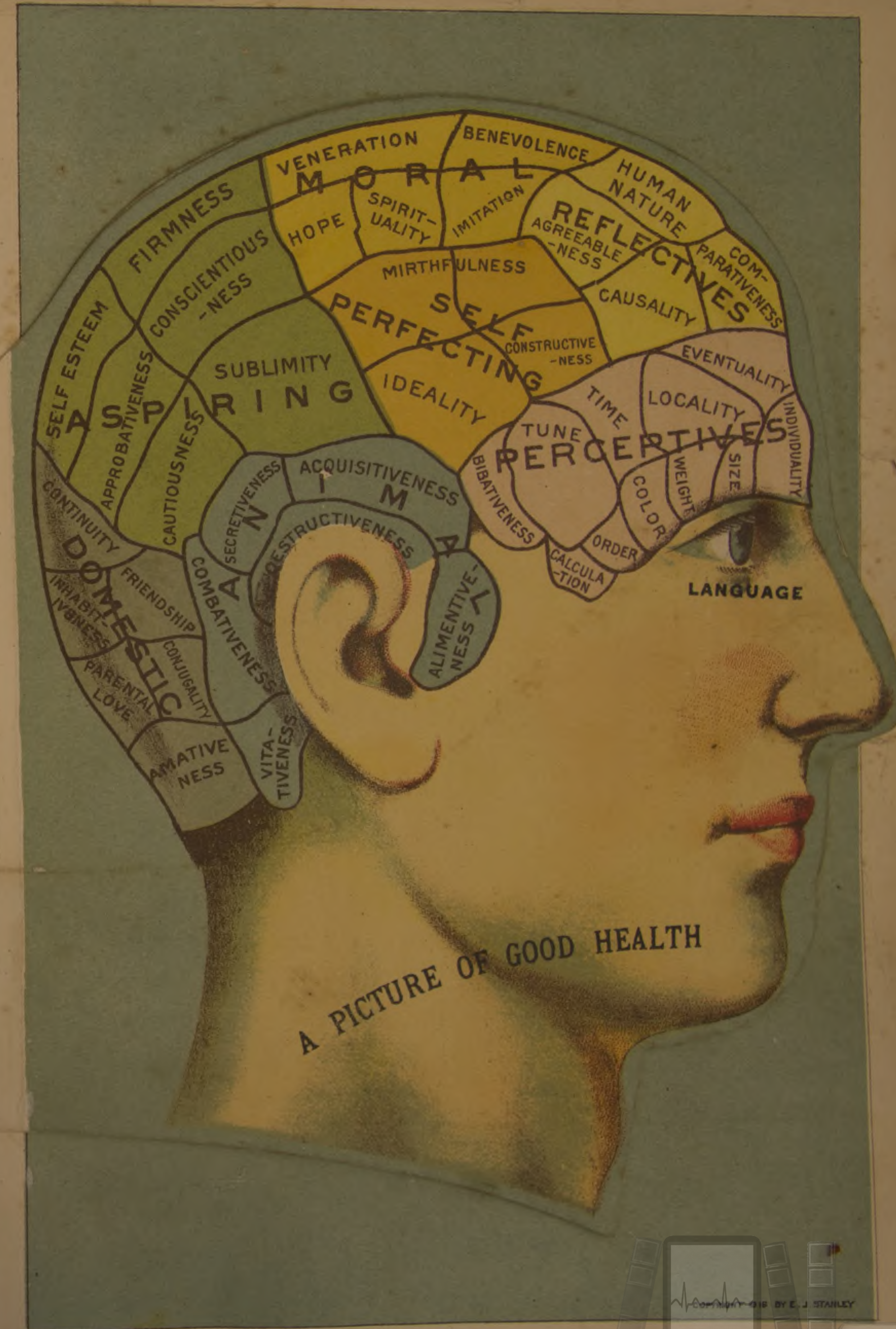


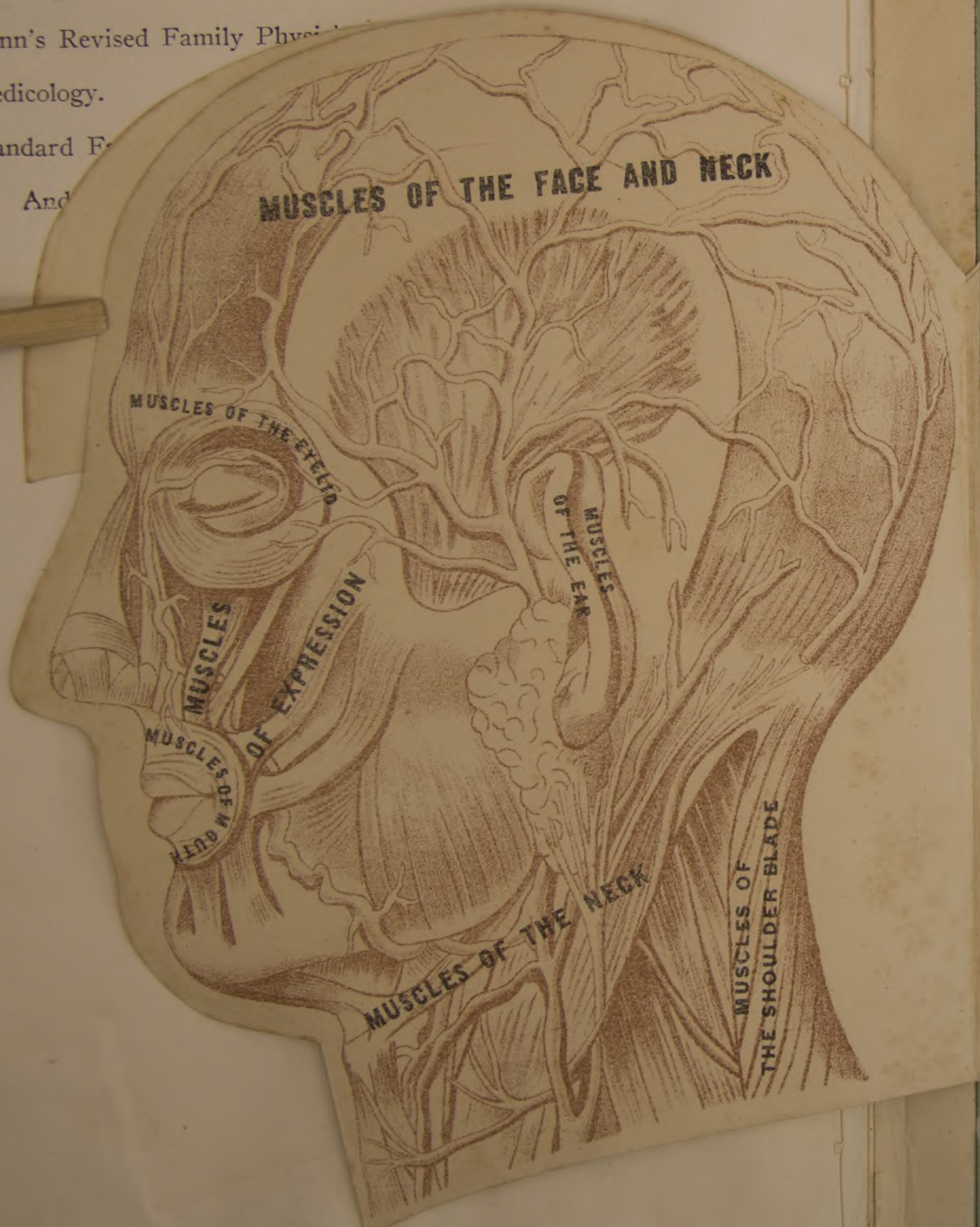
CHART 1.

Gunn's Revised Family Physi

Medicology.

Standard F

And



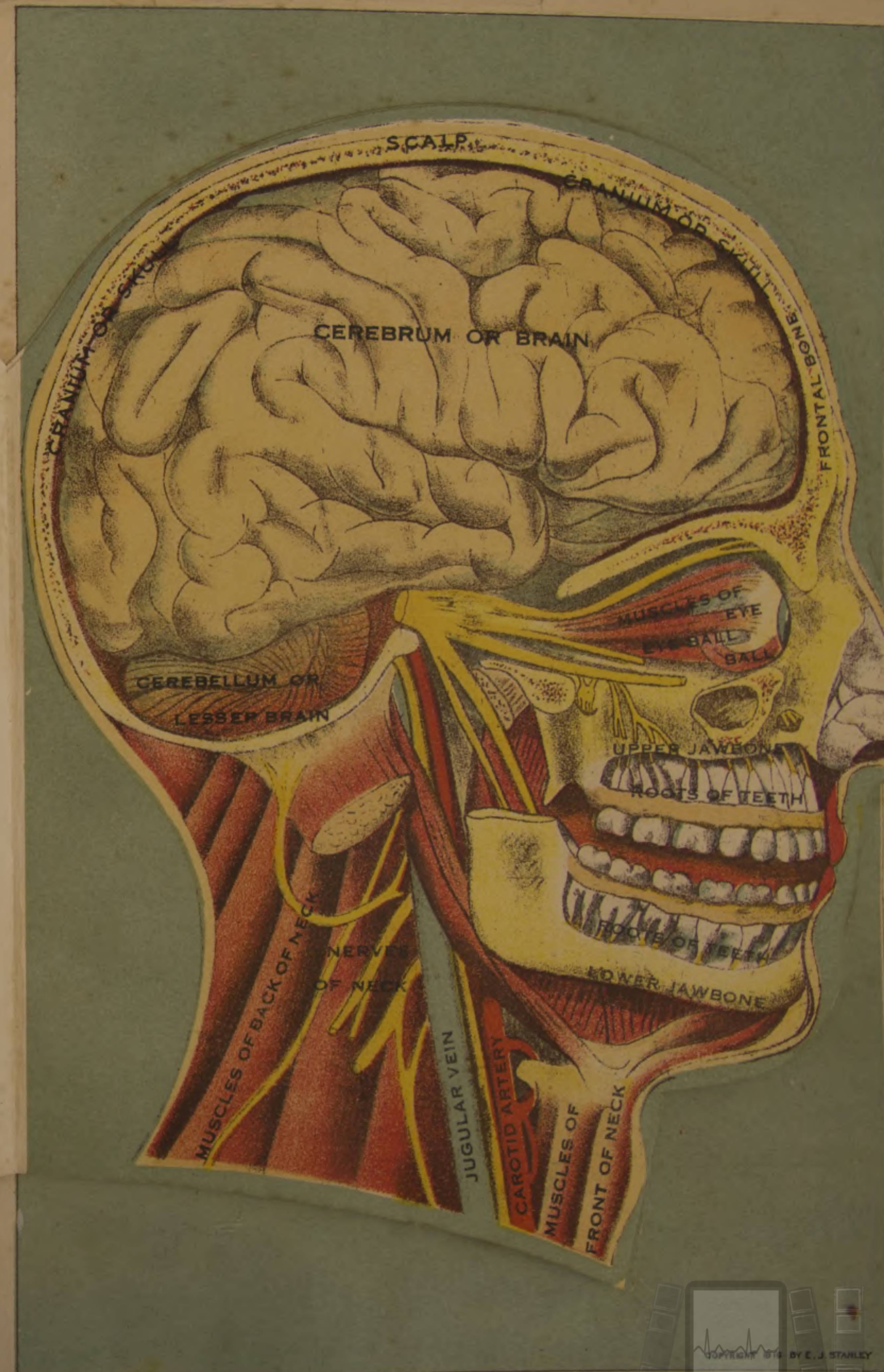


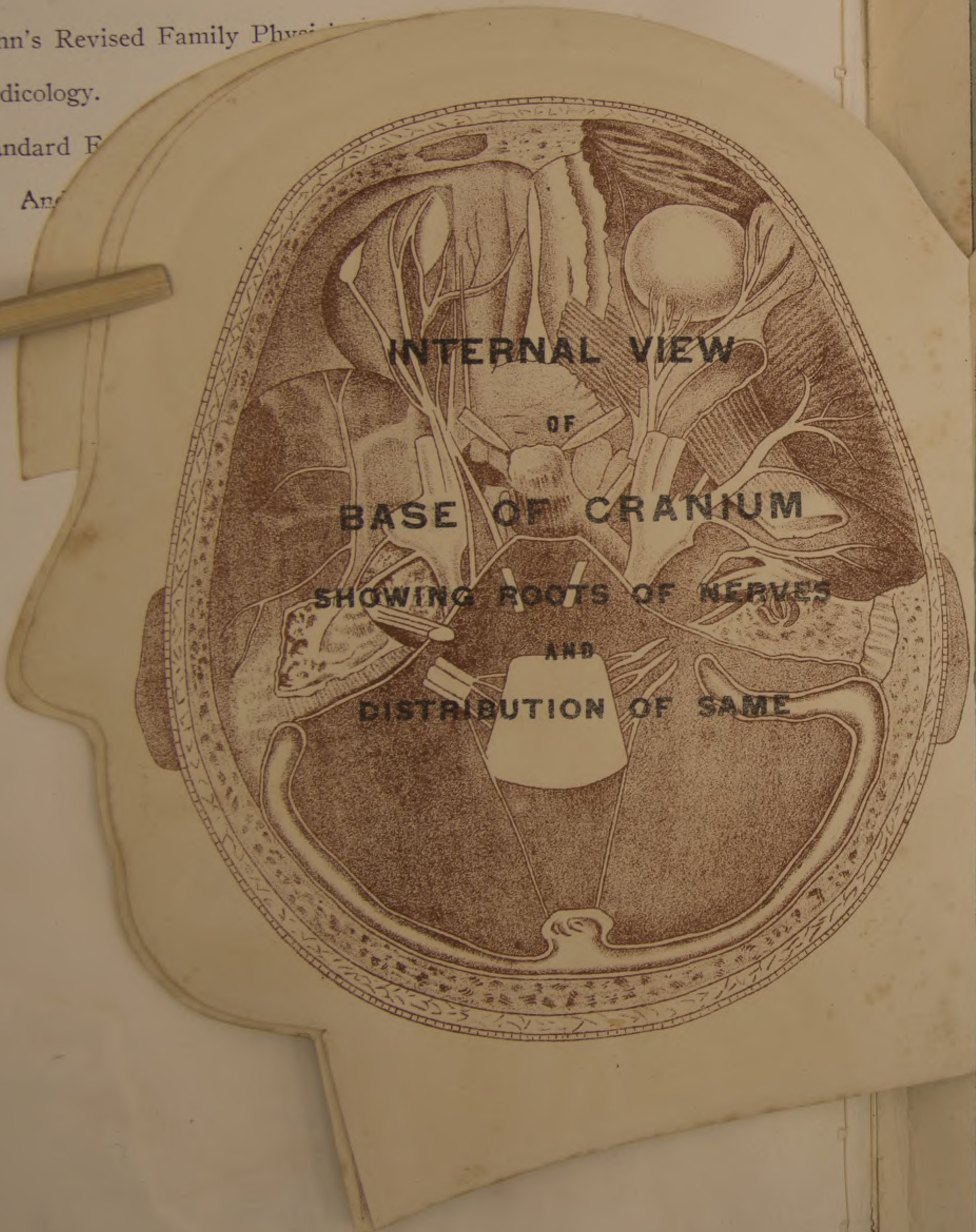
CHART 1.

Gunn's Revised Family Phy

Medicology.

Standard F

An



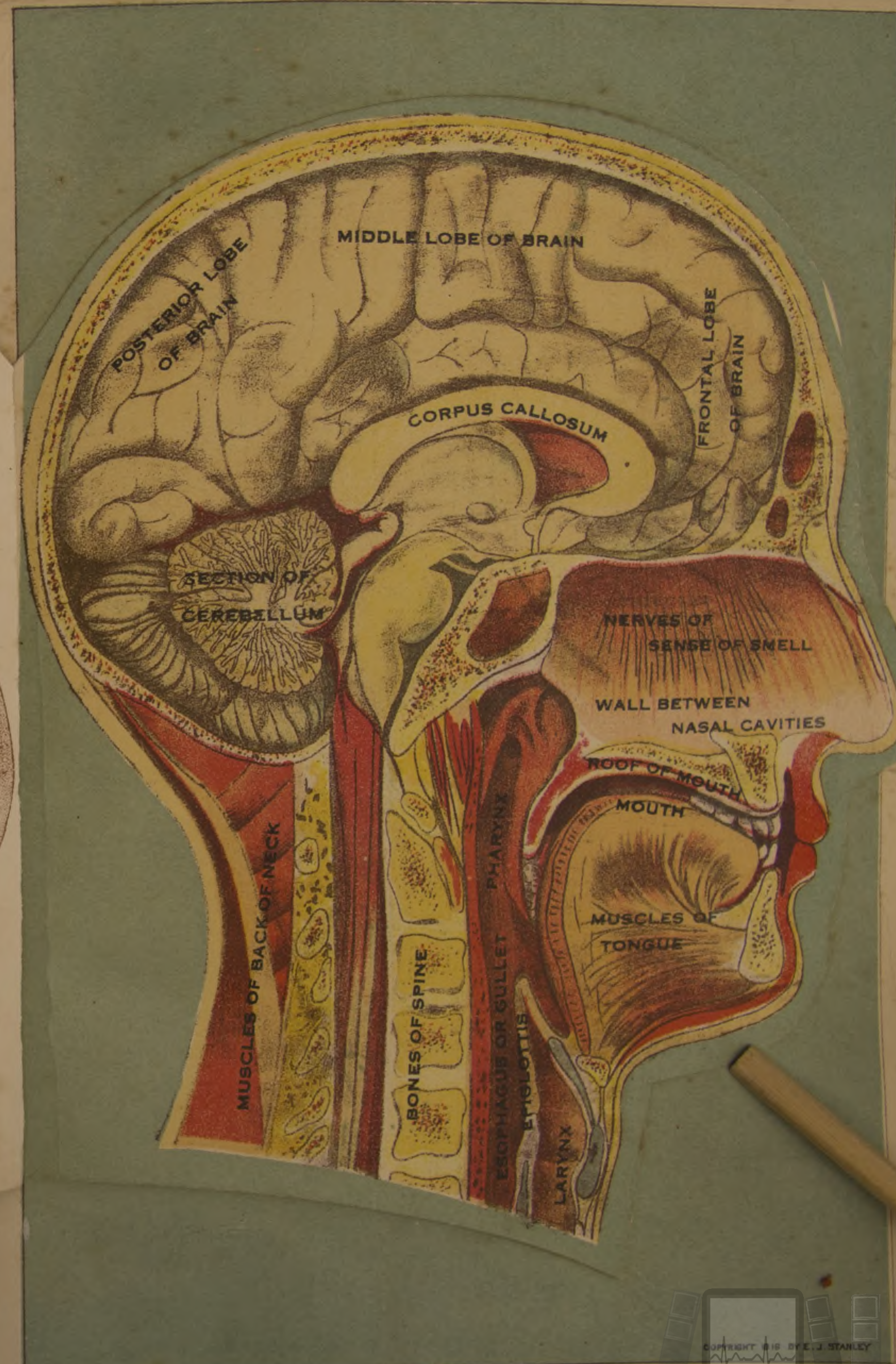


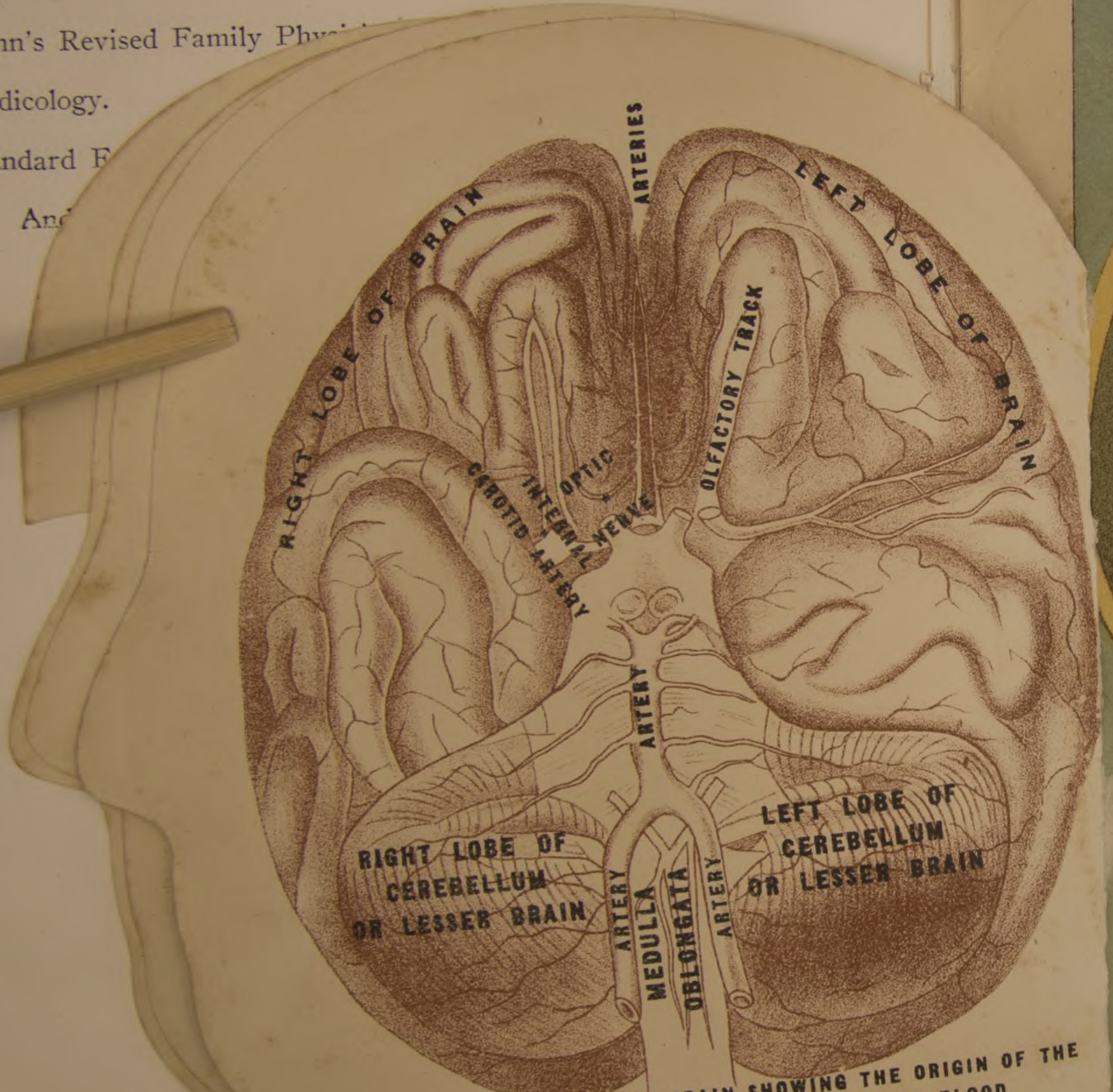
CHART 1.

Gunn's Revised Family Phy...

Medicology.

Standard F...

And...



VIEW OF BASE OF BRAIN SHOWING THE ORIGIN OF THE NERVES OF SPECIAL SENSES AND BLOOD SUPPLY OF BRAIN

CHART 1.

GENERAL ARRANGEMENT

Although contained in one volume this work is divided into twenty Books, which in their turn are subdivided into chapters or parts.

At the back of the whole work will be found a complete General Index of all matters contained in the different Books and their subdivisions, so that any disease or any remedy in any part of the work may be quickly located. But, in addition to this General Index, each chapter or part is prefixed with a special index of its own, thus giving immediate location of items to be consulted in the special subject at the time under consideration. For example, let us take the common disease Asthma. On consulting the General Index we find the main article to be on page 523. Turning to the index at the beginning of this chapter (Part VI of Book IV) we may find the causes, symptoms and varieties of Asthma.

If what we wish is not found in this general article, we again refer to the General Index; and we have special treatments of the disease in other parts of the work, such as Simple Remedies, Prescriptions, Homeopathic Treatment, Exercises, etc. This plan has been carried out all through the work.

IMPORTANT

READ CAREFULLY

ATTENTION is directed to the fact that all through this book the doses mentioned are for ADULTS, except where the treatment is specifically for a child.

PLEASE NOTE particularly the footnote on pages 1233 to 1248 inclusive.

Also note full directions given on pages 1224 and 1719, to determine doses for children.

Table of Contents

LIST OF ILLUSTRATIONS

INDEX TO BOOK I

Book I describes the human body and illustrates it by a series of Manikins or Anatomical Charts.

The following list of contents, alphabetically arranged, will enable the reader to quickly turn to any subject or illustration desired:

SUBJECTS OF THE TEXT

LIST OF ILLUSTRATIONS

Book I.

THE HUMAN BODY.

A Description of the Colored Anatomical Charts Composing the Manikin Accompanying this Work.

CHART I.

A PICTURE OF GOOD HEALTH.

This exquisitely beautiful and artistic Anatomical Plate presents the head and face of a young man in the enjoyment of perfect health. Apart from the subject it so accurately and faithfully represents, it is in itself a valuable life-like portraiture of the human head and face, and shows to what perfection the art of anatomical plate printing has attained. Note the prominent perceptive faculties, the high forehead, features characteristic of a large brain and a massive and unimpaired intellect. Mark the open expression of the eye! how true to nature and life-like. Observe the compressed lips, denoting firmness of character and determination of purpose. Look attentively at the bright, open, manly countenance; there are no signs of mental decrepitude, physical bodily infirmities, nervous fear, or exhaustion of brain power or life-force in the expression of the noble, ruddy and healthy face. It is, as its name implies, typical of *Perfect Health!*

Muscles of the Face and Neck.—This fine plate is a remarkably realistic and accurate representation of the head and neck, after the outer skin has been removed. It shows the bare skull, together with the admirable and skilful arrangement of the muscles of the face and neck; also the external part of the ear. There are, also, numerous blood-vessels noticed meandering over the parts exposed to view, by means of which this muscular area receives its supply of nutrient blood. The large, broad muscle observed over the forehead is the one by which we elevate the brow, and in conjunction with the orbicular muscle that is seen surrounding the eye, we can contract the brow, as in "scowling."

Muscles of the Face.—The muscles of the face are those employed to give variety of expression to the countenance It is through the medium of these small but useful muscles that public speakers can give facial emphasis to their flow of rhetorical eloquence; the tragedian employs them to give dramatic effect to the various characters he impersonates, and the low comedian and "clown" cultivate them for facial contortion and "guying" characterization. The numerous muscles observed about the neck are those which give elasticity and mobility to the head. It is by means of these muscles that the head can rotate on its axis, bend forward, backward, sidewise, and pose in the diversified attitudes and various positions it can be made to assume.

THE BRAIN; AND A VERTICAL SECTION OF THE FACE AND NECK.

What the Plate Shows.—As we progress in our anatomical course of study, our attention is firmly and deeply fixed in wonder and amazement at the marvelous mechanism revealed in the sublime profundity and grandeur brought out in this magnificent artistic plate. It brings before our astonished vision the beautiful proportions and symmetry of the human brain as it lays *in situ* within its bony castle; and as we look upon its wavy convolutions we naturally turn our thoughts to the hidden mysteries of mind and to its superiority over matter, and to the illimitable intellectual properties, powers and capacity of the mind, that lay quietly slumbering in the depths of the human brain, for the mind of man surpasseth all things of human conception or construction. Below this mighty throne of reason and intelligence, on the left, we observe the cerebellum or lesser brain, the fount from whence all the vegetative or organic functions of life—as respiration, beating of the heart, digestion, etc.—receive their inspiration and supply of vital force.

View of the Eye.—We can likewise view the human eye as it lays in position in its bony socket, and wonder at our Creator's munificence and benevolence in providing us with such a delicate instrument of vision with which to light our way about in the world, and view the magnificent beauties of nature that surround us on every hand. Here, too, we observe the teeth, those essential pre-requisites to personal beauty, and valuable adjuncts to the powers of articulation and speech, protruding through the gums, their roots being visible above and below the gums; and in the lower set we see the dental nerve distributing its nervous supply to their individual and collective roots.

The Neck Muscles.—This beautiful illustration brings out in bold relief the superficial and deep muscles of the neck, and, at the same time, we observe a faithful delineation, not only of the relative position of the carotid artery and jugular vein, but also of the manner in which the muscular and fleshy part of the neck receives its nervous supply.

VIEW OF THE BASE OF THE CRANIUM.

Brain Cavity.—Here in this remarkable illustration we have presented to us one of the most wonderful views in the anatomy of the skull, or, in fact, of any part of the human frame. It is a view of the floor of the cranial cavity on which that curious and mysterious, but sublime organ, the brain, rests. The marvelous skill and ingenuity therein displayed, of the complex mechanism surveyed, the beautiful and intricate manner in which the nerves of special sense are so elaborately set forth, the complicated profusion and exquisite design manifest in the distribution of blood-vessels for the nourishment and support of the special organ of reason and intelligence—all claim our closest and undivided attention, and we are unconsciously led to revere the Omniscience of Him who could conceive of such intricate architecture, and perform such delicate, unique and perfect workmanship. The large opening observed in the floor of the cranial cavity is the *foramen magnum,* through which the spinal cord, together with the cerebro-spinal nerves, escape.

SECTIONAL VIEW OF THE BRAIN, FACE AND THROAT.

The Brain in its Bony Citadel.—The artist, with true anatomical instinct and a rare technical ability in regard to accuracy and minute detail, has performed his part of the work in this illustration with such faithful fidelity to nature that one cannot withhold a word of praise at the grand style and elaborate manner of its execution. This elegant and artistic anatomical plate represents the brain held firmly in position within its strong, bony citadel, but cleft in twain from above downward, thus showing its internal mechanism and construction; besides which it gives the internal arrangements of the nose, tongue, throat and neck.

Order of Brain Mechanism.—Commencing from above and descending downward we observe the following important structures, to wit: The fascia or skin covering the cranial bones; and then a section of the bones themselves, showing their laminated structures. Between the bones of the skull and the brain are seen the meningeal coats of the brain, which serve the double purpose of supplying it with blood-vessels and protecting that delicate organ from pressure or injury.

Cerebrum and Cerebellum.—We observe that the cerebrum, the seat of mind and volition, is much larger than the cerebellum or little brain;

and as though that was not enough area for the evolution of the mind. we see this part of the brain most curiously wrinkled and folded into various sized convolutions, thus increasing the mental surface. The more numerous these convolutions are, the higher and more noble the mental faculties and intellectual powers become. The hemisphere of the brain, here shown, is seen to be divided into three lobes, the frontal, middle and posterior. The *Corpus Callosum,* or the great commissure of the brain, is most faithfully represented, and immediately below is seen the *Fornix.* The peculiar appearance of the cerebellum or little brain presents a tree-like resemblance, whence it is called the *arbor vitæ,* or the tree of life.

The Olfactory Nerve.—The olfactory nerve is graphically displayed, branches of which are seen passing in all directions over the mucous membrane of the nose. A little to the left of the olfactory nerve is seen the posterior nares, and immediately below the pharynx and epiglottis, the œsophagus or gullet, the larynx and trachea or wind-pipe.

The Tongue.—The tongue, or organ of taste and instrument of speech, is most accurately represented, the muscular fibres of which are seen running in different but determinate ways, thus giving to this important organ variety and regularity of motion and aiding it to assume numerous shapes and forms. The cervical portion of the spinal column is seen, with the fleshy part of the back of the neck attached. This plate is one that commends itself to our deep and careful study.

VIEW OF THE BASE OF THE BRAIN, AND THE THOUGHTS IT SUGGESTS.

Shape of Brain.—As so graphically delineated in this beautiful as well as natural illustration of the human brain, we glean a knowledge of the origin and source of its blood supply; the arteries are observed to distribute numerous branches in various directions along and over its surface, many of which penetrate its substance. As noticed, the brain presents an ovoid or egg-shaped appearance, divided into two equal, lateral halves—hemispheres as they are called—thus virtually giving us two brains, the same as we have two eyes, two arms and two legs. With this surplus of brains, as it were, at our command, we are naturally led to ask the question, who can define the metes and bounds of the mind? Or describe the limits of our intellectual capacity? Who can fathom the depths of thought? Or circumscribe our mental, educational or scientifical acquirements, when health crowns the human temple with its rubicund mantle? Echo answers who!

Beauty of the Brain Views.—Every view of the human brain we have seen in this series of magnificent and unparalleled anatomical plates has inspired our admiration and held us spell-bound in utter astonishment and amazement at the limitless attributes, the diversified powers, and the variety of functions this wondrous and mysterious organ is called upon to perform in the hourly transaction and business pursuits of daily human life. And yet, notwithstanding the marvelous properties of this elaborate organ, it is the least solid and most unsubstantial looking body of the human casket.

Consistency of the Brain.—It consists of eighty per cent. of water, seven per cent. of albumen, some phosphorized fat and a few other minor substances. Such is the composition of the mighty and powerful organ which rules the world. Whilst the brain is the seat of sensation, yet it can be cut, burned or electrified without causing pain in itself. Strange, passing strange, are the properties and powers of the brain!

BONES OF THE HEAD, FACE AND NECK.

Bones of the Skull.—This illustration gives an accurate and faithful representation of the head, face and neck, surrounded by an outline of the fleshy parts as they appear in the human frame. The bones of the head, eight in number, constitute the skull, and those of the face, fourteen in number, compose a strong, har bony case, which encloses and affords a suitable protection for the brain and the four organs of special sense, *viz.:* sight, smell, taste and hearing. All of these bones are immovable, except the lower jaw, which moves by means of a hinge-joint, and permits of the opening and closing of the mouth.

Bones Seen in the Plate.—The bones of the skull observed in this beautiful plate are: the frontal, which forms the forehead or front part of the skull; the parietal, constituting a portion of the side and top of the head; the occipital, forming the lower and back part of the skull, and the temporal, which forms the lower part of the side and a part of the base of the cranium. These several bones are joined together by notched seams, after the manner carpenters call "dove-tailing."

Shape of the Skull.—The skull, as will be seen, is oval, which adapts it to the conformation of the brain, besides giving it greater resistance to pressure. The stronger and smaller end is in front, where danger is greatest to the brain, whilst the projections before and behind shield its less protected parts. The peculiar conformation and shape of the skull forms a strong shelter for the brain—an organ so delicate that if not so strongly guarded from injury, an ordinary blow falling upon it would destroy it forever.

Bones of the Face.—The bones of the face shown in this plate are the nasal bone, forming the arch of the nose, the malar, which gives prominence to the cheek, the upper jaw, containing the upper teeth, and the lower jaw, containing the under teeth.

The Spinal Column.—That portion of the spinal column noticed in the illustration consists of the cervical vertebræ. Each vertebra is composed of a body, with seven spinous processes projecting from it. The body is perforated by a ring, through which is seen running the spinal cord, giving off nerves between each separate bone. A ring of cartilage is seen inserted between each separate vertebra, the object of which is to prevent any jar reaching the brain when we run, jump, walk or stumble.

CHART II.

THE INTERNAL WONDERS OF THE HUMAN BODY REVEALED.

THE HUMAN BODY AND ITS MARVELOUS PERFECTION.

Wonderful Structure of the Body.—The human body is the highest form of animal life. It is full of beautiful proportions and divinely symmetrical in shape, form, mould and outline. We look with honest pride and glowing admiration upon the many accomplishments that man has achieved in the world around us. We see his skill displayed in the various arts and sciences, and we look with awe upon the projects of his intellect and reason, the realization of which is but a small question of time! We boast of our ships, our steamboats and our steam cars; we are justly proud of our bridges, our viaducts and the progress of our engineering skill; we grow enthusiastic over our telegraphs, our telephones, our electric lights; we feel a degree of national pride in the achievements and successes of Edison, the wizard of Menlo Park; but where, let us ask, in the whole range of events, the acquirements of arts, the accomplishments of mechanics, the achievements of architecture, the attainments of engineering, or the successes and promises of electrical sciences, can we find such another structure as the human body, that curious, yet perfect world of wonders!

Man the Most Complex Body.—It embodies an epitome of the whole universe! Man is more elaborate, more complex, more God-like, than any other living organism; more wonderful, more beautiful, more marvelous, than any work of human ingenuity, conception or construction.

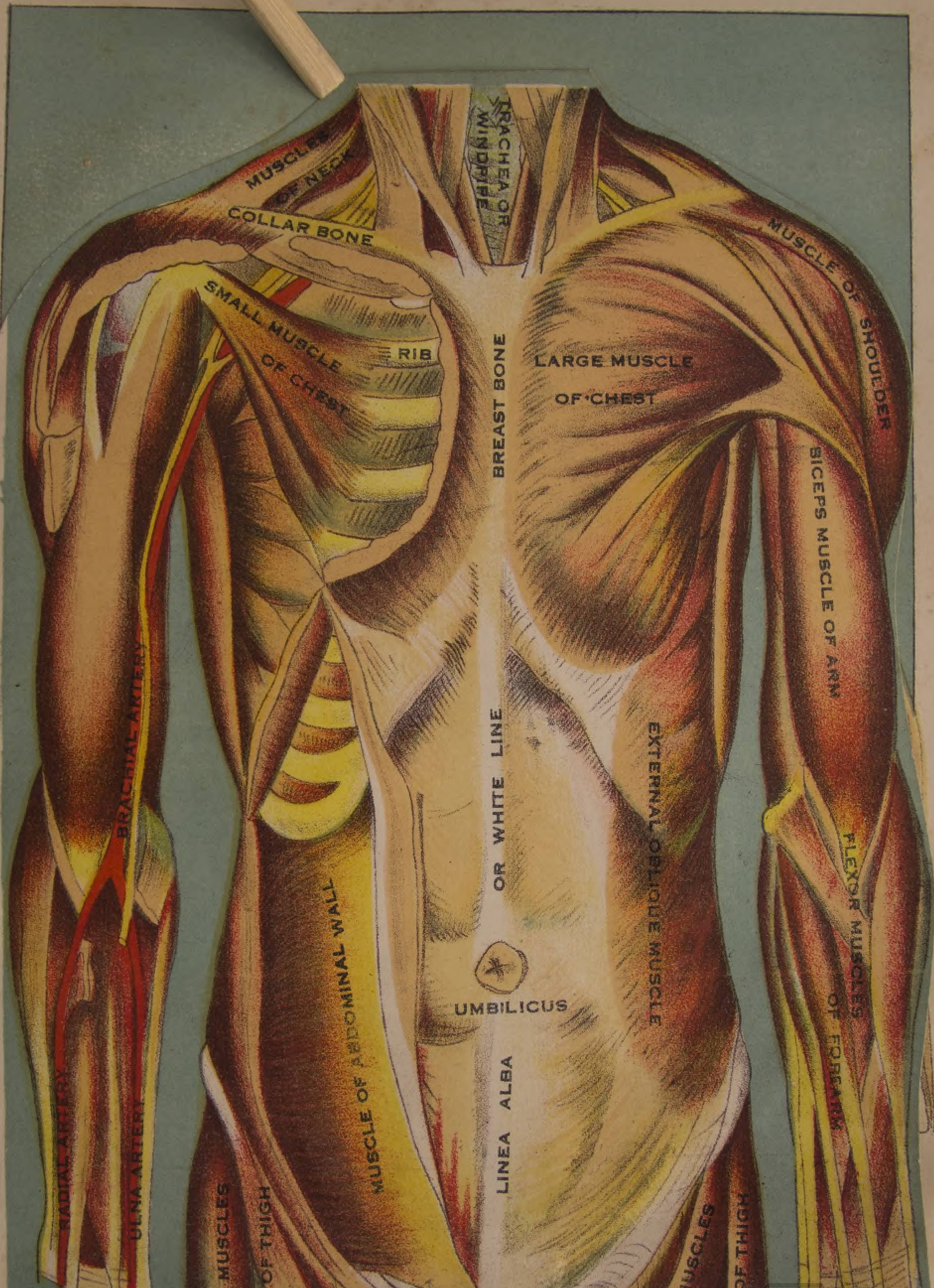
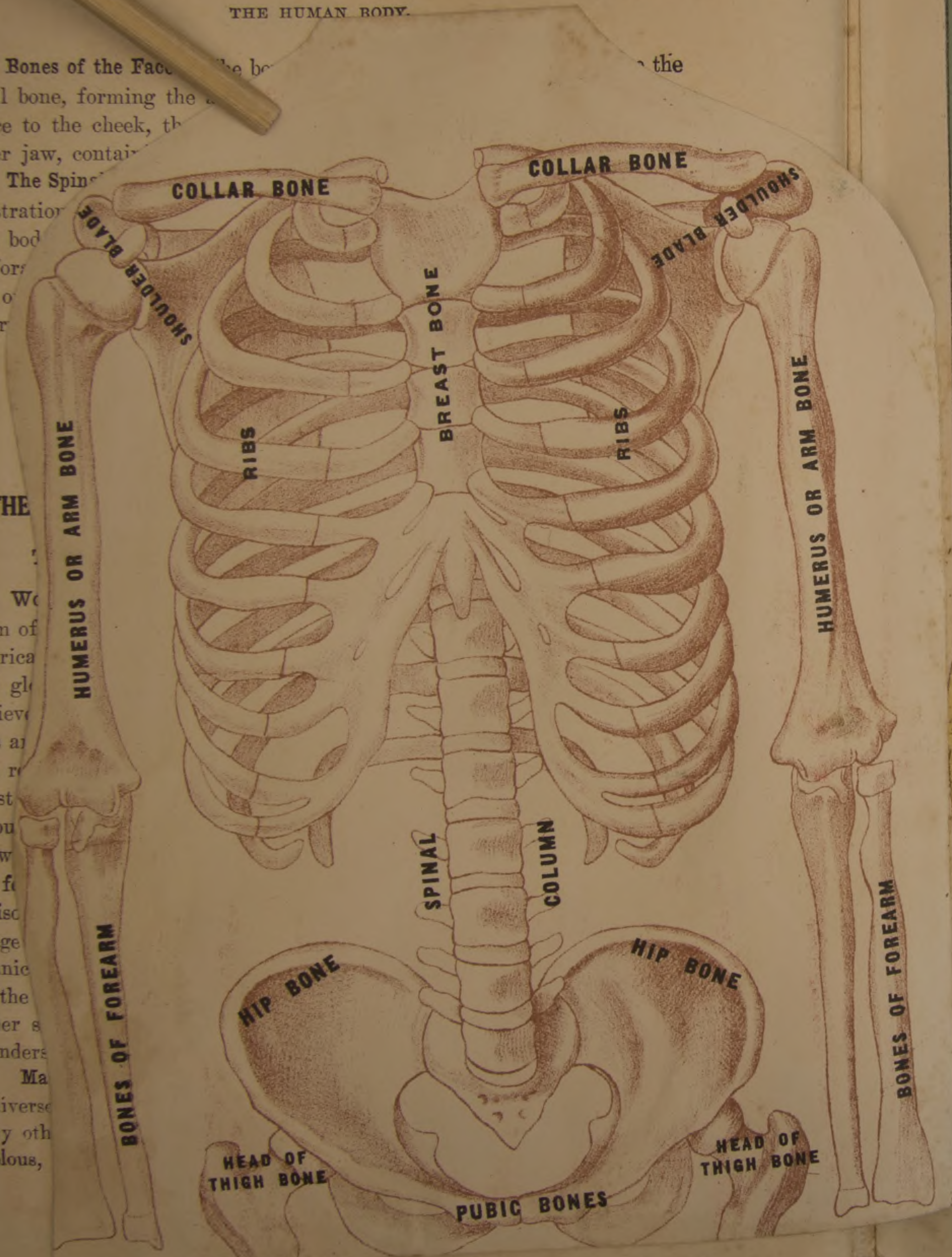

MUSCLES OF NECK
TRACHEA OR WINDPIPE
COLLAR BONE
MUSCLE OF SHOULDER
SMALL MUSCLE OF CHEST
RIB
BREAST BONE
LARGE MUSCLE OF CHEST
BICEPS MUSCLE OF ARM
BRACHIAL ARTERY
EXTERNAL OBLIQUE MUSCLE
OR WHITE LINE
FLEXOR MUSCLES OF FOREARM
MUSCLE OF ABDOMINAL WALL
UMBILICUS
LINEA ALBA
RADIAL ARTERY
ULNA ARTERY
MUSCLES OF THIGH
MUSCLES OF THIGH

CHART 2.

Bones of the Face ... the
nasal bone, forming the ...
nence to the cheek, th...
lower jaw, contai...
The Spin...
illustratio...
of a bod...
perfor...
ing o...
inser...
any

THE ...

W...
form of...
metrica...
and gl...
achiev...
arts a...
and r...
boast...
of ou...
grow...
we f...
Edis...
range...
chanic...
or the...
other s...
wonders...
Ma...
univers...
any oth...
velous,



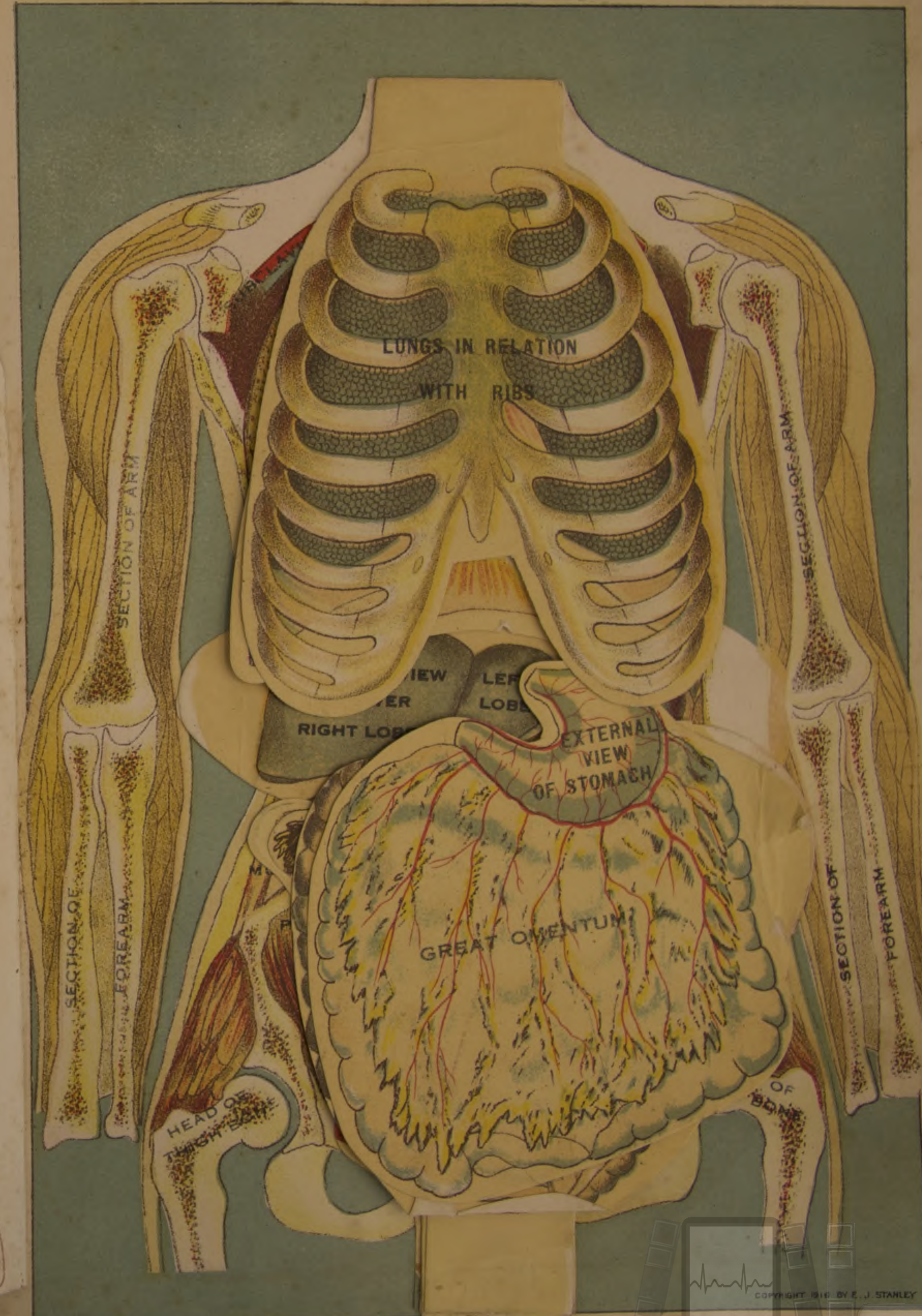
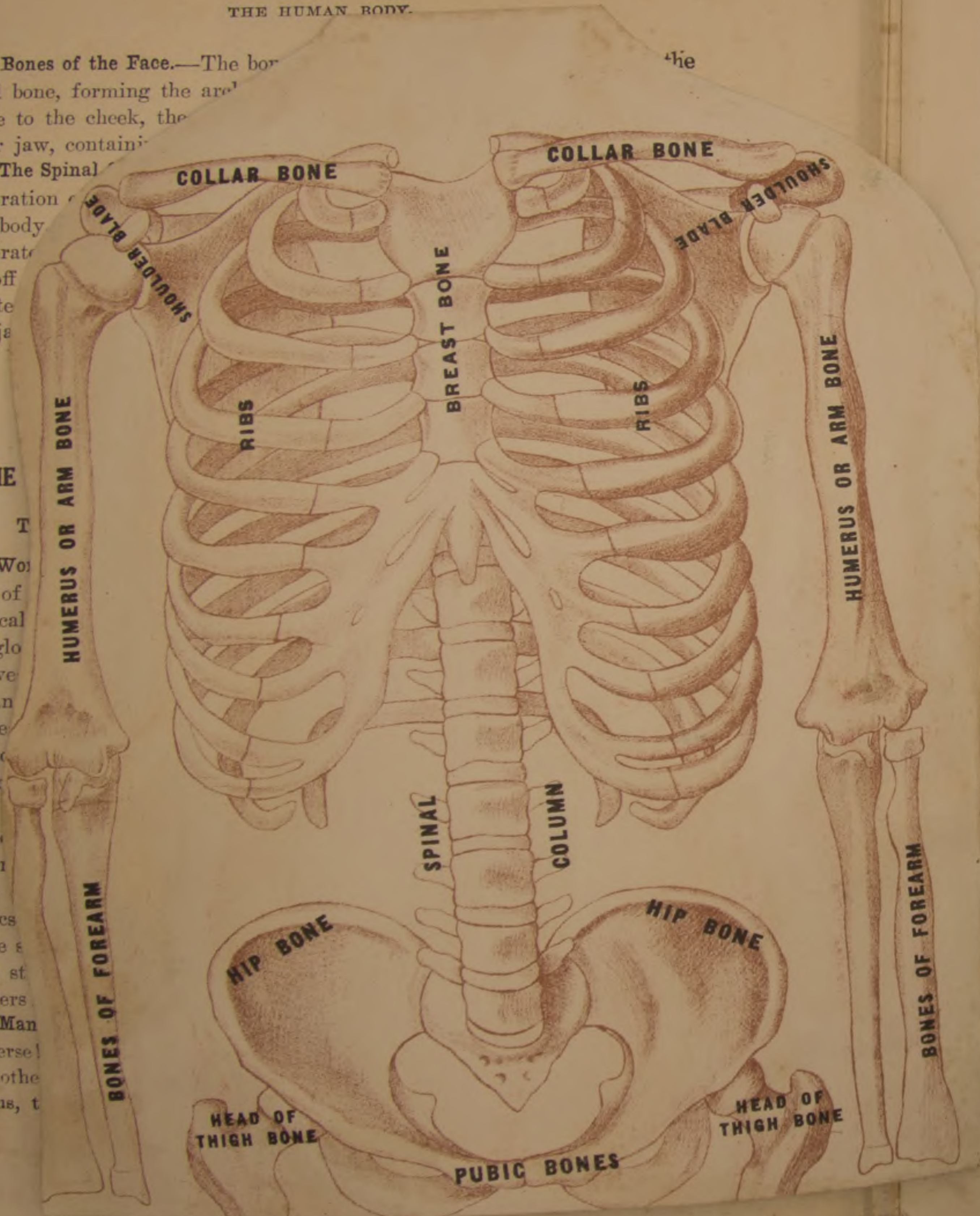


CHART 2.

Bones of the Face.—The bor … the
nasal bone, forming the ar…
nence to the cheek, the…
lower jaw, containi…

The Spinal …
illustration …
of a body…
perforat…
ing off …
inserte…
any ja…



THE …

T…

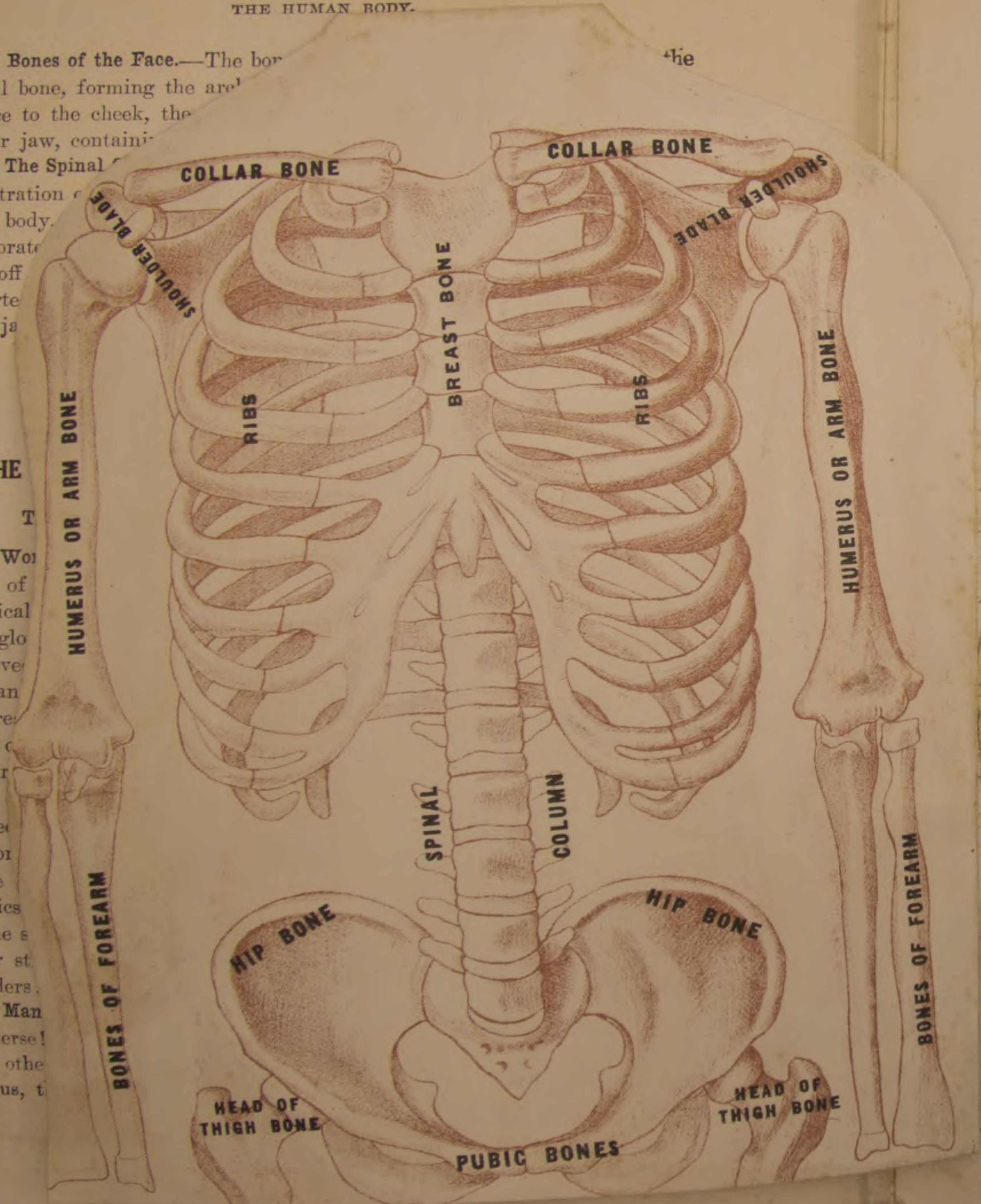
Wo…
form of …
metrical …
and glo…
achieve…
arts an…
and re…
boast …
of our …
grow …
we fe…
Ediso…
range …
chanics …
or the …
other st…
wonders …

Man …
universe…
any othe…
velous, t…

CHART 2.

Bones of the Face.—The bor ... the
nasal bone, forming the arc
nence to the cheek, the
lower jaw, containi

The Spinal ...
illustration
of a body
perforat
ing off
inserte
any ja



THE

T

Wo
form of
metrical
and glo
achieve
arts an
and re
boast
of our
grow
we fe
Ediso
range
chanics
or the s
other st
wonders

Man
universe!
any othe
velous, t

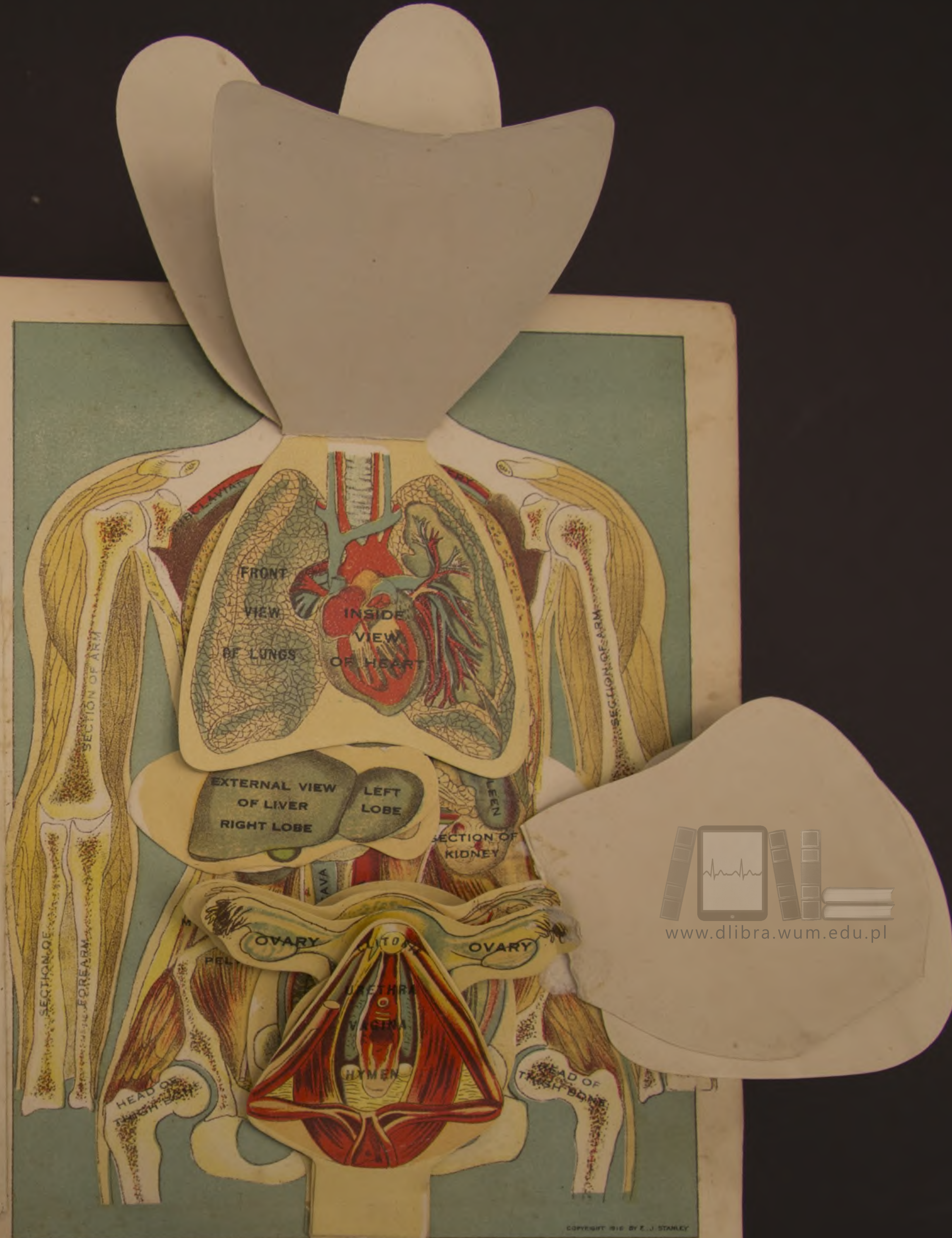
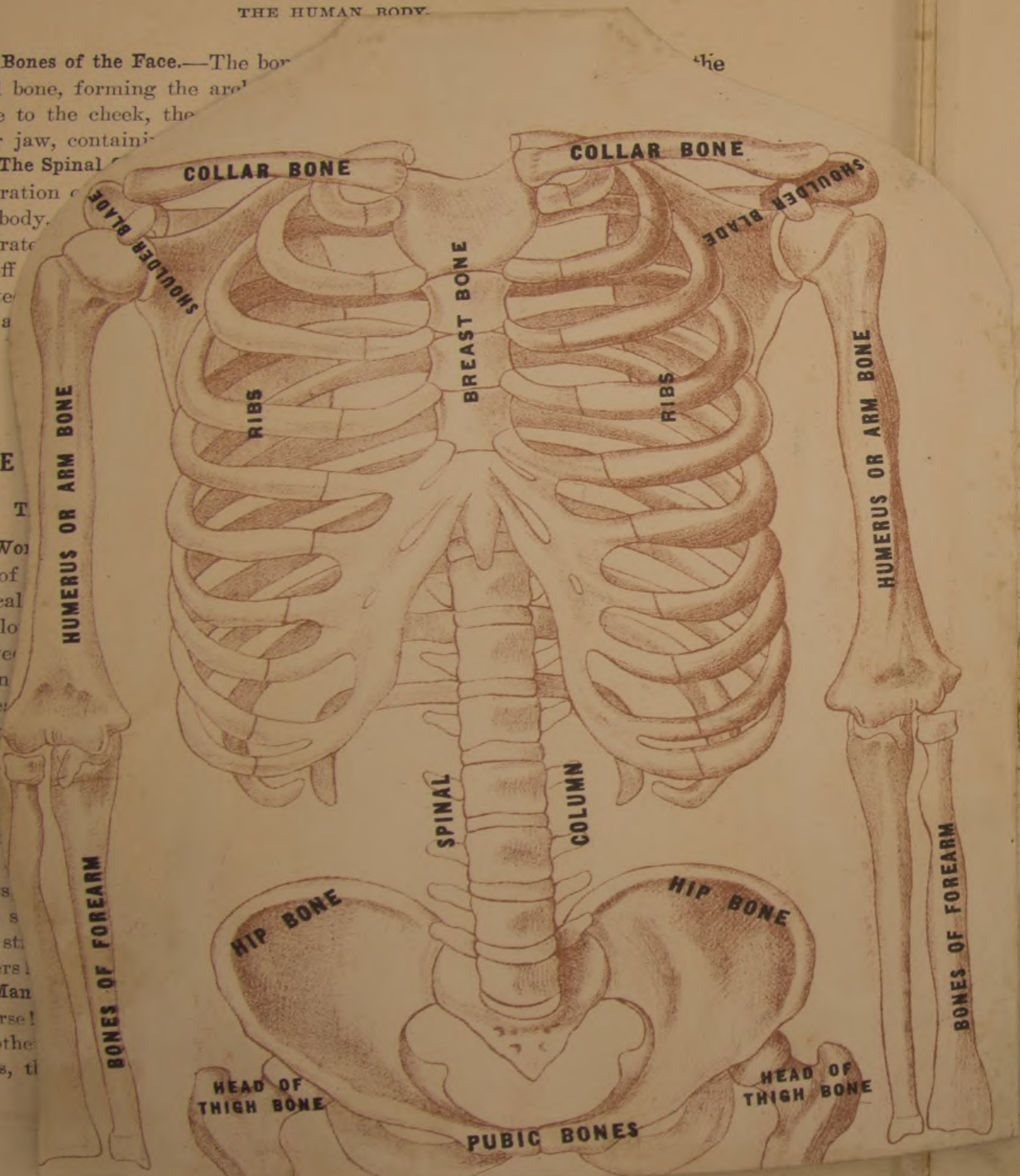
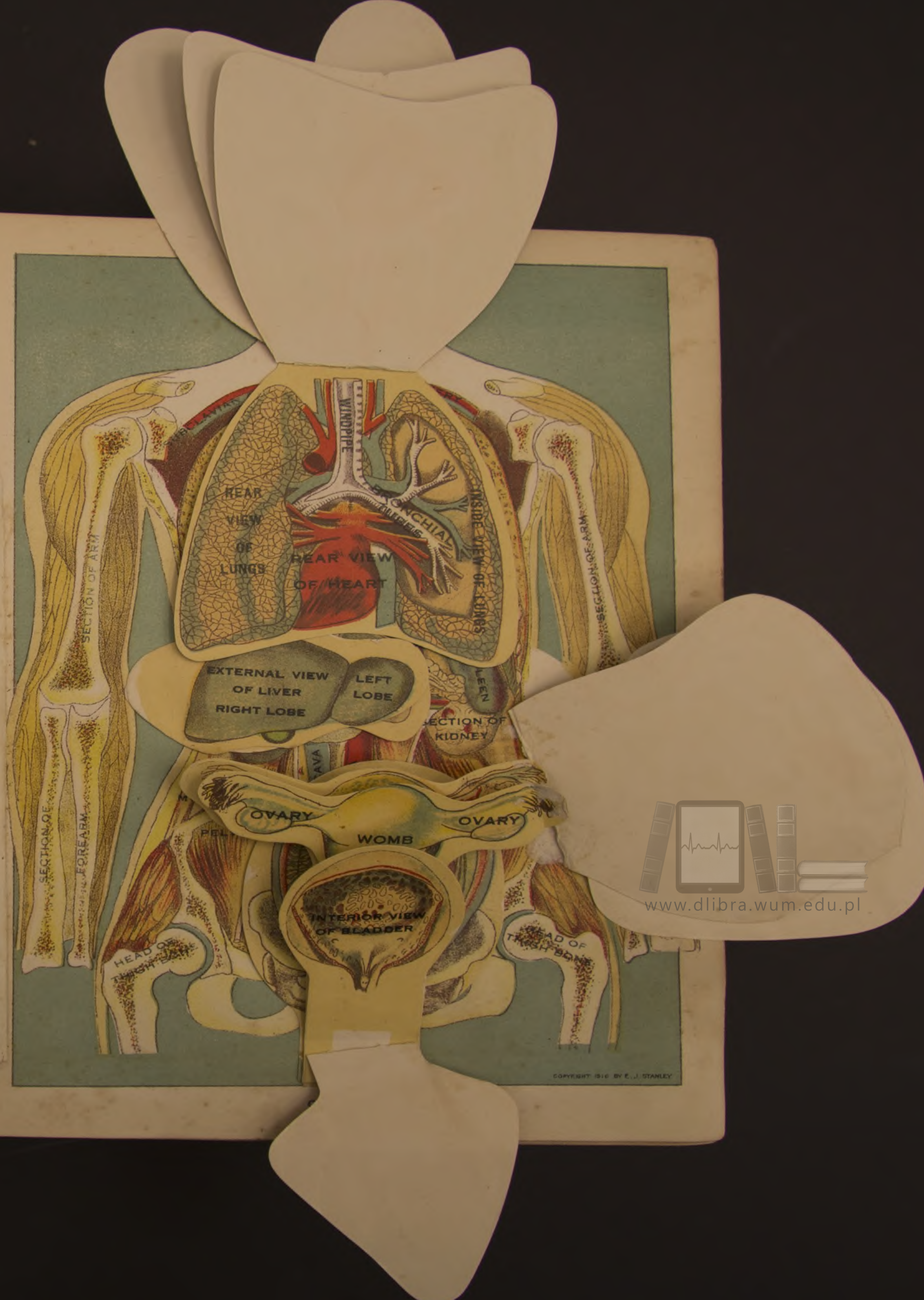


CHART 2.

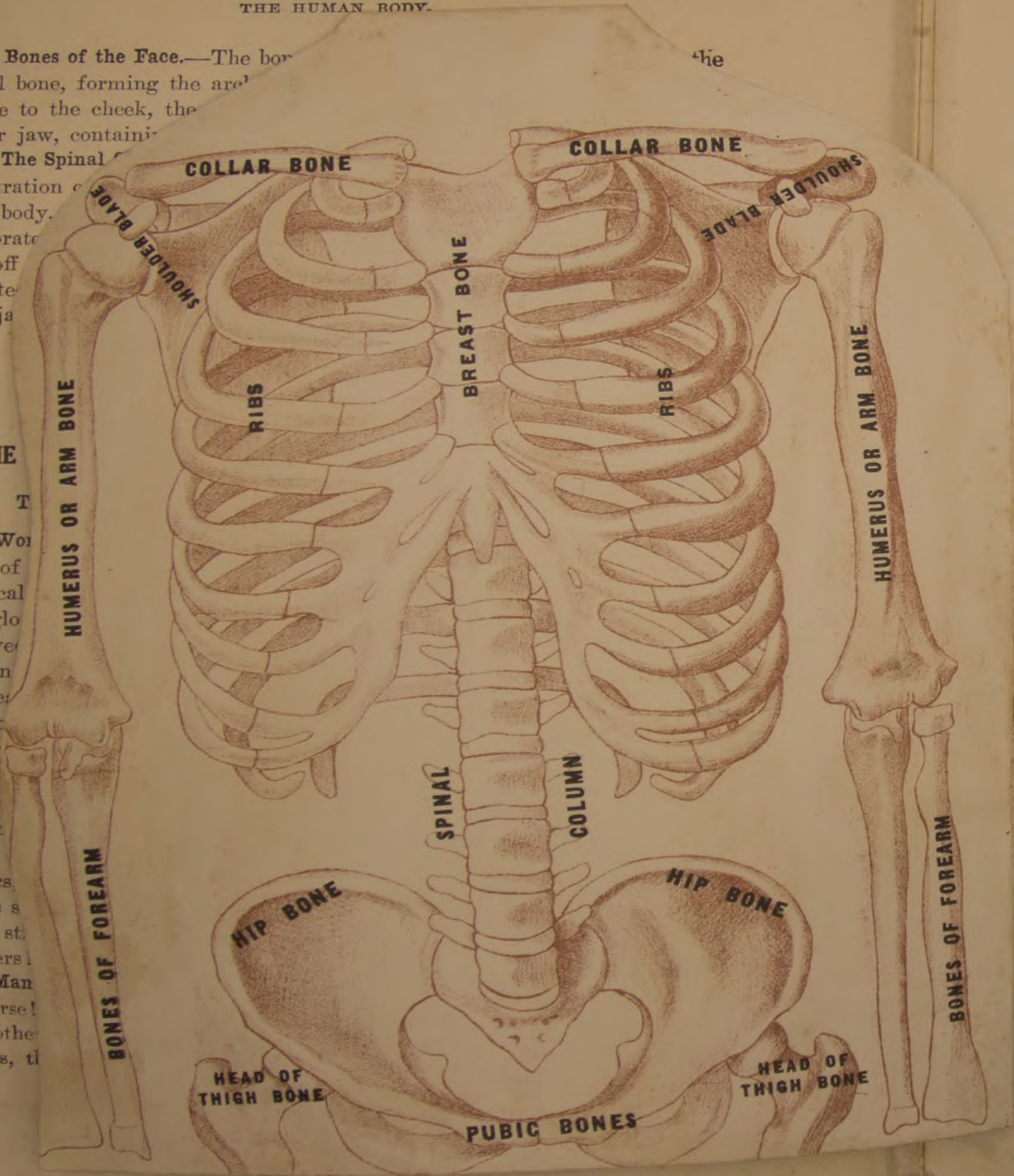
Bones of the Face.—The bo ... the
nasal bone, forming the arc
nence to the cheek, the
lower jaw, containi
The Spinal
illustration c
of a body.
perforate
ing off
inserte
any ja

THE
T
Wor
form of
metrical
and glo
achieve
arts an
and re
boast c
of our
grow c
we fe
Edison
range
chanics
or the s
other st
wonders
Man
universe!
any othe
velous, t



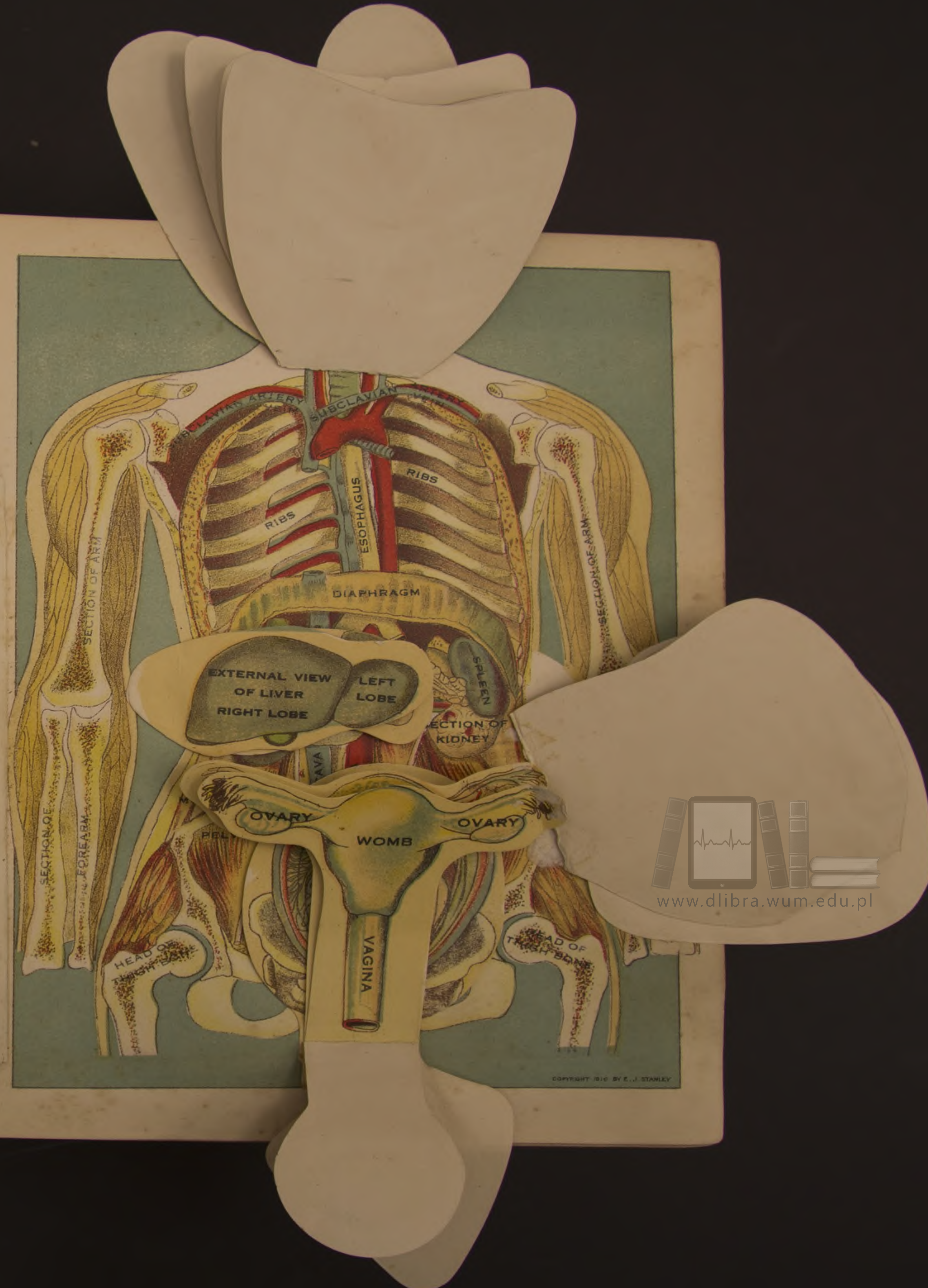


Bones of the Face.—The bon … the
nasal bone, forming the arc…
nence to the cheek, the
lower jaw, containi…
The Spinal C…
illustration c…
of a body.
perforate…
ing off
inserte…
any ja…



THE …

T…
Wo…
form of
metrical
and glo…
achieve…
arts an…
and re…
boast …
of our
grow …
we fe…
Edison
range
chanics
or the s…
other st…
wonders
Man
universe!
any othe…
velous, th…

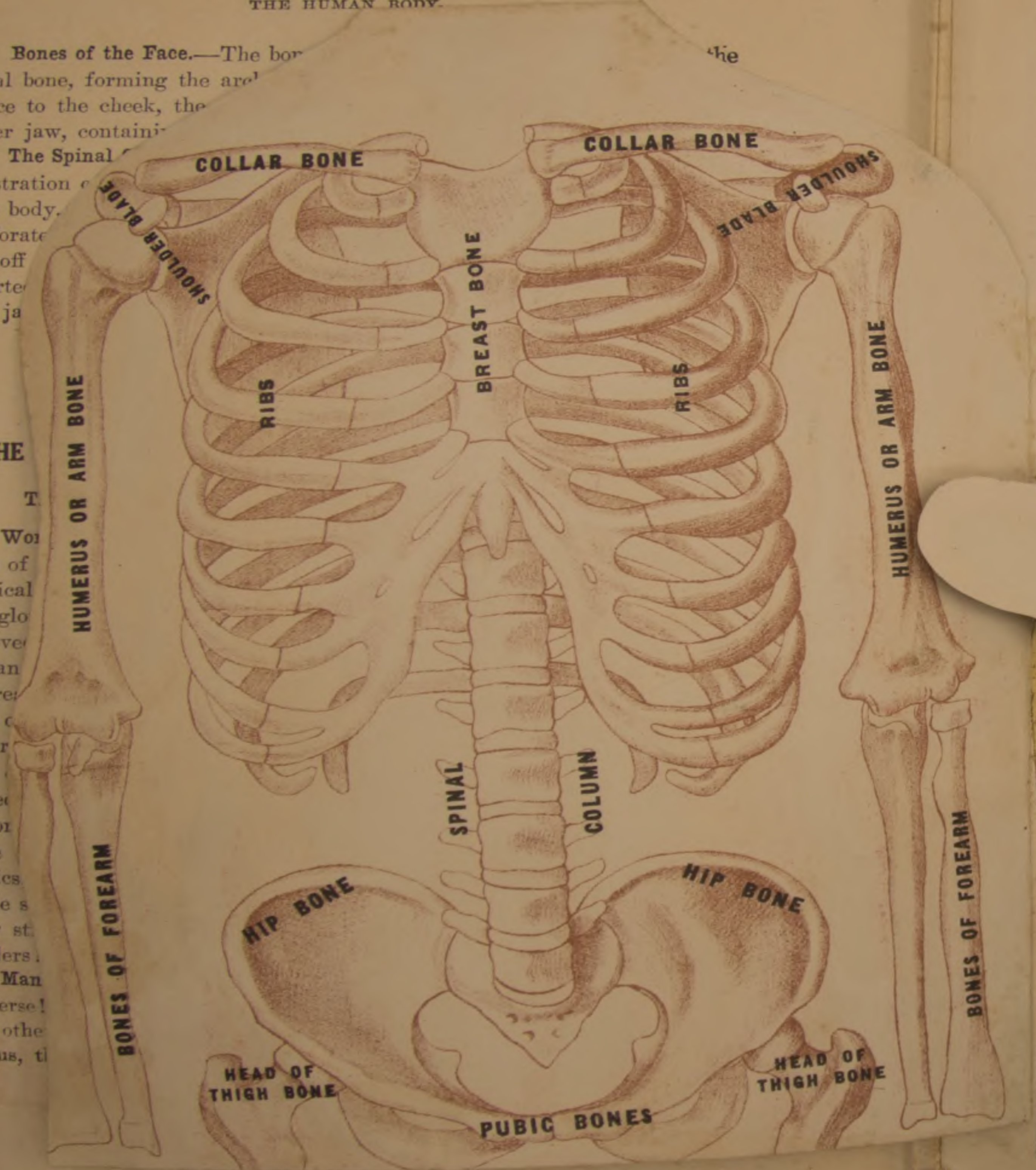


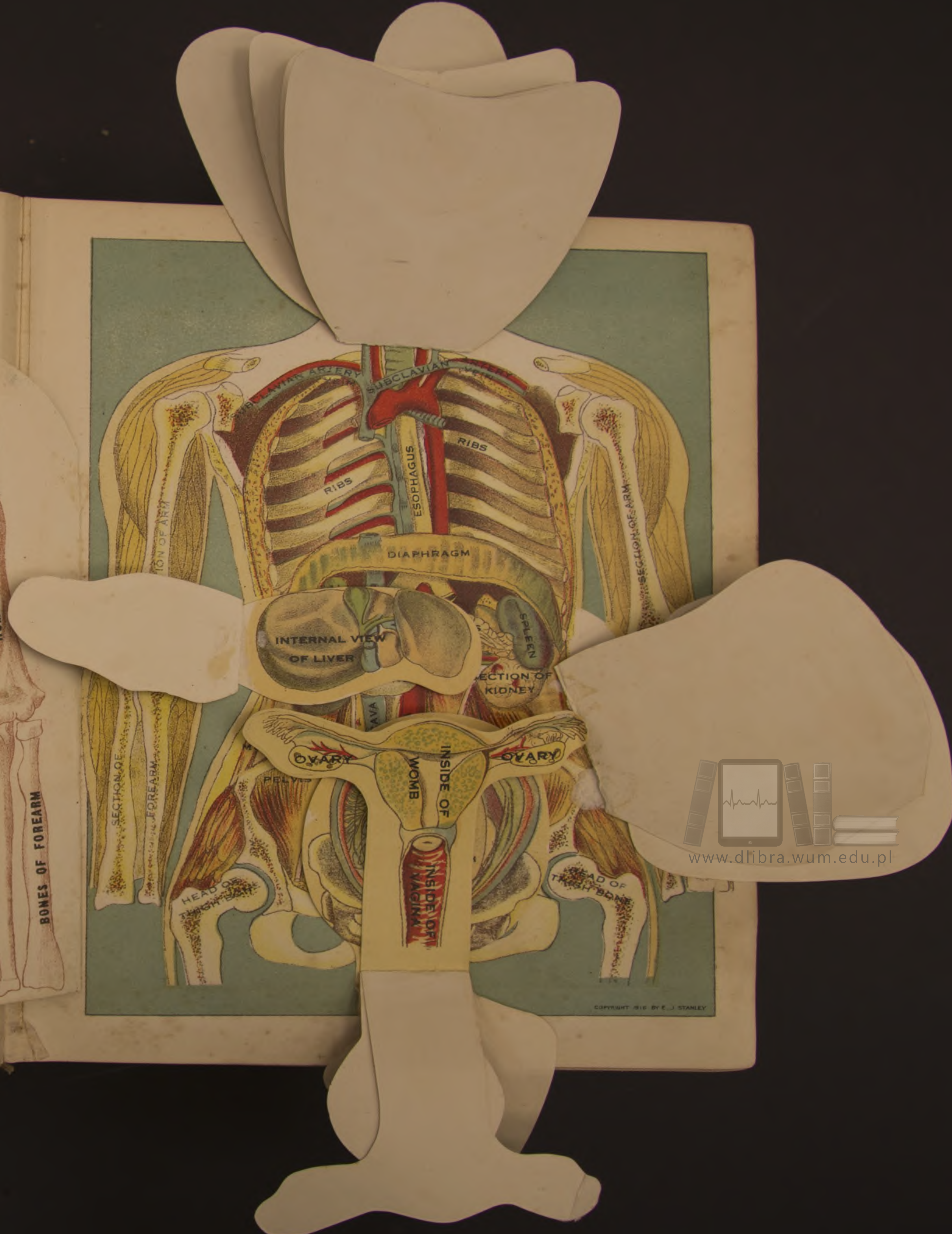
Bones of the Face.—The bon… the
nasal bone, forming the arc…
nence to the cheek, the…
lower jaw, containi…
The Spinal …
illustration c…
of a body…
perforate…
ing off…
inserte…
any ja…

THE …

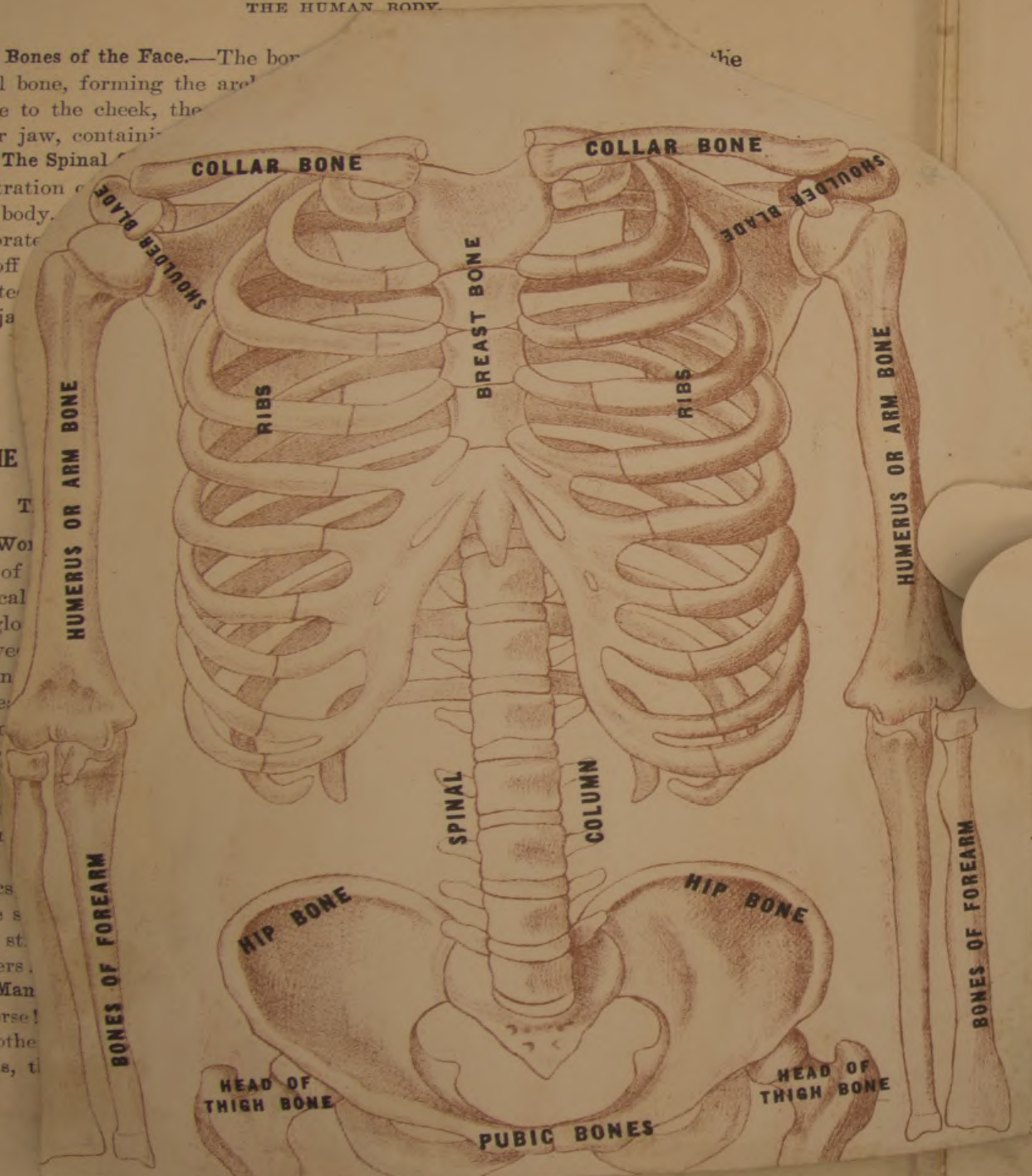
T…

Wo…
form of
metrical
and glo
achieve
arts an
and re
boast c
of our
grow
we fe
Edison
range
chanics
or the s
other st
wonders
Man
universe!
any othe
velous, t





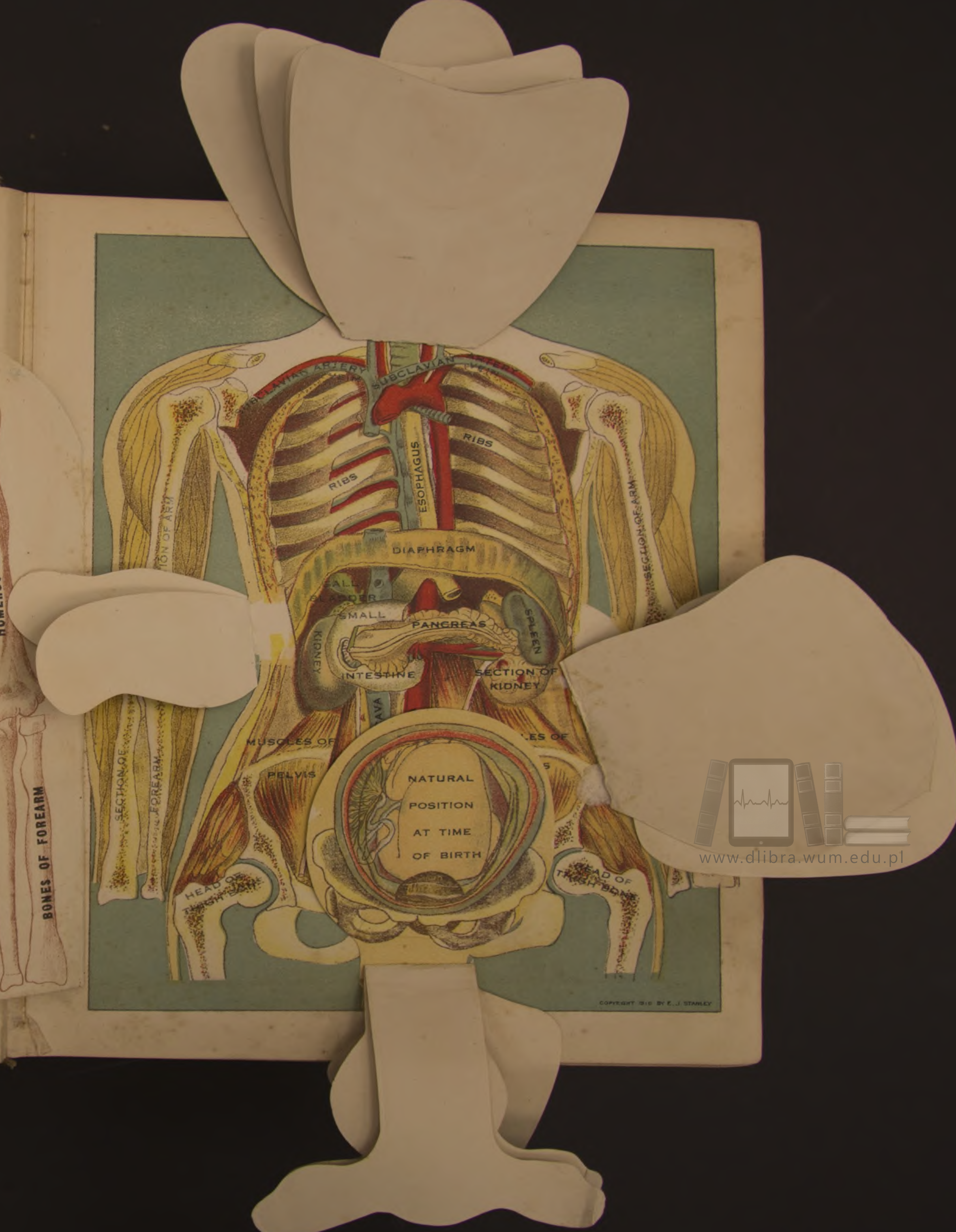
Bones of the Face.—The bon … the
nasal bone, forming the arc
nence to the cheek, the
lower jaw, containi
The Spinal
illustration c
of a body.
perforate
ing off
inserte
any ja



THE

T

Wor
form of
metrical
and glo
achieve
arts an
and re
boast c
of our
grow
we fe
Edison
range
chanics
or the s
other st
wonders
Man
universe
any othe
velous, t



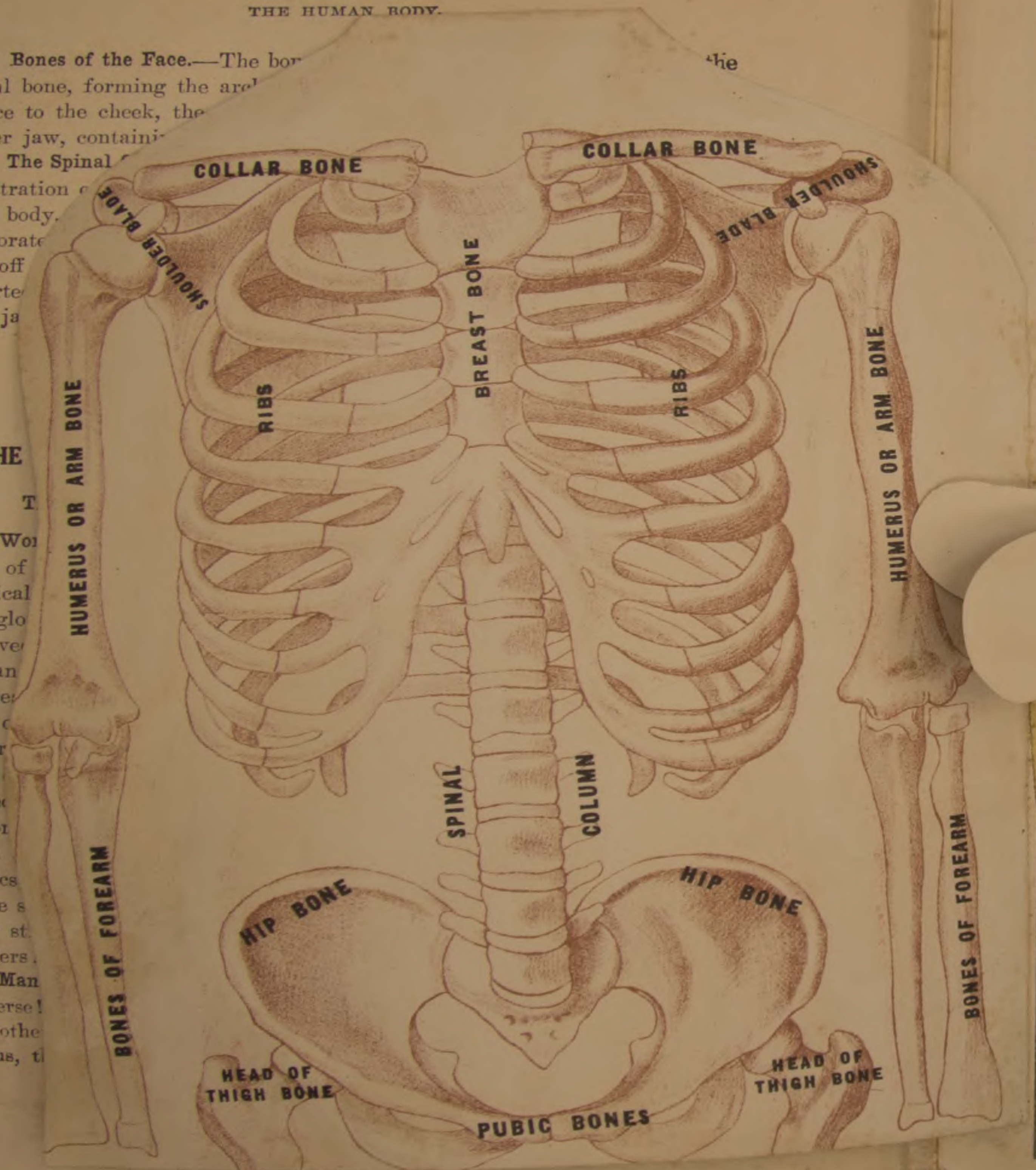
Bones of the Face.—The bo[...] the
nasal bone, forming the ar[...]
nence to the cheek, the[...]
lower jaw, containi[...]
The Spinal [...]
illustration [...]
of a body. [...]
perforat[...]
ing off [...]
inserte[...]
any ja[...]

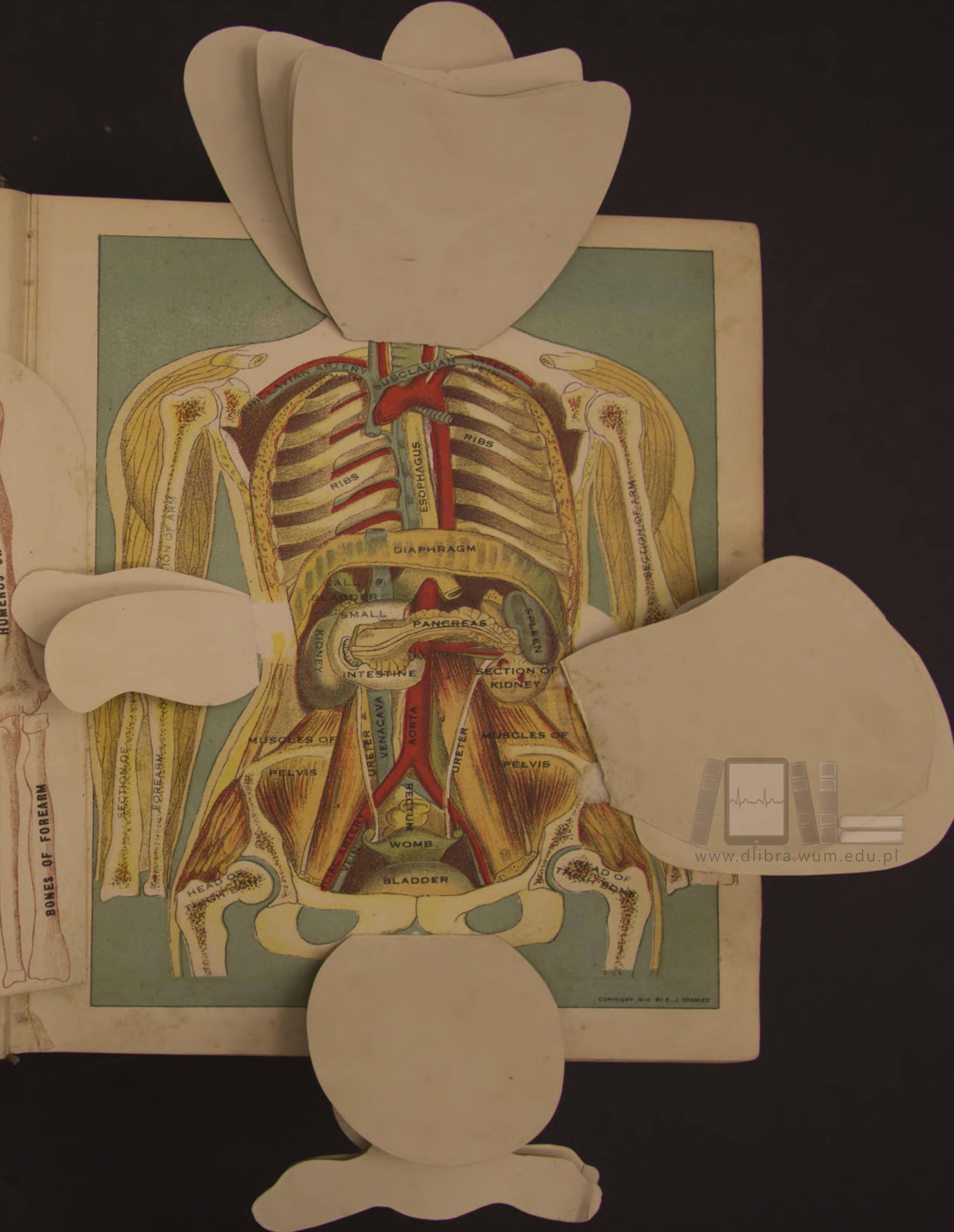
THE [...]

T[...]

Wo[...]
form of [...]
metrical [...]
and glo[...]
achieve[...]
arts an[...]
and re[...]
boast [...]
of our [...]
grow [...]
we fe[...]
Edison [...]
range [...]
chanics [...]
or the s[...]
other st[...]
wonders [...]

Man[...]
universe! [...]
any othe[...]
velous, t[...]





Indeed, the mechanism, the skill and the workmanship displayed in the human body is simply perfection itself. In conception, it is divine; in design, perfect; in architecture, grand; in construction, wonderful; in beauty, lovely; in form, symmetrical; in outline, sublime; in strength, great; in arrangements, marvelous; in mobility, transcendant; in adaptability, unexcelled; in fine, when studied in all its parts and their relationship to each other, we are led to exclaim with the Psalmist David, that the human body is "fearfully and wonderfully made."

Man the Most Complete Body—The all-wise Creator, when He first made man, made him perfect. He formed every organ of the body with direct reference to the function to be performed. Every bone, muscle, nerve, organ and tissue formed in the construction of this wondrous organism is made of the right kind of material; is of the proper form and size; placed in the right position to subserve best the purpose for which they were individually and collectively designed, and to perform the peculiar duties assigned to each. We cannot talk with the ears, smell with the eyes, see with the nose, nor walk with the tongue. We cannot think with the lungs, nor breathe with the brain. The stomach was not designed to propel the blood over the system, nor the heart to digest food.

The Complete Organs and Structures.—The muscles which give form and shape to the body would be powerless instruments of movement if devoid of the bones of the skeleton. Thus we see that every organ and structure was formed with direct reference to the accomplishment of a certain definite object. Hence, the bones form a frame work, to protect the delicate organs of mind, respiration, circulation, digestion and excretion, to serve as levers on which the muscles may act to produce motion, and to preserve the form and shape of the body; the muscles, such as we observe in this plate, give form, shape and symmetrical proportions to the body, and produce its varied motions; by means of the brain we think, feel and act; the nerves of the eye take cognizance of external objects, and convey their impressions to the brain; the auditory nerve distinguishes sounds; the olfactory nerve identifies and separates the different odors brought into contact with it, and the sentient nerves of the skin are fully impressed with the touch of external objects, carry the impression of their character and size to the brain, and the motor nerves carry the commands of the will to the muscular system, that the behests of the mind may be obeyed and carried out; the heart receives the impure blood from all parts of the body, and sends it to the lungs to be purified, then receives it back again and forces it with enormous power even unto the most remote and minute part of the system; the arteries and veins are made for the express purpose of conveying the "pabulum of life" from the heart, and to carry the vitiated and poisonous fluid to the heart; the lungs throw off the carbonic acid in the venous blood and replace it by oxygen; the stomach, by and with the aid of the salivary, biliary, pancreatic and intestinal juices, digests the food and transforms it into blood; the kidneys are designed as filters, to aid in the purification of the blood, thus we observe that the various tissues and organs of the body have each their own especial use in the human economy, and their exact and definite function to perform; and as a result of the sum total of the proper required performance of all these different functions, we have not only harmony and health, but happiness of mind, soul and body as well.

MUSCLES OF THE TRUNK OF THE HUMAN BODY.

Muscular Arrangement and Blood Supply.—In this exquisite and magnificent colored engraving we have a grand view of the wonderful arrangement of the muscles of the trunk of the human body, together with the muscular arrangement of the arms and likewise their blood supply. The trunk of the body is divided into two compartments—the thorax and abdomen.

The Thorax.—The thorax derives its name from the Greek word *thoreo,* and signifies "I leap," because the heart leaps in it. It is covered on the front part by large muscles; the pectoralis major, or large muscle of the breast, is observed on the left side of the chest, whilst on the right it is removed and exposes the pectoralis minor, or small muscle of the breast. The dove-tailed muscle observed on each side is the serratus magnus, and is employed in expanding and contracting the chest in the act of breathing. The muscles of the chest walls, in a deep inspiration, exert a force equal to lifting a weight of 750 pounds.

Walls of the Abdomen.—The muscular walls of the abdomen are nicely arranged and beautifully adapted to the functions they perform. On the left side we see the large oblique muscle, so named because of the direction its fibres run, and on the right side we observe the rectus muscle, the transverse muscle and internal oblique muscle, all of which are strong, broad muscles, whilst the manner in which they are so scientifically arranged gives additional strength to the abdominal walls, without deteriorating from its great mobility, and at the same time avoiding all pressure of the organs contained within this large cavity. There are ninety-one muscles on each side of the trunk, or one hundred and eighty-two in all, ninety of which are pairs, and two are single.

Muscles of the Shoulder.—The large triangular muscle of the shoulder—the deltoid—is one of great strength, as in fact are all the muscles of the arm. If you grasp the arm tightly just above the elbow-joint, and then bend the fore-arm, you will feel the biceps muscle of the arm become firm, hard and prominent; now straighten it again and it becomes relaxed, whilst the muscles on the back of the arm become hard and prominent. The muscles of the fore-arm are the flexors and pronators; that is, they flex the arm and turn the palm downward. In each upper extremity or arm there are fifty-three muscles, and we observe here the nicest and most economical method of packing away the muscles that could be improvised, securing strength, giving elegance to its form and shape and facilitating its mobility.

Blood Supply of Arm.—On the right arm we obtain a glimpse of the blood supply of the arm; we see the brachial artery giving off numerous branches, and observe the radial and ulnar arteries doing the same thing; thus securing ample nourishment to preserve the health, strength and beauty of the arm.

BONES OF THE TRUNK AND ARMS.

Different Forms of Bones.—On turning over this flap we are brought face to face with a grim looking but useful object—the frame work of the trunk and arms. The skeleton is of a ghastly appearance and emblematic of death; its unsightly look sends a thrill of horror through us, and we instinctively recoil from it. Yet it subserves a useful purpose in the human body, and the ugly looking bones, when carefully examined, abound in nice contrivances and ingenious workmanship; whilst each individual bone is designed for the especial duty it has to perform. Hence the bones differ in form; some are long, as in the arms and legs; some are short and thick, giving strength and compactness, as in the lumbar portion of the spine; some are flat, for covering a cavity, as the skull and pelvis, and others used for a special purpose are irregular, as in the hands and feet.

Combined Lightness and Strength.—But notwithstanding this diversity in form, the general plan constantly kept in view by the Divine Architect has been the central idea of combining lightness with the greatest possible degree of strength. The bones of the arms and legs are round, or triangular, and hollow, thus giving with the same weight a greater degree of strength than if solid, besides affording a larger surface for the attachment of muscles.

Composition of the Chest.—The chest is composed of bones, cartilages and ligaments. Its natural form is that of a cone diminishing upward; and it affords lodgment for the heart, lungs and large blood-vessels. Its walls are formed posteriorly by the seven dorsal bones of the spinal column, and the ribs as far as the angle, the sides by the body of the ribs, and front by the ribs, the costal cartilages and the breast bone.

The Ribs.—The ribs are twenty four in number, arranged in pairs, twelve on each side of the chest. At the back they are fastened to the spine, and in front the seven upper pairs are tied by cartilages to the breast bone, three are fastened to each other and the cartilage above, and two, the floating ribs, are loose. The long, slender ribs give lightness; their arched form confers strength, and the cartilages impart elasticity; thus the three most essential pre-requisites of the chest for the protection of the delicate organs contained within this cavity are secured, whilst the freest motion in respiration is ensured.

The Pelvis.—The pelvis is an irregular-shaped basin, formed by the hip bones and the pubic bones in front. In the upper and back part is the foot of the spinal column, consisting of a wedge-shaped bone called the sacrum. It is observed firmly planted between the wide spreading hip bones of the pelvis, like the keystone of an arch, and gives a strong support to the burden above.

The Spinal Column.—The spinal column, the lumbar portion of which is here seen, consists of twenty-four bones, between which are placed pads of cartilage. Such is the elasticity of these cushions of cartilage, that, though they become condensed through the day, making us shorter in the evening than in the morning, they resume their normal thickness while we are lying in bed at night. The perfection in the architecture of the spine surpasses belief; its various uses seem a bundle of contradictions.

Bones of the Spinal Column.—The twenty-four bones of which it consists are so stiffly locked together as to form a chain that will bear and support the heaviest of burdens, yet so flexible that it will bend like India rubber; within this wondrous column hides a delicate nerve that would thrill at the gentlest touch, yet so securely does it rest in its bony couch that it feels not the slightest jar or shock; and resting upon this remarkable pillar of bones is borne the brain, without a tremor or a fear of danger; to it are found clinging the vital organs of the chest and abdomen, secure in the protection it affords.

The Shoulder Joint.—The shoulder joint, formed as it is by the shoulder-blade (scapula), collar bone (clavicle), and the arm bone, is most beautifully designed and executed. It comprises a shallow ball and socket-joint, thus affording the freest rotary movements. The shallowness of the socket, however, accounts for the frequent dislocations of this joint; but that is compensated for by the easy, graceful carriage and swing of the arm, which a deeper socket would not permit.

The Collar Bone.—The collar bone is fastened at one end to the breast bone and first rib, and at the other end to the shoulder blade. It thus holds the shoulder-joint out from the chest, aids in protecting the important vessels of the axilla, and gives the arm a greater range of freedom, mobility and play.

THE LUNGS; THEIR MECHANISM AND WONDERS.

What the Lungs Are.—The lungs! Dense looking objects, and yet how light and buoyant! This beautiful anatomical chart shows us a front view of the chest and lungs, with the lungs enclosed within the bony basket-work of the chest. The lungs are two large, conical bodies, placed one on each side of the chest, and occupy the greater part of its cavity. During life they accurately adapt themselves to the varying dimensions of the chest; for, unhappily, the foibles of fashion very frequently cause restriction of the lungs, by interfering with the resistance and freedom of movement of the ribs, so essential to health, by tight lacing and the barbarous usage of corsets.

Pleura of the Lungs.—In this chart we see also the pleura or the investing membrane of the lungs, and right below it the diaphragm or midriff.

Two Distinct Lungs.—Although the lungs are two in number, as far as their structure is concerned, and are perfectly distinct from each other, having, as we observe in the chart underneath this one, the heart and blood-vessels between them, yet as regards their functions they may be considered the same, since they receive their blood from a single vessel, the pulmonary artery, and the air by one canal, the trachea or wind-pipe, and act in common with each other.

Size and Shape of Lungs.—As will be observed, the lungs are not quite the same size or shape; the right lung, although somewhat shorter and thicker than the left, is the larger and stronger, being divided into three lobes; whilst the left is the smaller and weaker, divided into two lobes only, and hence more frequently subject to disease.

Weight and Shape of Lungs.—The weight of the lungs varies very much; but in general they average about forty-two ounces in the male;

thirty-six in the female; the right lung being about two ounces heavier than the left. Each lung is conical in shape, with a broad concave base resting on the convex surface of the midriff, the apex directed upward and extending into the root of the neck about one inch above the level of the first rib.

Interior Arrangement of Lungs.—On turning this flap over we find a vertical section of the lungs, showing their interior arrangements. The lower end of the trachea divides, one portion going to each lung. These again subdivide and continue to subdivide in geometrical order, growing smaller and smaller with each division, and extending to every part of the lungs, finally terminating in a cluster of air cells, bound together by cellular tissue and forming a lobule. These lobules vary in size accordingly as they are located on the surface of the lung or deeper in its tissues. Each lobule is separate and distinct from the other, and forms in itself a perfect and independent lung in miniature.

Function of the Lobules.—In this arrangement we see the boundless wisdom of the Creator displayed, for were it not for this wise and perfect provision—one of the very greatest importance in the process of respiration, since it enables each individual lobule to perform its functions independently of the rest—tubercular disease, bronchitis and inflammation of the lungs would not only be incurable, but would prove to be very rapidly fatal.

Lung Air Cells.—Each air cell varies in size from the seventieth to the one two-hundredth part of an inch in diameter. The number of air cells in the two lungs is truly surprising, there being certainly not less than 600,000,000, though according to Dr. Addison's computation there are 1,700,000,000, equivalent to 1,500 square feet of surface on which the process of purifying the blood is constantly and continuously going on in a healthy lung.

Blood-vessels.—On the next flap we have a graphic illustration of the internal arrangements of the blood-vessels of the lungs and bronchial tubes. The pulmonary artery, arising from the right ventricle of the heart, conveys the venous blood to the lungs. It penetrates the lungs and divides and subdivides into branches, which accompany the bronchial tubes and terminate in a dense capillary net-work upon the walls of the air cells, where the blood undergoes that magical change, giving up its poisonous qualities and becoming revivified and healthful.

Pulmonary Veins.—From this net-work of arteries and air cells the radicles of the pulmonary veins arise, and, coalescing into larger and larger branches, at length accompany the arteries and return the blood to the left auricle of the heart in a purified condition. The pulmonary arteries and veins differ from the same vessels in other parts of the body, since the former conveys venous blood, and the latter arterial blood.

Breathing.—Respiration, or the act of breathing, consists of the alternate inspiration and expiration of air to and from the lungs; in the process of which the lungs themselves are almost passive instruments, since their contraction and expansion takes place by means of the muscles which surround the chest. The diaphragm or midriff, which, when at rest and the lungs empty, forms a beautiful dome to the abdominal cavity, becomes depressed during the inspiratory process, and presses the walls of the abdomen outward. At the same time the ribs become elevated, thus increasing the size of the chest. Thereupon the elastic lungs expand to occupy the entire space, whilst the current of air, in obedience to a well-known physical law, rushes down the wind-pipe and enters the numerous air-cells, the result of which is *in*spiration. In expiration the reverse of this takes place. We bend forward, draw the abdominal walls inward, press the diaphragm upward, whilst the ribs are pulled downward. All these acts simultaneously performed decrease the size of the chest, and force or expel the air from the lungs.

Breathing Capacity of Lungs.—The breathing capacity of the lungs bears a close correspondence to the stature of man. For an ordinary-sized man of about five feet eight inches in height, it will be 230 cubic inches, or about one gallon of air, and for each additional inch in stature up to six feet, there will be an increase of eight cubic inches. In a forcible expiration all the air in the lungs is not expelled; there still remains behind 100 cubic inches. Thus, with this unexpelled air, the breathing capacity of an ordinary-sized man is about 330 cubic inches, or equivalent to 11 pints of air. Of the 230 cubic inches, 100 can only be forced into the lungs by the exercise of great effort, and is available for emergencies, as striking a heavy blow, or for the purpose of training, as in singing, rowing, running, climbing, etc.; but the extra amount of air always on hand in the lungs is of great value, since it enables the lungs to perform their functions continuously, even under severe and violent exertions.

Giving Up of Oxygen.—The atmospheric air laden with its life-sustaining property, oxygen, having passed into the lungs, gives up that vital element and receives in its place the carbonic acid gas, water, and other refuse materials which the blood has picked up in its journey through the body, and which are no longer fitted to circulate in the blood and preserve the vitality of the body. No tonic invigorates so well as a few, deep, full inspirations of pure, cold air.

Circuit of the Blood.—The blood thus purified passes back to the heart to go on its circuit through the body, every organ of which renews its energy and vigor from the magician's fiery wand, pure, healthy blood; while the air exhaled carries off the impurities.

Change in Color of the Blood.—During this process the blood changes from a dark purple to a bright red. Pure air is the cheapest necessity and the greatest luxury of life. Let it not be the rarest. The relative proportion of the respirations to the pulsations of the heart is about 1 to 4½ or 5; and the quantity of air required to keep the blood pure is very great. Indeed, respiration is the falling weight, the bent spring, which keeps the clock of life in motion; the inspirations and expirations are the strokes of the pendulum which regulate it.

Delicacy of the Organs.—The perfection of the organs which carry on this stupendous office challenges our warmest admiration. So delicately are they arranged that the slightest pressure will cause intense pain, yet tons of air surge to and fro through their intricate passages, and bathe their innumerable cells without our knowledge, so to speak, of its coming and going. We annually perform over 8,400,000 acts of breathing, inhale over 150,000 feet of air, and purify nearly 4,000 tons of blood! This gigantic and unburdensome process goes on constantly, never wearying or worrying us when in robust health, and we are struck dumfounded with amazement when the cold calculations of science reveal to us its magnitude and marvelousness.

Second Use of Breathing.—Nor is this stupendousness all. Nature dislikes a waste of energy. In addition to and by a wise adaptation and economy, the process of respiration is made to subserve a second use no less important than that of purifying the blood—the power of speech. The exhaled air, laden though it may be with the human detritus and off-scourings of the body, in passing through the vocal organs can be transformed into prayers of faith, songs of hope and words of good cheer, kindly encouragement and expressions of love!

THE HEART AND ITS WONDERS.

What the Blood Is.—The blood—the pabulum of life—has not inaptly been termed "Liquid Flesh." But it is more than that, since it contains the materials so essential and so requisite for the building up and repair of every organ and tissue of which the body is composed. The blood is the liquid by means of which the circulation in the body is carried on; it permeates every nook and corner of the system, and is composed of a thin, colorless fluid, the *plasma,* filled with red disks, so small, flat and thin that it requires 3,500, placed side by side, to measure one inch, and no less than 18,000, placed one upon the other, to make a column one inch in height. These disks are continually forming and as constantly dying.

Coagulation of the Blood. According to Dr. Draper, of New York, 20,000,000 die at a single breath! Blood when exposed to the air coagulates, and the value of this peculiar yet intrinsic property cannot be overestimated. When an artery is ruptured bleeding takes place, the blood coagulates and forms a plug, thus preventing further hemorrhage. Thus we observe with what Divine foresight and wisdom, not only the wants of the body are provided for, but also the accidents to which it is liable.

Size, Shape and Location of the Heart.—In this beautiful anatomical chart we obtain an accurate idea of the relative size, shape and position of that wonderful engine, the heart, whose tireless efforts to keep the wheels of life in motion are truly surprising, and fill us with amazement at the prodigious work it daily performs. The heart is an irregular, pear-shaped, hollow, muscular organ, placed obliquely in the lower and front part of the chest, between the two lungs and inclining to the left of the centre. The base is directed toward the spine and corresponds with the fourth and fifth dorsal spinal bone, while the apex points between the cartilages of the fifth and sixth ribs on the left side. In this illustration the pericardium, or loose sac in which the heart is enclosed, is removed, and we see the coronary artery with its branches distributed over the outer surface of the complex and restless organ.

Heart a Double Organ.—On looking at the heart one would think it was a single, solid organ. It is not, however, but a double organ, divided into four compartments; the two upper ones, from their supposed resemblance to a dog's ear, are called auricles, and the lower ones, from resembling a little stomach, are called ventricles. The auricle and ventricle on each side communicate with one another, but the right and left halves of the heart are each separate and distinct organs, and perform different functions—the right side propels the dark, vitiated and impure blood, whilst the left deals with the bright crimson, life-giving and life-sustaining blood.

Use of the Auricles.—The auricles serve as reservoirs to receive the blood—the right, as it comes dark and foul from its tour of the body; the left, as it filters bright and pure from the oxygenated forest of the lungs—and to furnish it to the ventricles as they need it. This is graphically shown on the chart, the large blue vein, formed by the jugular and subclavian veins, is seen descending downward and emptying into the right auricle; the red pulmonary vein, formed by the coalescing of its numerous branches, conveying rich, pure blood from the lungs and depositing it in the left auricle. Corresponding to the lightness of the work they perform, the walls of the auricles are comparatively thin and weak.

Ventricles of the Heart.—The walls of the left ventricle, which propels the blood to the remotest corners of the human frame, are correspondingly thicker and stronger than those of the right, which forces the blood to the lungs only. Arising from the right ventricle is seen the blue pulmonary artery, conveying its foul, poisonous, vitiated and venous stream to the lungs, while from the left ventricle is observed the large main artery of the circulatory system—the aorta—from the arch of which arise the right and left carotid arteries.

Changes in the Human Body.—The human body is in a constant state of change. In the midst of life there is death. The blood disks die and new ones are born into life. Every act of life is destructive as well as constructive. Not a thought can be evolved but numerous brain cells die; not a wink of the eye, a smell of a lovely rose, nor a muscular movement, but results in the death of some part of the machinery involved. Every process of life is a process of death. The scales of the epidermis are constantly falling off and being replaced by fresh cells from beneath, and it is on the continuance of this interchange that our life, health and vigor depends. The more rapidly this change goes on, and fresh, vigorous, healthy tissues take the place of the old lifeless ones, the more elasticity, buoyancy and strength we possess—the more healthy and robust we become.

Work of the Heart.—No slave ever performed his work more patiently than the heart. Its quivering task is essential to life and health. It is the fountain from whence the spirit flows, and on the faithful performance of its functions every part of the body depends for the warm stream of life, motion and vigor which it unstintingly furnishes. The ancients believed the heart to be the seat of love. Within its walls were located all that was pure, true, good and noble, as well as the evil passions of the soul. And although modern science has found the seat of mind, reason, consciousness and the mental powers to be located in the brain, and thus robbed the heart of its romance, yet it has revealed wonders connected with this small organ, that certainly eclipse the mysteries associated with it in the past. Pit-a-pat! pit-a-pat! throbs this marvelous engine, and in response to its constant throbbing the blood bounds along the myriad of tubes, conveying messages of life and health.

Constancy of Heart Work.—Our mind cannot stop its beatings; it cannot stop itself; sleep does not interfere with its workings, and our daily labor only strengthens its force and regularity. This wonderful organ throbs on night and day, week in and week out, the year round, with ceaseless, tireless energy. It beats at the rate of 100,000 strokes per day, 40,000,000 per year, and not unfrequently, 2,800,000,000 without a single stoppage. It is the most powerful engine known to science. Its daily work is equal to one-third of that of all the muscles of the body. If it should expend its entire force in lifting its own weight vertically, it would rise 20,000 feet in an hour. The greatest exploit ever accomplished by a locomotive was to lift itself through less than one-eighth of that distance. Vast and constant as is this perpetual throbbing, so perfect is the machinery with which it is carried on, that there are those who do not even know where the heart lies until disease or accident reveal its location.

Vitality of the Heart.—Its vitality is as amazing as its strength. While life exists this tireless organ never stops. In disease, as long as a flutter of this wondrous organ exists, we know the spark of life has not altogether vanished, and new hope is begotten that health may be restored. During such long lives as we sometimes see, the heart has propelled no less than 500,000 tons of blood; and yet, during all this patient, unfaltering and unflinching labor, it has repaired itself as the waste has occurred.

Heart Rhythms.—The rhythm of its beats never fails until death breaks into the casket and seizes the ever throbbing pendulum at the command of the great Master Workman, silencing the quivering muscles of the heart and compelling the wheels of life to stand still.

THE DIGESTIVE APPARATUS AND ITS WONDERS.

Value of the Plates.—Seeing is believing; nay, it is more, it is knowing and remembering. The mere reading of a statement on any particular subject does not always advance our knowledge of the matter in question. The observation of a fact, or its proper illustration by appropriate diagrams, such as we observe these anatomical charts to be, not only emphasizes the point considered, but aids us in remembering the principal features connected with the functions performed, thus advancing our knowledge of the subject discussed, and educational progress is made.

Quantity and Variety of Foods.—As we have already seen, the human body consists of numerous mechanics or artisans, who are constantly at work repairing and upbuilding the unceasing destruction that is continually going on. If fresh food be not daily supplied, this work would soon cease, and the lamp of life flicker out. To replace this constant waste we require nearly three pounds of solid food, and fully three pounds of liquid food for our daily allowance. But to convert the pent-up energies of bread, meat and vegetables into the tissues of our own mechanism requires a number of differently constructed organs, and these we now desire to draw your attention to in this beautiful chart. The organs consist of the stomach, liver, pancreas and intestines, which comprise the principal organs concerned in the process of digestion.

The Stomach.—The stomach is an irregular expansion of the gullet or œsophagus, and is the receptacle which receives the food when swallowed. Its shape has been, not inaptly, likened to the Scotch bagpipe. It will hold about three pints, though it is capable of considerable distension. When moderately filled with food it measures about twelve inches in length by four inches in diameter at its widest end. The walls of the stomach consist of four distinct coats, held together by fine areolar tissue, and are arranged in the following order, from within outward: the mucous, the areolar, the muscular and the serous. The inner mucous coat is a smooth, soft, rather thick, pulpy membrane, loosely connected with the muscular coat, and secretes the gastric digestive fluid of the stomach.

Fine View of Stomach Coatings.—On turning over the flap we obtain a very fine view of this remarkable membrane. The areolar coat is placed between the muscular and mucous coats, and connects with both. The muscular coat is very thick and stout, and composed of three sets of fibres, the longitudinal, circular and oblique, which form three distinct layers. The outer coat is a thin, smooth, transparent and elastic membrane, derived from the peritoneum, and well lubricated to prevent friction. When the fibres of the muscular wall contract, a peculiar churning movement of the stomach is produced, thus securing the thorough mixing of its contents, that every particle may come into contact with the solvent properties of the gastric juice.

The Pyloric Gate.—At the smaller end the muscular fibres contract and form a gateway—the pylorus, as it is called—which carefully guards the exit from the stomach, and allows no food to escape until properly prepared. The gastric blood-vessels are seen distributing themselves over the outer surface of the organ, thus ensuring its nutrition and repair.

The Liver.—The liver is the secreting organ by which the bile is formed. It is situated on the right side below the diaphragm, and is of a reddish-brown color. It is irregular in form being convex on the upper surface, irregularly concave behind, very thin in front, and weighs about four pounds. It is, therefore, seen to be the largest organ or gland in the body. It is divided into two lobes, the right and the left, the former being by far the larger. On turning the flap over, we see how intricately it is arranged internally.

Blood-vessels of the Liver.—The blood-vessels of the liver are the hepatic artery and veins, and the portal vein; the lymphatic vessels are numerous, and the nerves are supplied from the pneumogastric, the phrenic and the hepatic plexus. The liver, therefore, receives two kinds of blood: the arterial, by means of the hepatic artery, and the venous, from the portal vein, from which the bile is principally formed. The bile is a dark, golden fluid, of extremely bitter taste, of which three pounds is secreted daily. When not used in digestion it is stored away in the gall-bladder, a fine view of the location of which we have in this chart. The action of the bile on food, though not fully understood, is necessary for perfect digestion.

The Pancreas, or "Sweetbread."—The pancreas, or "sweetbread," is a single glandular organ, situated transversely across the upper and back part of the abdomen, on a level with the last dorsal spinal bone. It is of an irregular, elongated form, from six to eight inches in length, an inch and a half in breadth, and from a half to one inch in thickness. It secretes about seven ounces daily of a slightly alkaline fluid containing an organic principle—pancreatin, which has the property of changing the starchy food into sugar. Whilst it has this power, yet its chief work in the digestive process seems to be the breaking up of the fat globules into myriads of minute particles which mix freely with water, and thereby promote their absorption by the lacteals.

The Intestines.—The next chart shows us the manner in which the intestines are arranged in the abdominal cavity. The entire intestinal canal is about thirty feet in length, and is divided into two portions—the small intestines, and the large intestines; these again are each subdivided into three different portions. Of the large intestines, the transverse portion is laid open, showing the internal arrangements. A section of the bladder is seen on this chart.

Machinery of Digestion.—From the number and differently formed structures which constitute the digestive organs, it will be observed that that function is a very highly complex process. If the food were thrown directly into the circulating fluid, it could not be used for the purpose of nutrition. It requires for its transformation into blood, bone and muscle, a series of complex machinery, each part of which is specially designed for the particular part it plays in this wonderful and complicated process.

Use of Mouth and Teeth.—The mechanical part, which, although not shown in this chart, may be carefully studied in the chart giving the different views of the head, is performed by the mouth and teeth, and the pulverized food is subjected to the action of the saliva. The lubricated morsel of food is now gathered into a ball and conveyed to the back of the mouth by the muscles of the cheek and tongue. On its arrival here, the soft palate lifts upward and closes the posterior nasal openings; the epiglottis shuts down over the trachea or wind-pipe, forming a bridge over which the food passes, thus preventing it from falling into the respiratory track.

Duty of the Throat.—The muscular bands of the throat now grasp it and pass it down the gullet into the stomach, beyond our control. Here it comes into contact with the gastric juice, undergoes the churning motion of the stomach, is guarded over by the pylorus, thoroughly saturated and mixed before entering into the intestinal track, where it is subjected to the action of the bile, the pancreatic juice and the intestinal fluid, each with its special duty to perform.

Nature's Treasures Open to Man.—All this is a very complicated and diversified process, the necessity for which can only be explained upon the hypothesis that Nature, in her exhaustless munificence, has opened her proud domains, and poured forth to man the treasures of every land and every sea for food; the cornfields wave their golden grain for him; the wheat, rye, oats, corn, maize, rice, each different, yet highly nutritious and sufficing; the palm, the date, the banana, the fig, the pineapple, spread out a delicious harvest on the air; the luscious apple, pear, peach, plum, cherry, tempt his ready hand; the potato, the beet, the turnip, the tomato, the cabbage, the pea, the cauliflower, and a thousand other good things, incite his appetite, whilst to this feast is added the flesh of birds, of oxen, of sheep, of swine and of fish; that before the waving wheat and corn, the flesh of other animals, the fruits and farinaceous foods, the running water, the luscious oyster and fish, etc., can be transformed into the refined and spiritual organization of man, it must be thoroughly prepared by the several steps in the digestive process—then, and only then, is it permitted to enter into and commingle with the highly complex, nutritious and life-sustaining fluid, the blood.

Great Value and Beauty of the Plate.—We can understand much of this wonderful process. We have looked into the stomach, watched its peculiar actions and traced its various steps, from which the scientist is capable, in his laboratory of knives, mortars, baths, chemicals and filters, of imitating many of the operations of digestion; but just at the moment he thinks himself most successful, he is compelled to pause. At the threshold of that "one step more," which Fontenelle required, "and he would surprise nature herself," he stops, and very wisely, without concealment of his designs, admires, then wonders, and finally worships with all the reverence of his soul.

Transformation of Food Into Flesh.—How strange this is—the transformation of food into human flesh, into human thoughts! We eat a meal; it is composed of meat, bread, vegetables and liquids. The more solid part is ground by the teeth, mixed with the different juices, dissolved, changed, organized and is swept through the body in the circulation of the blood. Each organ seizes its own particular food as it passes. Within the cells of the various tissues it is transformed into the soft, sensitive brain, or the hard, callous bone; here into the nerve of sight, there into gristle or tendon; here briny tears are formed, there the bland saliva; in the stomach, acid juice; in the skin, acrid perspiration; bile for digestion, oil for the hair, nails for the fingers, muscle for the strong arm of toil, and flesh and fat to give shape, form and beauty to the face.

Wonderful It All Is.—Wonderful! Within us is an Almighty Architect, who superintends a thousand skilled laborers, that make a way which puzzles human comprehension; here a fibre of muscle; there a filament of nerve; here constructing a bone; there uniting a tendon—fashioning each with the most scrupulous care and unerring nicety. Without the buzz of a saw, or the sound of a hammer; without the slightest compression, or the least particle of noise; with a regularity, certainty and exactness, the glorious temple of man, in the image of his Creator, goes up and up, day by day, skilfully put together by these noiseless, tireless and expert workmen.

THE VERMIFORM APPENDIX.

The chart brings into view the location and form of that wonderful little organ known as the Vermiform (wormlike) Appendix (appendage). It is an appendage of the Cæcum, or lower bowel. Its uses as a bowel appendage have never been established. It occurs in other animals besides man. Notwithstanding its diminutive size and uselessness as an organ it is the seat of that most painful and dangerous disease called Appendicitis, which was formerly attributed to the presence of some foreign body, as a grape-seed, lodged within. But it has been found inflammation of the Appendage may arise from numerous other causes.

Many doctors insist that a surgical operation—that is, the entire removal of it with knife—is the proper curative agent, especially in acute cases. But others insist that the knife is too frequently used, and that the disease, if taken in time, is quite surely curable by other means.

THE CLITORIS, URETHRA, VAGINA AND HYMEN.

These female organs show further the perfection which anatomical plate printing has attained.

Clitoris.—This small organ, it will be seen, is situated at the upper part of the vulva, or outside parts of the female generative system, and is usually concealed by the lips of the pudenda. It performs a function during sexual intercourse similar to that performed by the penis of the male.

Urethra.—This highly useful organ, common to both sexes, is, as will be seen by the plate, the canal, or medium, by means of which the urine is carried from the bladder to be voided. It is a delicately lined organ, furnished with retentive valves, and therefore susceptible to a variety of diseases.

Vagina.—This word implies a sheath, and is applied to the canal which leads from the uterus (womb) to the external organs of generation in the female sex. Commonly, it implies such external organs, or organ, as depicted in the plate.

Hymen.—The mucous membrane, or virginal membrane, at the entrance of the female sexual organ, or vagina.

BLADDER AND PART OF VAGINA.

The function and form of the bladder are familiarly known. It is the recipient of the kidney secretions, and contains them till voided through the urinary canal. It is of tough, clastic structure, guarded at the exit by a contractile valve, by means of which the urine can be retained until the quantity becomes excessive. The plate brings out the entire urinal tract, from the bladder to the vagina, and presents a fine and useful anatomical and physiological study.

WOMB, OVARIES AND VAGINA.

The Womb.—The plate beautifully and effectively illustrates the location and formation of the womb, that wonderful organ which performs the function of parturition, and which is so constructed as to assist in all the necessary efforts of birth. Its structure is elastic and strong, and it expands readily to accommodate the growth of the child (fœtus). While this is true exteriorly, its inner parts are rather delicately lined, and subject to a variety of painful diseases, generally designated as "Diseases of the Womb."

The Ovaries.—The organs are situated contiguously to the womb. They signify eggs from their shape, and they are the parts which the male semen acts upon to produce the phenomenon of pregnancy. Their enlargement by inflammation and their passage down the fallopian tubes, once a month during the middle period of female life, produces the condition familiarly known as menstruation. The plate also affords another view of the vagina.

NATURAL POSITION OF CHILD AT TIME OF BIRTH.

This beautiful and effective plate shows the natural position of the child at the time of birth. It is technically called the presentment of the fœtus for birth. Of presentments there are many varieties, whose study is most interesting to the obstetrician. Some of them give rise to very difficult and dangerous delivery. When the presentment is natural, as in the figure, the comfort of the mother is increased and the doctor's anxiety is much allayed.

VIEW OF THE LARGE BLOOD-VESSELS, SPLEEN, KIDNEYS AND BLADDER.

Blood Vessels of the Body.—The blood-vessels of the human body consist of heart, arteries, veins and capillaries. The heart and its wonders we have already referred to. In this magnificent chart we are enabled to form some idea of the larger blood-vessels. We see the main arterial tube of the body—the aorta—from a point where it unites with the arch of the aorta; and in its descent downward along the spinal column it gives off numerous branches.

The Arteries.—Opposite the fourth lumbar vertebra it is seen to split in two, and these divisions are called, from their position, the right and left iliac arteries. These are seen to divide again into the internal and external iliac arteries, the former of which is distributed to the walls and viscera contained in the pelvis, then proceeding to the lower limbs after sending two important branches to the abdominal walls. The arch of the aorta gives off the innominate artery, which divides into the right carotid and right subclavian arteries; the left carotid and left subclavian spring direct from the arch of the aorta. Each carotid artery divides into the external and internal carotid arteries, the former being distributed to the external parts of the face and head; the latter supplies the brain and internal parts of the cranium. The subclavian arteries supply the upper extremities with blood.

Intercostal Arteries.—The intercostal arteries and veins are beautifully illustrated in the chart. The veins return the blood to the heart. The large ascending and descending venæ cavæ are seen in this illustration.

Meaning of Artery.—From the fact that at death the arteries are empty, the ancients believed them to contain air, whence their name, derived from *aer,* air, and *terco,* I keep, which literally means, *air ducts.*

The Spleen.—The spleen is a spongy organ, of a livid color, oval in figure and situated in the left upper part of the abdomen and immediately behind the stomach. Its weight varies from four to ten ounces. It is largely composed of cells, but its function is little understood, though from its position it is believed to be in some way useful to the stomach during the process of digestion.

The Kidneys.—The kidneys are two glandular bodies, having for their functions the secretion of urine. The form of the kidney resembles a French bean; its average length being from four to four and a half inches, two inches in breadth and one in thickness. The two kidneys are situated one on each side of the spine in the lumbar region, opposite the last two dorsal and two first lumbar vertebræ; they are a brownish-red color flattened from before backward, and grooved on the interior border for the reception of the great vessels.

The Veins.—The venal arteries are derived direct from the aorta; and the large veins terminate in the ascending large vein. On the right kidney is seen the super-renal capsule; whilst the left is cut vertically into showing the uriniferous tubes, much convoluted and inosculating with each other. The ureter is seen arising from the pelvis of the kidney, descending in an oblique manner to the bladder. These wonderful little organs appear to act as filters, and thus assist to keep the vital stream of life in as pure and as healthy a condition as possible.

The Bladder.—The bladder is a thin, membranous bag, which serves as a receiver of the urine secreted by the kidneys, and which remains there until voided by urination through the urethra.

Bone Sections.—The sections of the bones show their cancellated appearance, which combines lightness with strength

CHART III.

WONDERS OF SIGHT, HEARING, TOUCH AND LOCOMOTION.

THE EYE AND ITS WONDERS.

Beautiful Plate of the Eye.—The beautiful flesh-colored engraving at the right-hand top corner of this exquisite composite anatomical plate gives a strikingly natural, life-size representation of the human eye, together with its external appendages, the eyebrows, the eyelids, and the lachrymal or tear glands.

Muscles of the Eye.—On turning the flap we see four of the six delicate, but withal strong muscles which not only hold the eye firmly in its bony orbit, but also move it upward toward the canopied vaults of heaven, downward to view the beauties of nature on earth; or sidewise, to the right or left, spanning half the horizon at a single glance! The next illustration gives us a graphic and faithful delineation of the beautiful arrangements of the numerous curtains, humors, lenses, pigments, membranes, nervous coats and blood-vessels which enter into the composition of this remarkable organ, each of which is exquisitely adapted to the respective functions it has to perform.

Wonders of the Eye.—The human eye is one of the most wonderful, as well as delicate, organs of the body. It is the window through which the heart, mind and soul of man shines. Sorrow or joy, grief or mirth, pain or pleasure, sunshine or shadow are reflected through this wondrous camera of light; the human passions hold their orgies in this window; truth and love dance their happy and joyous day-dreams before its luminous curtain; and through it accurate delineations of every object that comes within its range are carried to and photographed on the brain, the great art gallery of the soul! Can man, with all of his great and scientific achievements, conceive of anything in the arcana of his accomplishments more beautiful, more wonderful, or more perfect than the human eye!

THE EAR AND ITS WONDERS.

The External Ear.—The organ of hearing consists of three parts: the external ear, the middle ear or tympanum, and the internal ear or labyrinth. The external part of the ear represented in this colored engraving is very realistic of that essential appendage to this important special organ of sense in man. It consists of an expanded sheet of cartilage, folded in true trumpet fashion, for collecting the sound waves and conveying them to the external meatus or mouth of the auditory canal.

The Ear Drum.—On the back of this flap is seen a strikingly natural representation of the middle ear, the tympanum or drum, as it is frequently called. From the bottom of the tympanum is observed the Eustachian tube, through which is conveyed air from the pharynx to the middle ear. Across this chamber is seen stretched three very tiny, singular bones, which, from their shape, are called the hammer, the anvil and the stapes. These delicate bones are connected together, one by ball and socket joint, the other by a hinge-joint and by ligaments, and are moved by small muscles; they serve to convey the wave sounds across the tympanum cavity to the internal ear.

Show of Ear Canals.—The semicircular canals, and the cochlea, so named from its resemblance to a snail's shell, are also typically shown. In the next colored illustration we observe a graphic and truthful view of the delicate internal arrangement and mechanism of the internal part of the organ of hearing. Here we observe the winding stair of the cochlea, over the surface of which the delicate fibrils of the auditory nerve expand, and the minute fibres of Corti, called from their discoverer, are seen arranged with geometrical precision, the longest at the bottom and the shortest at the top.

Wonders of the Spiral Plate.—If this curious and artistic spiral plate, which is seen to wind two and one-half times round, could be unrolled and made to stand in an upright position, it would make a beautiful microscopic harp, not of a thousand strings, but of three thousand strings, and if it were possible to strike these delicate infinitesimal cords as we can the keyboard of an organ or piano, every conceivable variety of tone that the ear can distinguish would be produced and conveyed to the brain as the product of sound.

THE HAND; ITS MECHANISM AND WONDERFUL ENDOWMENTS.

Engraving of the Hand.—To tell one that this exquisite colored engraving represents a human hand seems almost like questioning his sanity. Yet such it is; but how few there are who can give an intelligent account of the hand, describe its beautiful arrangements and complex mechanism, or tell of its wonderful endowments. Small in compass, compact in structure, yet so skilfully arranged are its blood-vessels and nerves, that they form a complete net-work over its surface. So minute are they in their

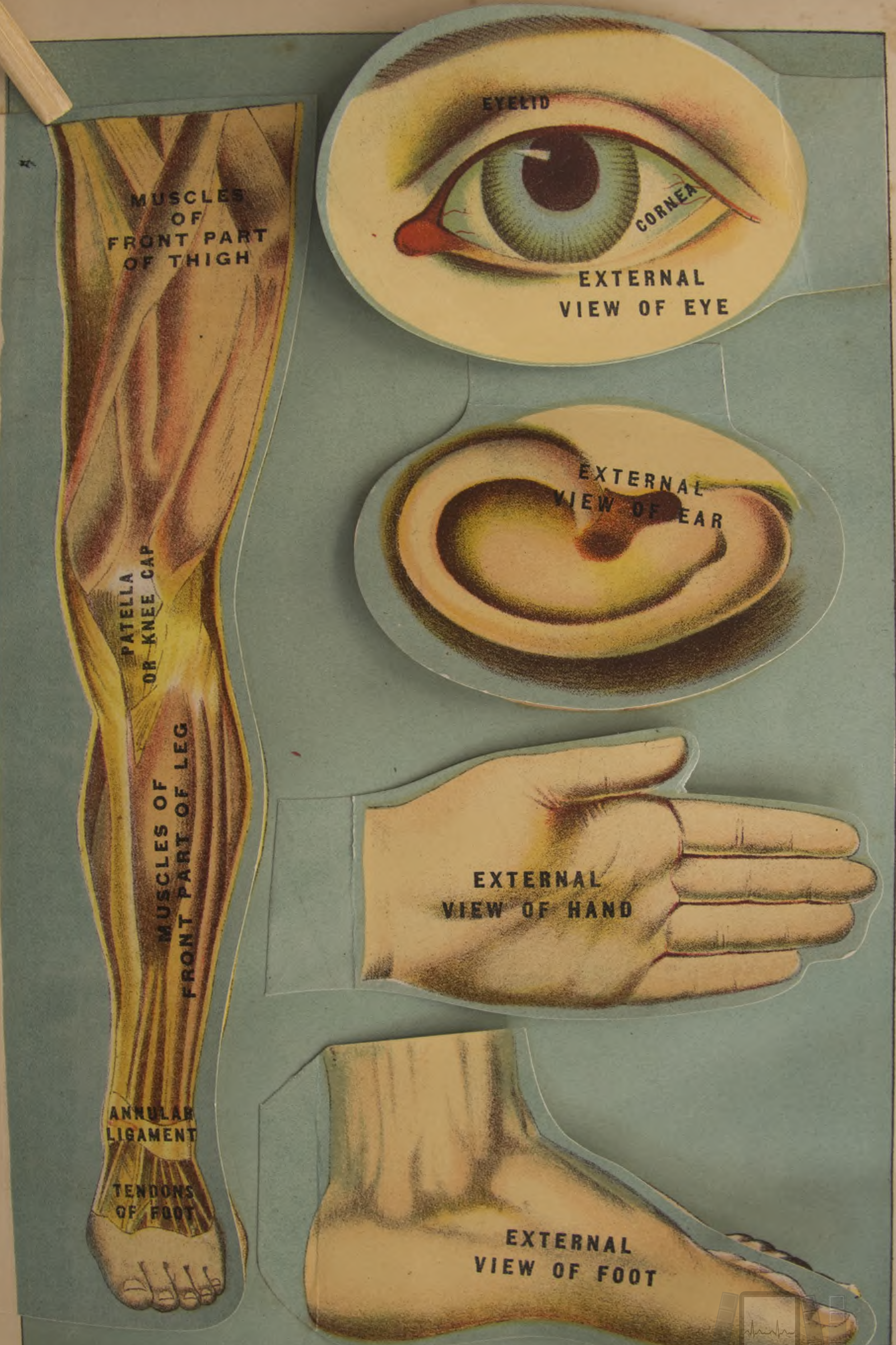

MUSCLES
OF
FRONT PART
OF THIGH
PATELLA
OR KNEE CAP
MUSCLES OF
FRONT PART OF LEG
ANNULAR
LIGAMENT
TENDONS
OF FOOT
EYELID
CORNEA
EXTERNAL
VIEW OF EYE
EXTERNAL
VIEW OF EAR
EXTERNAL
VIEW OF HAND
EXTERNAL
VIEW OF FOOT
COPYRIGHT 1910 BY E. J. STANLEY

CHART 3.

of sense in man. It consists of an expanded sheet of cartilage, folded in true trumpet fashion, for collecting the sound waves and conveying them to the external meatus or mouth of the auditory canal.

The Ear Drum.—On the back of this flap is seen a strikingly natural representation of the middle ear, the tympanum or drum, as it is frequently called. From the bottom of the tympanum is observed the Eustachian tube, through which is conveyed air from the pharynx to the middle ear. Across this chamber is seen stretched three very tiny, singular bones, which, from their shape, are called the hammer, the anvil and the stapes. These delicate bones are connected together, one by ball and socket joint, the other by a hinge-joint and by ligaments, and are moved by small muscles; they serve to convey the wave sounds across the tympanum cavity to the internal ear.

Show of Ear Canals.—The semicircular canals, and the cochlea, so named from its resemblance to a snail's shell, are also typically shown. In the next colored illustration we observe a graphic and truthful view of the delicate internal arrangement and mechanism of the internal part of the organ of hearing. Here we observe the winding stair of the cochlea, over the surface of which the delicate fibrils of the auditory nerve expand, and the minute fibres of Corti, called from their discoverer, are seen arranged with geometrical precision, the longest at the bottom and the shortest at the top.

Wonders of the Spiral Plate.—If this curious and artistic spiral plate, which is seen to wind two and one-half times round, could be unrolled and made to stand in an upright position, it would make a beautiful microscopic harp, not of a thousand strings, but of three thousand strings, and if it were possible to strike these delicate infinitesimal cords as we can the keyboard of an organ or piano, every conceivable variety of tone that the ear can distinguish would be produced and conveyed to the brain as the product of sound.

THE HAND; ITS MECHANISM AND WONDERFUL ENDOWMENTS.

Engraving of the Hand.—To tell one that this exquisite colored engraving represents a human hand seems almost like questioning his sanity. Yet such it is; but how few there are who can give an intelligent account of the hand, describe its beautiful arrangements and complex mechanism, or tell of its wonderful endowments. Small in compass, compact in structure, yet so skilfully arranged are its blood-vessels and nerves, that they form a complete net-work over its surface. So minute are they in th

CHART 3.

distribution that the point of the finest needle cannot penetrate any part of the hand without piercing quite a number of them. The hand is the great organ of touch and prehension, and the instrument which distinguishes man in the large class of mammals, since he is the only animal which possesses two perfect and complete hands.

Bony Frame of the Hand.—On turning over this flap we behold the bony frame-work of this wonderful organ. It is seen to consist of a number of bones, so exquisitely arranged as to combine the greatest possible degree of flexibility and strength.

Palm of the Hand.—Below this is given an elegant, and at the same time a true and correct view of the muscular arrangement of the palm of the hand and fingers. Over the wrist is seen the annular ligament, that thin, tough, strong sheath, which binds the muscular cords and holds them firmly in place. Thus in these three anatomical charts have we depicted the perfection of the human hand.

Powers of the Hand.—And how varied and useful are its endowments! How wondrously adapted to the uses to which it is daily applied! Its elegance of outline, delicacy of mould and beauty of color has ever made it the attractive study of the artist; whilst its elasticity, flexibility and strength, combined with its delicate and exquisite mobility, and perfect adaptation as an organ of prehension, have led many philosophers to attribute man's high and graceful superiority even more to the hand than to the mind. Glowing thoughts are penned upon the pages of history by means of the hand; it wields the artist's pencil and brush, and makes the bare canvas an attractive and valuable work of art; now it strikes the keyboard of the piano with so delicate a touch that low, sweet, plaintive strains of music are brought forth; now the force of the blow is much greater and firmer, and louder and louder and more thrilling the musical strains.

Skill of the Hand.—The farmer's toil, the housewife's task, the dressmaker's deftness, the mechanic's skill, are all accomplished by the human hand. How constantly this little instrument aids us in expressing our feelings. It is the orator's chief aid in giving expression to his lofty strains of eloquence, or emphasizing his pathetic appeals.

Various Uses of the Hand.—With the hand we affirm or reject a proposition with more force than with the tongue. It is the first to greet, and the last to bid our friends good-bye. We use it to express our joy and pleasure, or to give vent to our fear and horror. In the hour of peril we employ it in powerful supplication to Him to whom we look for succor and help, and it adds force and power to the appeals of suffering, of sorrow and of woe. It bestows its loving caresses on the downy cheek of the baby, invokes the blessings of Heaven, pleads for mercy, or hurls curses on our enemies. Indeed, we do not always seem to realize how many notes in the tune of human life the hand of man is made to play. Its beauties, its perfect adaptability, it varied endowments, and the different uses to which it is applied, are almost beyond our thoughts, and he who is deprived of this useful member sustains a loss that none can estimate, nor the wealth of Crœsus compensate.

THE FOOT; ITS MECHANISM AND ITS WONDERFUL ENDOWMENTS.

Arrangement and Uses of the Foot.—In this exquisite colored engraving is represented the human foot, the organ by which we stand, walk or run. Look at it carefully, aye, critically, and see if you can duplicate it in the whole range of man's achievements! The general arrangement of the bony frame-work of the foot, as seen in this illustration, is strikingly like that of the hand. The graceful arch of the foot, composed by the tarsal and metatarsal bones, is firmly joined together by a thick layer of cartilaginous structure, not only preventing a liability to displacement, but giving to it an elasticity, sprightliness and strength which could never be attained by a single flat bone. In the next colored illustration we have a section of the foot, showing its architectural dignity and perfection. On its under or plantar surface are seen stretching from the heel forward toward the toes a number of ligaments, the principal one of which is the plantar ligament, and possesses great strength and elasticity.

The Toes.—The toes are observed to be straight forward in a line with the general contour of the foot. This is their natural position. The beautiful outline of the natural foot, as here represented in these several different views, the graceful arch of the instep, the elegance of its form, its marvelous elasticity and strength, all combine to make the foot not only of great perfection and beauty, but admirably fit it for the manifold duties it is called upon to perform. Man, in his diversified labors and varied trials throughout life, is sometimes obliged to walk, run, jump, leap, climb, stand erect, lean forward, etc., and he depends upon the foot to maintain his equilibrium in the performance of these several duties.

Beauty and Strength of the Foot.—Not only does the foot, too, frequently sustain heavy weights, but it must carry them as well. It likewise affords a firm support. Were it not for this beautiful mechanism, the constant jarring and concussion which would be experienced in the act of walking would inevitably destroy those delicate organs, the brain and spinal cord, and death would immediately follow. How few persons in civilized nations have perfectly natural feet! The beauty and utility of the human foot is marred; its movements are impeded by encasement in unnatural boots and shoes; these, instead of conforming to the form and shape of the foot, make the foot adapt itself to them. The consequence is corns, bunions, cross toes, ingrowing toe-nails, large joints, and a number of other evils from which so many suffer at the present day.

THE LEG; ITS MECHANISM AND ITS WONDERFUL ENDOWMENTS.

Leg Muscles.—In every part of the human frame there is witnessed ample evidence of design, beauty of architecture, great skill, finished workmanship, and a perfect adaptability to the duties to be performed. This fact is strikingly illustrated in the beautifully executed colored plate to which attention is now drawn, showing, as it does, at a glance, the thick, strong, muscular instruments employed and the manifold intricacies involved in the act of human locomotion. This exquisitely artistic anatomical plate represents a front view of the thigh, leg and foot, and of the fifty-four fleshy levers which give form, shape, symmetry, strength and mobility to this useful member of the body. Quite a number of the most important are seen exposed to view, after the skin and fatty tissues have been removed. We are deeply impressed with their large size and great strength, both of which correspond with the requirements demanded in the varied work which the leg is called upon to perform.

Use of the Leg Muscles.—The muscles observed in this plate are the principal instruments for carrying out the behests of the will in the acts of walking, running, leaping, climbing, and the graceful, gliding motions of the entrancing and captivating waltz; and although we see a complicated piece of machinery, yet there is perfect order. Harmony, promptitude and exactness prevail, not only in the skilful manner in which they are individually and collectively arranged, but in the action of the different muscles, each one of which performs its duty either independently of, or in connection with, its fellow lever, and that, too, without interfering in the slightest degree with the functions of the others.

Muscular Levers.—These great muscular levers bend the body forward on the thigh, and bring the legs inward toward each other, besides moving the whole body to and fro when walking, etc. The long, narrow muscle, seen running obliquely across the thigh, is the Sartorius muscle. so-called from the fact that it crosses the legs for the sartorial (tailor's) posture. It is the longest muscle in the body.

The Knee-Pan.—The patella or knee-pan is seen held firmly in position, giving greater strength and security to this important joint. Around the ankle is observed the annular ligament, binding the long silvery thongs or tendons of the muscles of the legs, thus preventing their displacement. It also affords security and strength to the ankle joint, though not interfering with its elasticity and motion. The foot shows us the natural position and shape in which the toes should be when encased in a boot or shoe.

Thigh and Leg Bones.—On turning the flap we see the bones of the thigh and leg, and a front view of the bones of the ankle joint and foot. As was to be naturally expected, we here find the largest, the longest and strongest bone in the human body, since, with every step taken, it has to bear the entire weight of that wonderfully and fearfully constructed body, and support whatever additional burdens or weights one is called upon to impose in the course of his daily labors. The bone is observed to be compressed, somewhat cylindrical in shape, but expanded at both ends, thus giving it the greatest possible degree of strength. At its lower end it articulates, and forms a hinge-joint with the knee, the strength and protection of which is further secured by the shape and position of the knee-pan.

The Shin Bone.—The tibia or shin bone is also a very large, strong, triangular-shaped bone, enlarged at both ends; the lower end, however, where it articulates and forms a hinge-joint with the foot, is larger and more prominent than the upper end. And as if this bone was not sufficiently strong enough in itself to bear the weight of the body, our Creator, with that boundless wisdom and forethought which everywhere in the human frame we see revealed, strengthens the legs by an additional bone, which is seen running on the outer side of the shin bone, and to which it is firmly bound at both ends.

The Fibula.—Not only does this second bone—the fibula—give additional strength and support to the leg proper, but it likewise increases the bony area or surface of the leg, to which its powerful muscular levers are attached.

The Sciatic Nerve.—The large sciatic nerve, its position, course and distribution, is graphically outlined, and as we look upon this white, sensitive cord, we are deeply impressed with the force and truth of what Shakespeare makes one of his characters, *Timon*, say:

"——— The cold SCIATICA
Cripples our senators, that their limbs may halt
As lamely as their manners."

Muscles of Thigh and Leg.—Turning to the next colored illustration, we have a graphic and faithful view of the deeper muscular arrangements of the thigh and leg, together with a striking description of the nervous supply of the lower extremity. These beautiful, silvery threads are the wires which carry the behests of the will to the muscular levers, and whose commands the muscles promptly obey; and give to the leg its wonderful and diversified endowments. To stand erect is a very difficult and complex act, and the process of walking is a no less difficult or complex function. Few persons ever realize the peril involved in walking, and it has only become safe by constant practice.

Art of Walking.—Walking requires the nicest adjustment, prompt action, and the finest calculations to maintain the dignity, proper attitude, equipoise and balance of the body. This is well illustrated when one runs up against any obstacle in the dark. We observe then with what headlong force the body is propelled forward. In walking the first thing that occurs is the inclining of the body forward; the foot is then gradually raised upon the toes, and brought from a horizontal position into an almost vertical one; at the same time the knee, which was at first considerably bent, straightens out by the advancing forward movement. Every part of the leg and thigh has changed its position except the toes; that part farthest from the toes the most of all; and gradually diminishing in geometrical proportions downward.

How We Walk.—The foot is then raised from the ground and swung forward in true pendulum fashion. The leg in so doing becomes flexed at the knee-joint, and considerably shorter, and the whole weight of the body is transferred to and supported by the leg and foot, which is planted firmly on the ground. The leg and the foot which was swinging in the air is now brought down to the ground, the muscles passing through changes just the reverse of those employed in raising it. Planting this foot firmly on the ground, to prevent the body from falling, we raise the other foot, swing it forward, the leg describing the same movements as before, repeating the process alternately with each leg. These movements constitute the act of walking; the complexity of which is fully illustrated by the complicated machinery employed for its performance, as we have seen in the beautiful plates showing the wonderful and skilful arrangements of the bones and muscles of the leg.

Grace and Ease in Walking.—In the several beautiful anatomical charts illustrating the bony, muscular and internal mechanism of the human frame we have been consciously awakened to its complexity; we have been forcibly impressed at the amazing skill and wisdom displayed in its marvelous arrangement, and at the general order, system, harmony and perfection which everywhere prevails throughout the diversified contrivance of the body. But its wonders do not stop there. The graceful motion, the ease with which we walk, run, leap, dance, etc., demonstrate with what astonishing rapidity the different muscles concerned in those movements contract and obey the impulse of the will.

The Voice.—The voice may utter one thousand five hundred letters in a minute, yet the articulation of each of those sounds requires a different and distinct position of the vocal organs, the muscles of which move with surprising celerity and swiftness.

Deftness of the Fingers.—In music we train the muscles of the fingers until they glide over the keyboard of the piano with dexterity and precision, and perform the most simple and delightfully exquisite music and on to the grand, difficult and complex passage of operatic harmony. The mind of the skilful and professional violinist is upon the music which his right hand is executing by the varied movements of the bow, yet the muscles of his left hand and fingers are deftly engaged in determining the length of the space on the strings, the character and duration of each note; and so rapidly, carefully, aye, even unconsciously are these complex movements made, that not a false note is heard, though the variation of a single hair's breadth would cause a discord, and thus spoil the pleasing effect of the music, and destroy the attractiveness of its harmony.

Muscle Development.—The bicep muscle in the arm of the blacksmith may grow strong, hard, firm, and as solid almost as a club; the legs of the pedestrian may become large and well developed; the hand of a prize fighter may be trained to strike a stunning blow with the force of a sledge hammer; while the penman can describe the most beautiful curves, the engraver trace lines so delicate and fine as to be invisible to the naked eye, and the fingers of the blind acquire a delicacy of touch that almost compensates for the missing sense. Thus there are few conceptions of the designing mind which the muscular system of man cannot be made to execute and perform.

INDEX TO BOOK II

Book II treats of Anatomy and Physiology, a knowledge of which is essential to a proper study of disease.

SUBJECTS OF THE TEXT

LIST OF ILLUSTRATIONS

Book II.

ANATOMY AND PHYSIOLOGY.

Necessity for This Book.—A brief outline of the structure or anatomy, and of the function, use or physiology of the human organism must necessarily inaugurate any book purporting to present the prevention and cure of disease, for disease means disordered function, which cannot be understood without some knowledge of the normal or regular function, which in turn necessitates a study of structure.

Plan of the Book.—As anatomy and physiology are naturally inseparable we will interweave one with the other in the following pages, the part played by an organ being given with its description.

Bodily Organs.—Every animal is composed of organs, as the heart, liver, kidney, etc., and every organ consists of tissues, of which there are four varieties: epithelial, connective, nervous and muscular. Each tissue is made of numbers of cells.

Forms of Cells.—A cell is a microscopic bag of jelly-like substance called protoplasm, which often contains within its substance a smaller cell called a nucleus, and sometimes inside the smaller cell, a tiny dot called the nucleolus.

Protoplasm.—Protoplasm is formed of water, albuminous substances, sugary material, fat and chemical salts. The chief chemical salts entering into its formation are carbon, hydrogen, oxygen and nitrogen.

Size of Cells.—Cells vary from $\frac{1}{5000}$ to $\frac{1}{120}$ of an inch in diameter; some tubes as in the hair-like blood-vessels, and some float in fluid as the blood corpuscles. Some have the power of moving from place to place, ameboid motion.

Human Body Compared to a City.—The human body may be compared in its arrangement to a city, the houses being the organs; the brick, stone, wood and metal the tissues, and the individual bricks, fragments of stone, boards or pieces of metal the cells.

Human Body Compared to an Army.—Huxley compares it to an army, "each cell is a soldier, an organ a brigade, the central nervous system the headquarters and field telegraph, and the alimentary and circulatory systems the commissariat." The function of a cell is the same as that of a human being, they absorb food and grow, fill special offices, as protecting, secreting, etc., reproduce and die.

Epithelium.—Epithelial tissue or epithelium means literally upon the nipple. It covers the entire outside of the body, as the skin, the inside of the respiratory, alimentary and genito-urinary apparatuses as mucous membrane, and dips down into the various glands which open on the skin and mucous membrane.

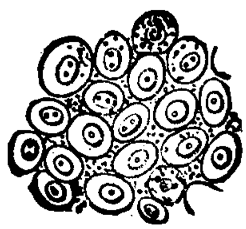


Figure 8.—PAVEMENT EPITHELIUM.

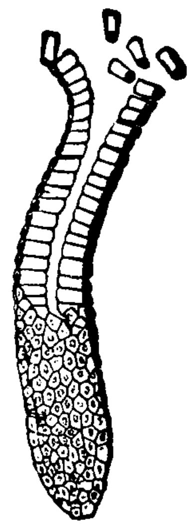


Figure 9.—COLUMNAR EPITHELIUM.

Skin Arrangement.—On the skin it is arranged in layers as pavement epithelium (Fig. 8) and acts as a protection to the delicate structures beneath. In some places, as in the hair and nails, it is much modified to more effectually guard against injury.

Shape in the Stomach.—In the stomach, intestines and elsewhere the epithelial cell is oblong in profile (Fig. 9) and is called columnar epithelium.

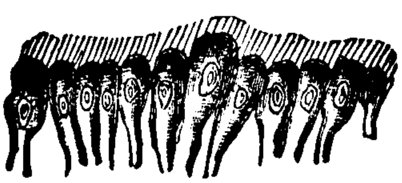


Figure 10.—CILIATED EPITHELIUM.

Cilia of Windpipe.—Some epithelium, like that in the windpipe, has projecting from it long waving filaments called cilia (Fig. 10). The cilia wave constantly, acting as brooms, which keep the windpipe clean.

Glandular Epithelium.—Secretory or glandular epithelium (Figs. 11 and 12) is found in the glands, varies in shape, and

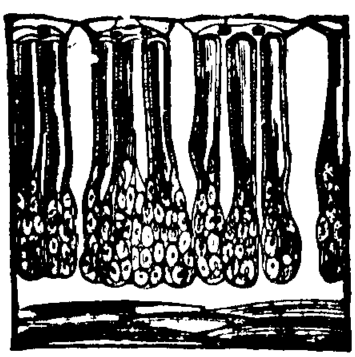


Figure 11.—SIMPLE GLAND.

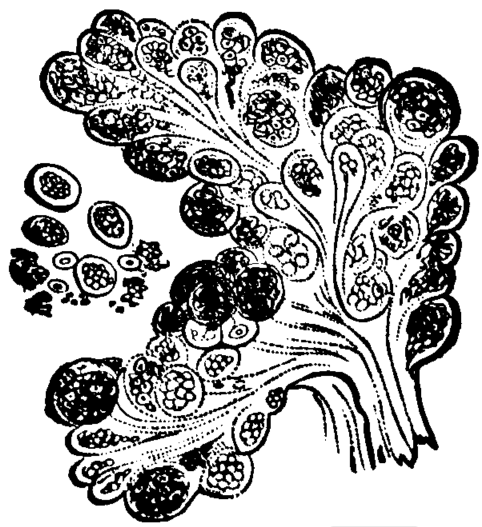


Figure 12.—RACEMOSE GLAND.

is the essential portion of the gland, *i. e.*, the portion which manufactures the special secretion from the blood.

Endothelium.—Endothelium, lining serous sacs, joint cavities (synovial sacs), and the blood and lymphatic vessels, is analogous to epithelium.

Connective Tissue.—Connective tissue occurs as bone, cartilage and fibrous connective tissue.

Bone Structure.—Bone is fibrous tissue cemented with petrified cement. It consists approximately of one-third animal and two-thirds earthy material, the principal earthy constituents being the phosphate and carbonate of lime; lining bone is pinkish in color and oozes blood when cut.

Periosteum.—Externally it is covered by a membrane called periosteum. The shafts of long bones are hollow, the cavity being filled by the marrow, which consists of blood and lymph vessels, nerves and fat supported by fibrous tissue.

Tissue of Bones.—Bone tissue is of two kinds, spongy, which forms the very thin bones and the ends of long bones, and compact, which is found in the shafts of long bones and in the outside of flat bones. Spongy bone is made up of a meshwork of bony arches, the spaces filled with vessels, bone cells and connective tissue.

Compact Bone. — Compact bone (Fig. 5) consists of a series of concentric layers of bone disposed around a canal called the Haversian canal which affords the passage for the blood-vessels. The layers of bone are separated from each other by small spaces called lacunæ, and passing through the bony layers and connecting the lacunæ are many fine channels called canaliculi; they serve to convey nourishment to the bone cells. The function of bone is to support, to protect, and to give attachment to muscles.

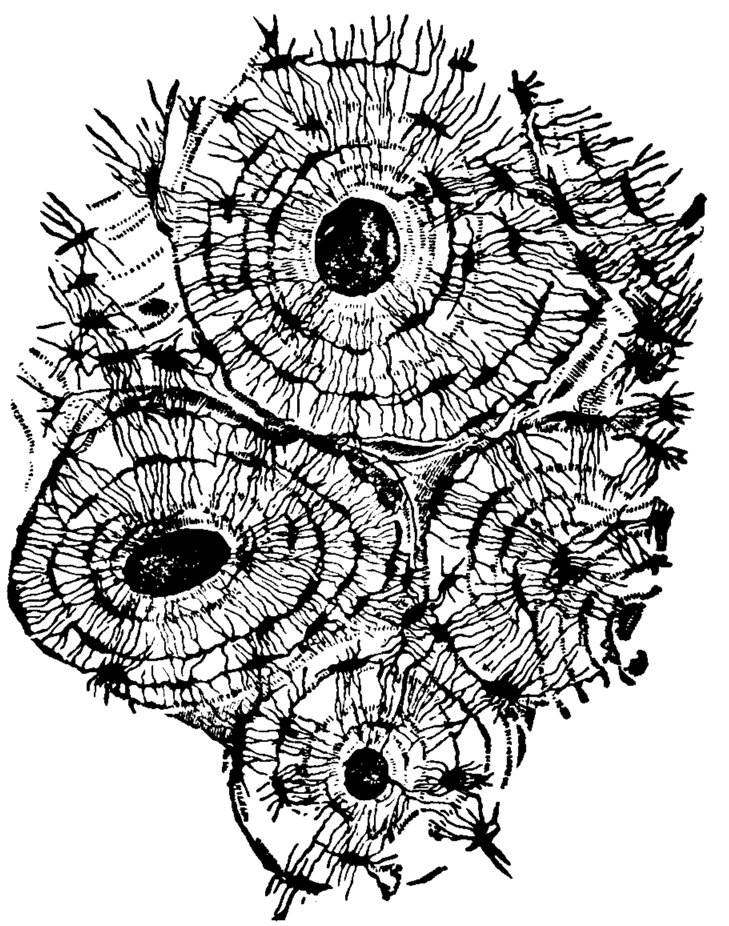


Figure 5.—SECTION OF BONE, MAGNIFIED.

Structure of Gristle.—Cartilage or gristle (Fig. 4) is fibrous tissue glued together by a substance containing chondrine. It has no blood-vessels but is nourished by lymph which filters through it by means of small spaces and canals analogous to the lacunæ and canaliculi of bone.

Use of Gristle.—Cartilage forms a smooth covering for the ends of bones entering into a joint; acts as a buffer between the bones of the spine, prevents certain tubes, like the windpipe, from collapsing, and as in the external ear gathers sound.

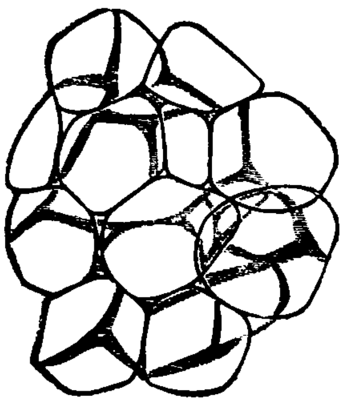


Figure 3.

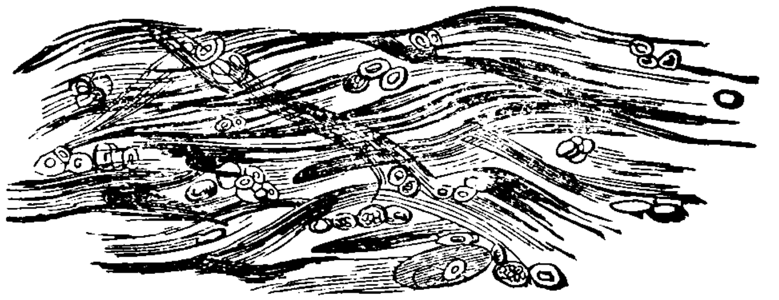


Figure 4.

Figure 3.—FAT.
Figure 4.—CARTILAGE. } Magnified.

Fibrous Tissue.—Fibrous tissue consists ultimately of fibres which are developed from spindle-shaped cells. Its function is to hold the various

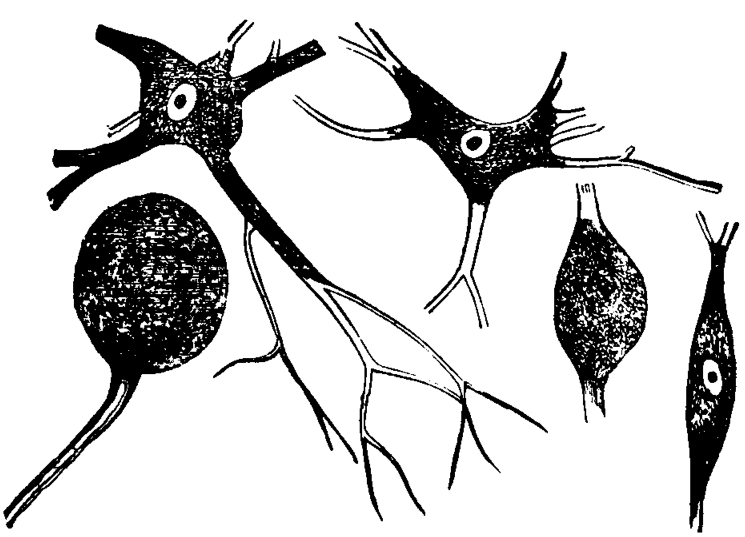


Figure 57.—NERVE CELLS.

parts of, and the organs themselves, together. Fatty tissue (Fig. 3) is fibrous connective tissue unfiltrated with fat.

Nervous Tissue.—Nervous tissue is either gray, which is a mass of tailed cells (Fig. 57) supported by a fine connective tissue (neuroglia), or white, which is made of bundles of little nerve febrils, each febril is the tail of a cell in the gray nervous tissue and is surrounded in some places by the white substance of Schwann (Fig. 58) and by a primitive sheath.

Figure 58.—NERVES. a, axis cylinder; b, inner border of white substance; c, c, outer border of same; d, d, tubular membrane; B, tubular fibres; e, in natural state; f, under pressure; g, varicose fibres.

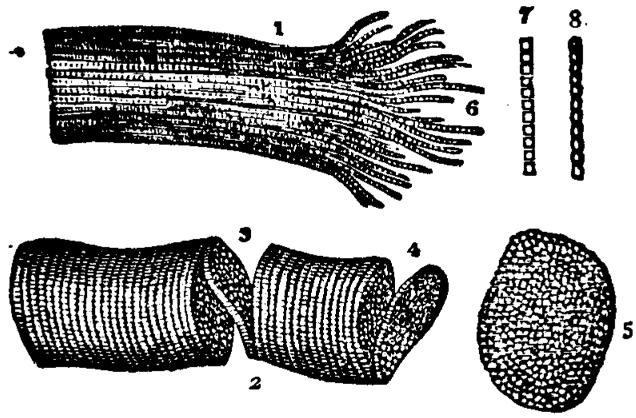


Figure 6.—STRIPED MUSCLE. 1, longitudinal section; 2, 3, 4, cross section; 5, detached disk; 7, 8, fibrillæ.

Muscular Tissue.—There are two kinds of muscular tissue, the voluntary or striped, and the involuntary or non-striated. Voluntary muscle (Fig. 6) is composed microscopically of the primitive fasciculi (minute bundles of febrils), each febril of which consists of a row of disks (Fig. 6) called sarcous elements. Involuntary muscle is built of a number of non-striped, spindle-shaped cells (Fig. 7) which branch and join with one another.

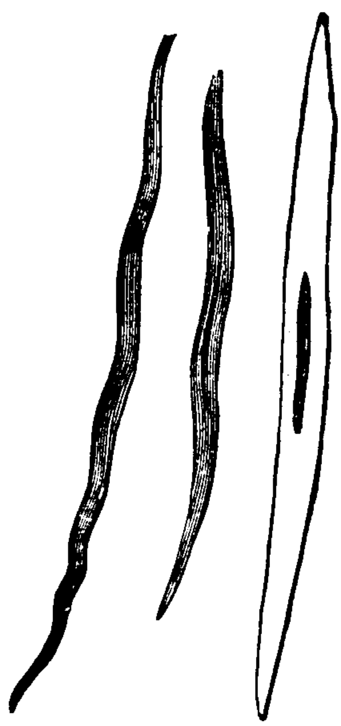


Figure 7.—NON-STRIATED MUSCLE.

THE BONES.

Framework of the Body.—The body skeleton (Fig. 13) forms the framework of the body. Bones are divided into long, short and flat bones. The long bones consist of a hollow shaft of compact bone, and two broader extremities of cancellated bone. They are found in the extremities and form levers by which the trunk is moved.

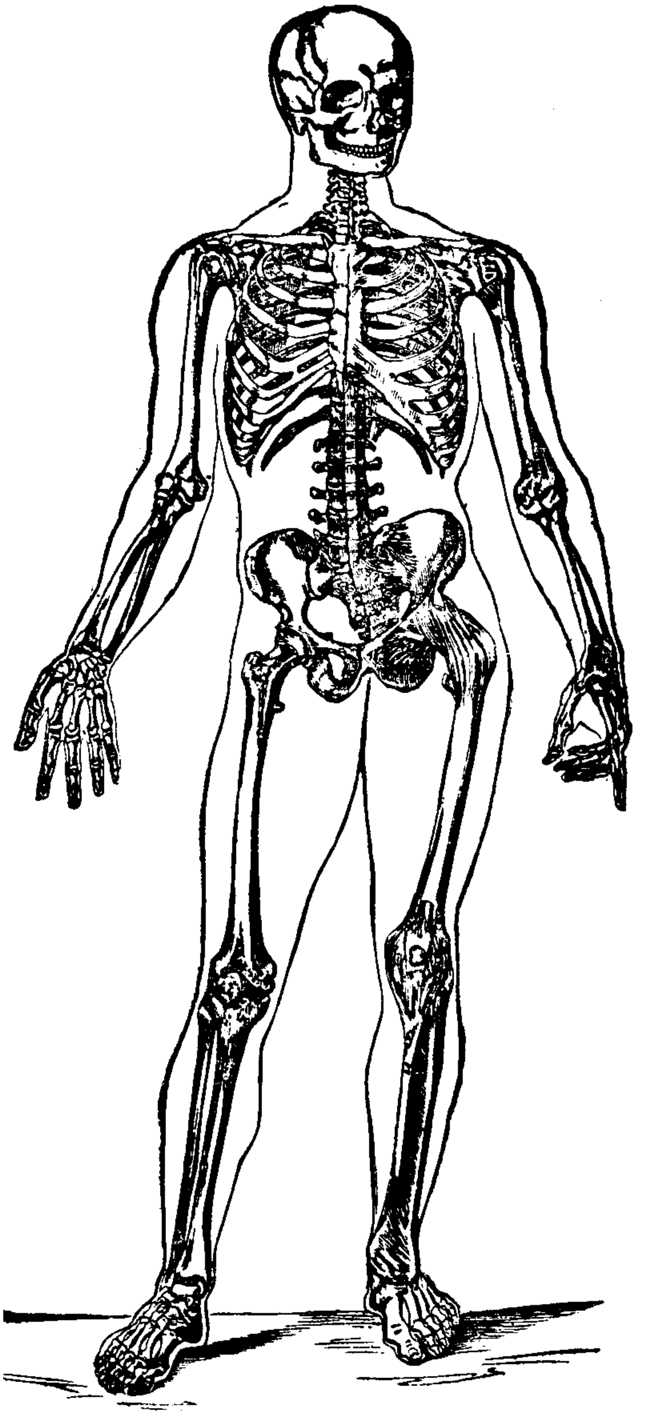


Figure 13.—HUMAN SKELETON.

Short Bones.—Short bones are placed where strength is more necessary than mobility, as in the hand and foot; their structure is spongy, covered by a thin layer of compact bone.

Flat Bones.—The flat bones are found where protection of important organs is necessary, as in the skull, sternum and scapulæ. They consist of two tables of compact bone filled in with cancellous tissue. Certain bones do not belong to one class alone and are called mixed bones.

Number of Bones.—There are in the adult skeleton, excluding the teeth, ossicles of the ear, and Wormian bones, 200 separate bones. These are:

In the spinal column	26
In the skull	8
In the face	14
Ribs, breast bone and hyoid bone	26
Upper extremity	64
Lower extremity	62

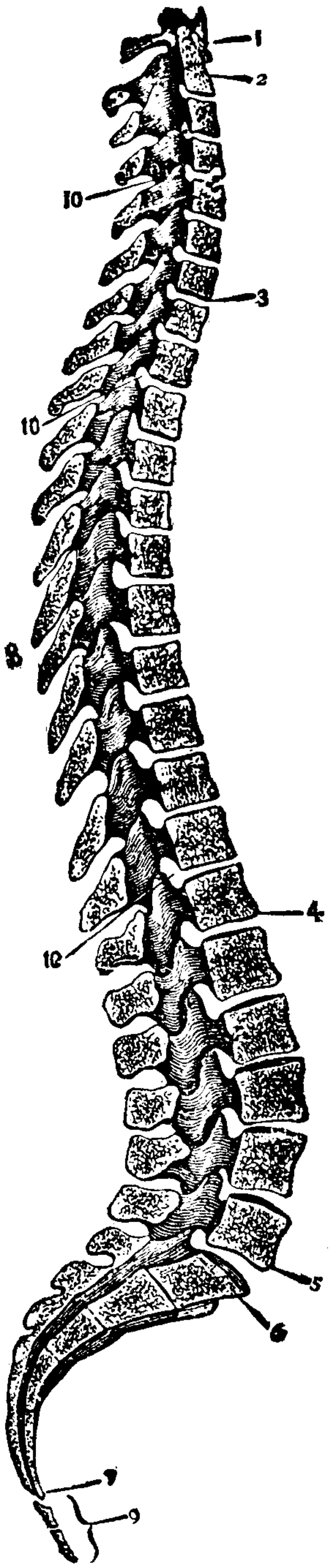


Figure 14.

THE SPINE.

Spinal Column.—The spine (Fig. 14) is a flexible column made of small bones called vertebræ, seven cervical, twelve dorsal, five lumbar, five sacral and four coccygeal vertebræ.

Spinal Vertebræ.—A vertebra (Figs. 16 and 17) consists of a solid portion in front called the body, and an arch behind, so that when placed

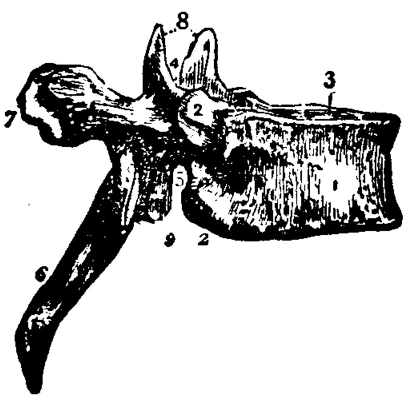


Figure 16.

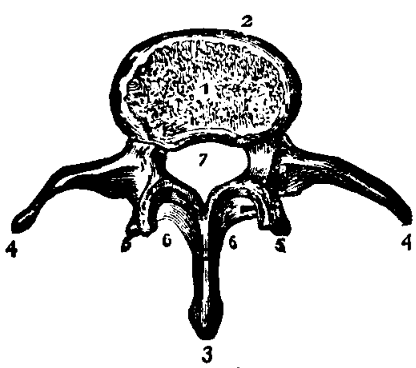


Figure 17.

Figure 14.—SPINAL COLUMN. 1, atlas; 2, axis; 3, vertebra prominens; 4, twelve dorsal; 5, fifth lumbar; 6, 7, sacrum; 8, coccyx; 9, a spinous process; 10, 10, intervertebral foramina.

Figure 16.—DORSAL VERTEBRA. 1, body; 2, facet for rib; 3, superior surface body; 4, 5, intervetebral notch; 6, spinous process; 7, articular facet for tubercle of a rib; 8, 9, articular processes.

Figure 17.—LUMBAR VERTEBRA. 1, body; 2, front of the body; 3, spinous process; 4, transverse process; 5, articular process; 6, arch; 7, spinal foramen.

one above the other, as in Figure 14, the bodies of the vertebræ form a support for the body and the arches a canal which contains and protects the spinal cord. The arches are formed by a plate of bone on each side (lamina) joined to the body or constructed portion of bone (pedicle) and unite behind to form the spinous process, which is the portion one feels when running a finger down the back.

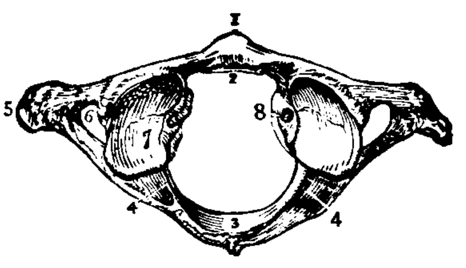


Figure 15.—ATLAS. 1, anterior tubercle; 2, facet for axis; 3, posterior surface spinal canal; 4, 4, intervertebral notch; transverse process; 5, foramen for vertebral artery; 7, superior articular process; 8, tubercle for transverse ligament.

The Atlas.—The first cervical vertebra or atlas (Fig. 15) has neither body nor spinous process, but consists of an anterior and posterior arch and two lateral masses on which rests the skull. The axis, or cervical vertebra has a projection from the upper surface of its body (odontoid process) which fits in the anterior arch of the atlas, permitting the head with the atlas to be rotated from side to side.

The Sacrum.—The sacrum consists of five vertebræ welded into one bone. It is triangular in shape and is wedged in between the haunch bones, forming the back of the pelvis. Attached to its apex is the coccyx, which consists of four vertebræ, so joined as to form one bone.

Ligaments.—The vertebræ are tied together by ligaments. Between each vertebra and its neighbor is a disk of cartilage, which acts as a buffer to prevent shock and allows the spine to bend in various directions.

THE SKULL.

Bones of the Skull.—The skull is divided into the cranium or brain case and the face. The cranial bones are one occipital, two parietal, one frontal, two temporal, one sphenoid and one ethmoid. The occipital bone forms the back and under part of the skull. It is perforated by a large opening (foramen magnum) which transmits the spinal cord to the spinal canal. The cerebellum rests on its inner or upper surface, the external surface gives attachment to muscles.

Side and Top Bones.—The parietal bones form the sides and top of the cranium, joining in the median line and being placed between the occipital bone behind and the frontal bone in front.

Frontal Bone.—The frontal bone forms the forehead and forms the roof of the orbit, on the upper surface of which rests the brain. The orbital plates are separated by the ethmoid bone, which is spongy and filled with perforations which transmit the nerves of smell to the nose.

Temporal Bone.—The temporal bone consists of a squamous or scale-like portion which overlaps the parietal bone, and a petrous or stony portion which helps form the floor of the cranium. The petrous portion lodges in the internal and middle ear.

Sphenoid Bone.—The sphenoid resembles a butterfly in shape. It is

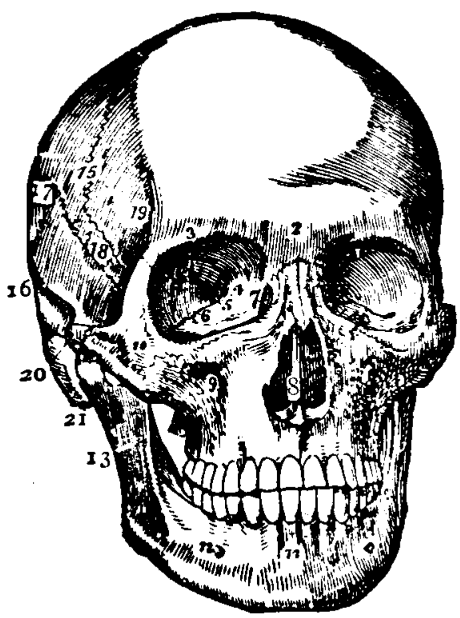


Figure 18.

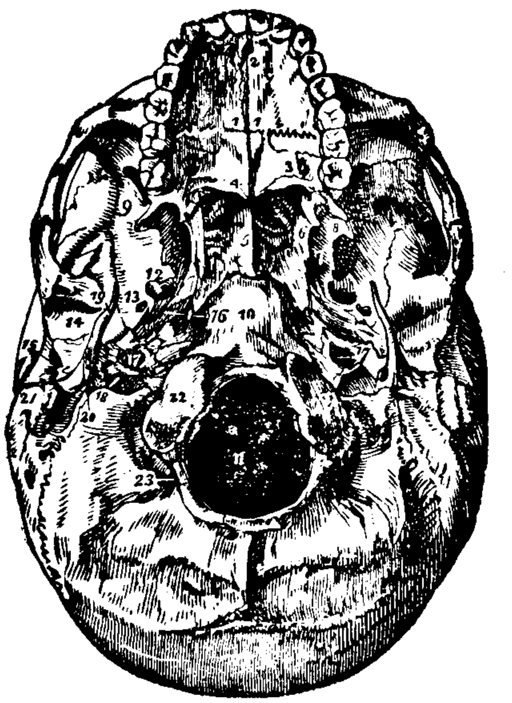


Figure 19.

Figure 18.—FRONT OF THE SKULL. 1, os frontalis; 2, globella; 3, supraorbital ridge; 4, optic foramen; 5, sphenoidal fissure; 6, spheno-maxillary fissure; 7, lachrymal fossa; 8, anterior nares; 9, infraorbital foramen; 10, malar bone; 11, symphysis menti; 12, anterior mental foramen; 13, ramus of the lower jaw; 14, parietal bone; 15, coronal suture; 16, temporal bone; 17, squamous suture; 18, great wing of the sphenoid.

Figure 19.—BASE OF THE SKULL. 1, hard palate; 2, foramen incisivum; 3, palatine plate of palate bone; 4, crescenteric ridge; 5, vomer; 6, internal pterygoid plate; 7, pterygoid fossa; 8, external pterygoid plate; 9, temporal fossa; 10, basilar process; 11, foramen magnum; 12, foramen ovale; 13, foramen spinale; 14, glenoid fossa; 15, meatus aditorius externus; 16, foramen lacerum anterius; 17, carotid foramen; 18, foramen lacerum posterius; 19, styloid process; 20, stylo-mastoid foramen; 21, mastoid process; 22, condyles of occipital bone; 23, posterior condyloid foramen.

the keystone of cranial architecture binding the bones of the head firmly together.

Facial Bones.—The facial bones are: two nasal bones, forming the bridge of the nose; two superior maxillary (upper jaw); two lachrymal, forming a portion of the inner wall of the orbit; two malar or cheek bones; two palate bones forming the back part of the roof of the mouth and the corresponding portion of the floor of the nose; two inferior turbinated bones which are scrolls of bone placed in either nostril; one vomer, forming the partition between the nostrils; and the lower jaw or inferior maxillary bone, horseshoe in shape, joining with the temporal bone above and being freely movable below to permit chewing, talking, etc.

Hyoid Bone.—The hyoid bone is U-shaped, situated in the neck just above the larynx and gives attachment to many muscles of the tongue and throat.

THE THORAX.

The Chest.—The thorax or chest is an elastic bony cage made by the breast bone in front, the spine behind, and the ribs and their cartilages at the sides. It is filled by the heart and lungs, which it protects. The sternum or breast bone occupies the middle line anteriorly, is flat, and is made of three pieces, the manubrium (handle), the gladiolus (blade), and the pointed extremities, the ensiform or xiphoid appendix, these names were given by the ancients who compared it to a sword.

The Ribs.—There are twenty-four ribs (Fig. 20), twelve on each side. They are joined to the vertebra behind and to the sternum, by means of cartilages, in front. They are irregularly semicircular in shape, flattened antero-posteriorly, and slightly twisted on themselves. The head joins the vertebra behind, the neck is the constriction in front of the head and the angle, the point of greatest curvature. The seven upper ribs unite directly with the sternum and are called true ribs. The other five are called false ribs, the upper three being united in front to the cartilages of the ribs above them, and the last two having no attachment in front are termed floating ribs.

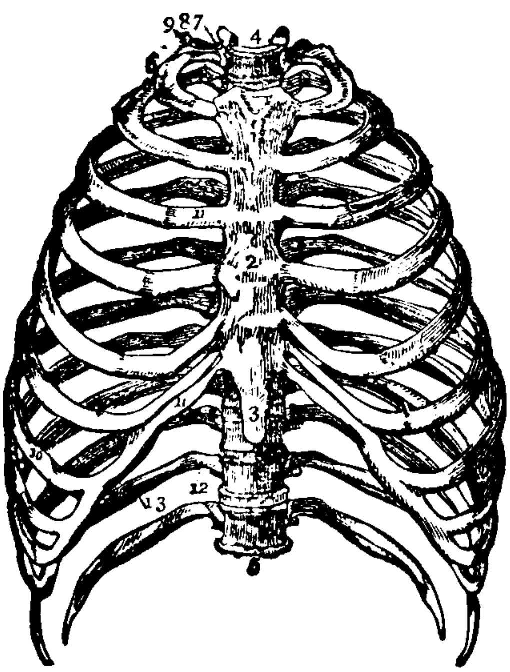


Figure 20.—THORAX. 1, manubrium; 2, gladiolus; 3, ensiform process, 4, first dorsal vertebra; 5, twelfth dorsal vertebra; 6, first rib; 7, its head; 8, its neck; 9, its tubercle; 10, last true rib; 11, its cartilage; 12, angle of eleventh rib; 13, its body.

THE UPPER EXTREMITY.

The Shoulders.—The upper extremity consists of the shoulder, the arm, the forearm, and the hand. The bones of the shoulder are the clavicle and scapula connecting the arm with the trunk. The clavicle, collar, or key-bone is a short bone curved like the letter *f*, running horizontally between the sternum and scapula.

The Scapula.—The scapula (Fig. 21) forms the back of the shoulder, is triangular in shape, the apex pointing downward and lies on the ribs. On the upper part of the outer surface is a thick triangular spine, the outer extremity of which (the acromion) forms the point of the shoulder.

Socket of the Shoulder.—Beneath this process the upper angle is hollowed out to relieve the upper end of the arm bone. In front of this depression is a curved prominence, the coracoid process.

Arm Bone.—The humerus (Fig. 22) or arm bone consists of a long cylindrical shaft, having a rounded head above for articulation with the

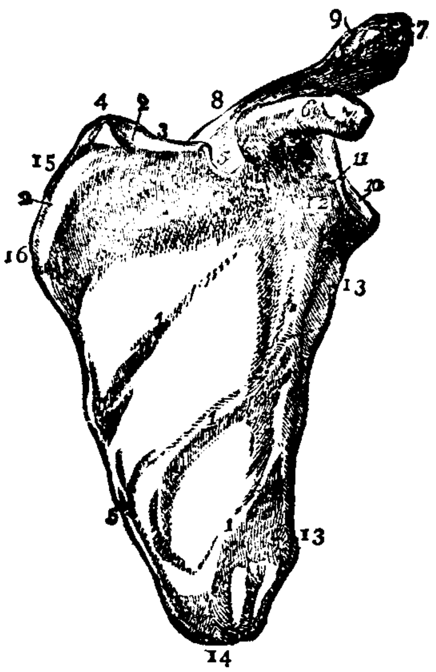


Figure 21.

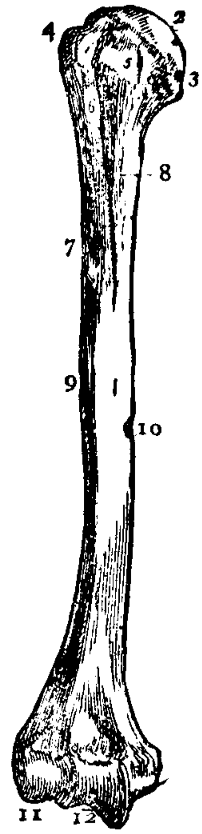


Figure 22.

Figure 21.—SCAPULA. 1, 1, 1, oblique ridges; 2, 2, subscapular fossa; 3, superior border; 4, superior angle; 5, supra-scapular notch; 6, coracoid process; 7, acromion process; 8, spine of scapula; 9, articular surface; 10, glenoid cavity; 11, head of scapula; 12, neck; 13, inferior border; 14, inferior angle; 15, posterior border; 16, origin of the spine.

Figure 22.—HUMERUS. 1, shaft; 2, head; 3, anatomical neck; 4, greater tuberosity; 5, lesser tuberosity; 6, bicipital groove; 7, ridge pectoralis major; 8, internal bicipital ridge; 9, insertion of deltoid muscle; 10, nutrient foramen; 11, facet for radius; 12, facet for ulna.

scapula, and a broad flattened lower extremity for articulation with the forearm bones.

The Forearm.—The bones of the forearm are the ulna and the radius. The ulna (Fig. 24) lies on the inner side of the forearm when the palm of the hand faces upward. The upper extremity which joins the humerus, has two processes, the olecranon, forming the point of the elbow and the coronoid process, which complete the hinge joint of the elbow in front.

The lower end of the ulna is small and does not articulate with any bone of the wrist.

The Radius.—The radius (Fig. 23) lies on the outer side of the forearm. It has a cup-shaped head for articulation with the humerus. The rounded edge of the head fits in a concavity of the ulna and is surrounded

Figure 23.

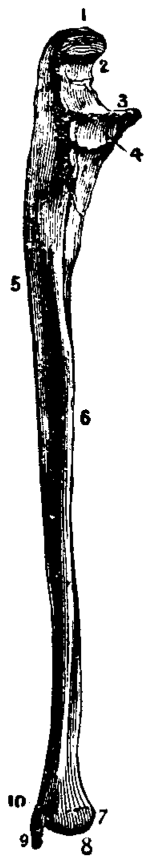


Figure 24.

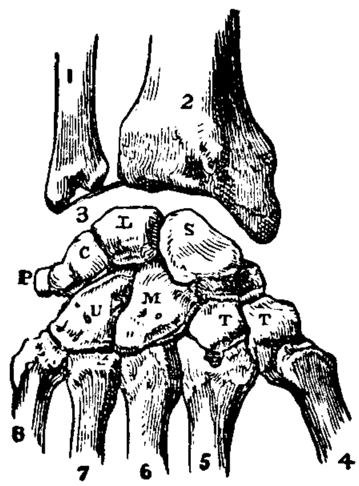


Figure 25.

Figure 23.—RADIUS. 1, head; 2, articulates with ulna; 3, neck; 4, tuberosity; 5, interosseus ridge; 6, articulates with ulna; 7, carpal surface; 8, styloid process; 9, insertion of pronator quadratus.

Figure 24.—ULNA. 1, olecranon; 2, sigmoid cavity; 3, coronoid process; 4, lesser sigmoid cavity; 5, external surface; 6, interosseus ridge; 7, articulates with radius; 8, carpal surface.

Figure 25.—CARPUS. 1, ulna; 2, radius; 3, interarticular cartilage; 4, metacarpal of thumb; 5, 6, 7, 8, metacarpal bones of fingers; S, scaphoid; L, semilunar; C, cuneiform; P, pisiform; T, T, trapezium and trapezoid; M, magnum; U, unciform.

by a sling-like ligament, which allows the head to rotate. The lower extremity is larger and is hollowed out to fit the wrist bones.

The Wrist.—The wrist or carpus consists of eight small bones in two rows (Fig. 25). In the upper row, beginning at the radial side, are the scaphoid, semilunar, cuneiform, and pisiform bones; in the lower row, the trapezium, trapezoid, or magnum and unciform bones.

The Hand.—The hand is made of five short cylindrical bones called the metacarpal bones (Fig. 25), to the lower extremity of which are attached the finger bones or phalanges, there being two for the thumb and three for each finger.

THE LOWER EXTREMITY.

Parts of Lower Extremity.—The lower extremity consists of three parts, the thigh, the leg and the foot, and is united to the trunk by the os innominatum or haunch bone, which bears the same relation to the lower extremity that the bones of the shoulder do to the upper extremity.

The os innominatum (Fig. 26) consists of the ilium, ischium and pubes, which in the adult grow together and form one single bone. It is irregularly oblong in shape and twisted upon itself. The ilium is the broad upper part of the bone and forms the prominence of the hip. The ischium is the V-shaped lower portion upon which we sit. The pubes is situated in front and is also V-shaped; in the adult the upper part is covered by hair. Between these V-shaped bones is a large opening, the obturator or thyroid foramen.

Hip Socket.—At the junction of the three bones is a cup-shaped cavity, the acetabulum or socket of the hip, which receives the rounded head of the thigh bone. In front the pubic bones join and behind the sacrum complete the bony ring of the pelvis. The pelvis (Fig. 26) is basin-shaped, supports the contents of the abdomen and the trunk upon the limbs.

Thigh Bone.—The femur (Fig. 27) or thigh bone is the largest and strongest bone in the body. It consists of a shaft and two extremities. The upper extremity consists of a head which is spherical and smooth, fitting into the acetabulum, and a neck which joins the shaft at an obtuse angle. The shaft supports the body, is an important lever in locomotion and gives attachment to muscles. The lower extremity resembles the lower end of the humerus; it is smooth and joins with the main bone of the leg, the tibia.

Knee Pan.—The patella or knee pan is a small flat bone situated in the huge tendon of the great muscles on the front of the thigh. It protects the knee joint and increases the leverage.

Leg Bones.—The leg bones are the tibia or shin bone (Fig. 27a) and the fibula (Fig. 28). The tibia, the larger and stronger, is expanded above to join the femur; the shaft is triangular, the sharp edge in front may be readily felt beneath the skin as the shin. The lower extremity forms the inner part of the ankle joint. The fibula (Fig. 28) is a long, slender bone lying on the outside of the leg. Its upper end joins the ex-

Figure 26.

Figure 26.—MALE PELVIS.

panded upper extremity of the tibia, strengthening it, the lower end forms the outer part of the ankle joint.

Foot Bones.—The foot (Fig. 29) consists of the tarsus or ankle bones, the metatarsus or foot bones and the phalanges or toe bones. The bones of the tarsus are the calcaneum, os calcis, or heel bone, the astragalus which joins the bones of the leg, the cuboid, the scaphoid and the three cuneiform bones. There are five metatarsal bones corresponding to the metacarpar bones of the hand. The phalanges are similar to those of the hand, there being two for the great toe and three for each of the other toes.

THE JOINTS.

Where two bones meet a joint or articulation exists. The bones may be so soldered together (Fig. 30) as to form an immovable joint, as in the bones of the skull; they may be slightly movable as the pelvic and vertebral joints, or they may be freely movable as in most of the articulations of the limbs. The freely movable joints (Fig. 31) are the hinges, as the elbow; the ball and socket, as the shoulder; the gliding, as the sterno, clavicular articulation and the ring and pivot (Fig. 32) joint, as the atlo-axoid articulation. The structures entering into joint formation are bones, cartilages, ligaments and synovial membrane which secretes the lubricating fluid of the joint. (Figs. 30, 31 and 32.)

Figure 27.

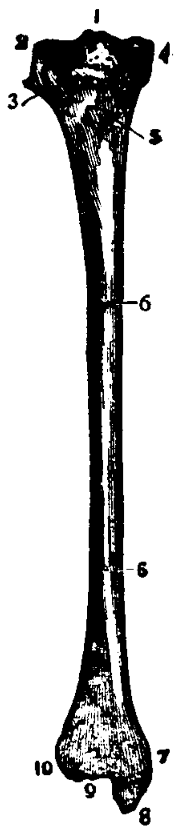


Figure 27a.

Figure 28.

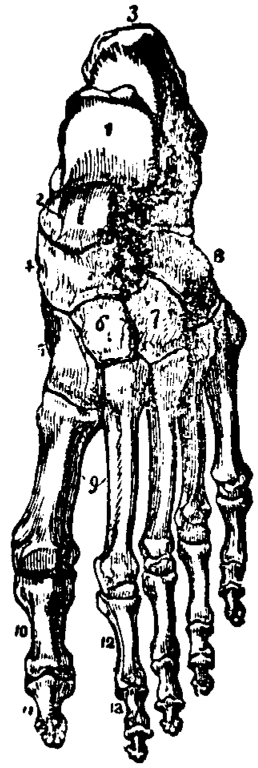


Figure 29

Figure 27.—FEMUR. 1, depression for round ligament; 2, head; 3, depression for rotary muscles; 4, great trochanter; 5, lesser trochanter; 6, roughness for gluteus maximus; 7, linea aspera; 8, gastrocnemius insertion; 9, external condyle; 10, depression for anterior crucial ligament; 11, depression for posterior crucial ligament; 12, origin of internal lateral ligament.

Figure 27a.—TIBIA. 1, spine; 2, articulates with femur; 3, facet for fibula; 4, head; 5, tubercle; 6, 6, shaft; 7, internal malleolus; 8, attaches internal lateral ligament of ankle; 9, tarsal surface; 10, facet for fibula.

Figure 28.—FIBULA. 1, head; 2, articular facet; 3, insertion of external ligament; 4, shaft; 5, 5, external face; 6, interosseus ridge; 7, facet for tibia; 8, external malleolus; 9, tarsal surface.

Figure 29.—FOOT BONES. 1, astragalus; 2, its anterior face; 3, os calcis; 4, scaphoid; 5, internal cuneiform; 6, middle cuneiform; 7, external cuneiform; 8, cuboid; 9, 9, metatarsal bones; 10, first phalanx of big toe; 11, second phalanx; 12, 13, 14, phalanges of other toes.

It will be unnecessary to describe the individual joints, reference having already been made to them in the section on bones.

THE MUSCLES.

Function of Muscles.—Muscles are familiar as the flesh of animals. They are attached to bones, ligaments, cartilages and the skin, and by their contractions cause all the movements of the body. Some muscles are arranged in sheets (Fig. 33), some are spindle-shaped, some are disposed

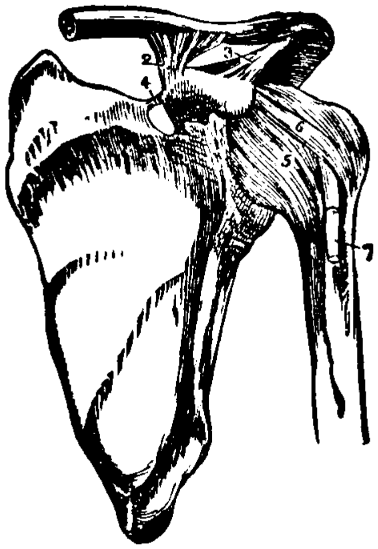


Figure 30.

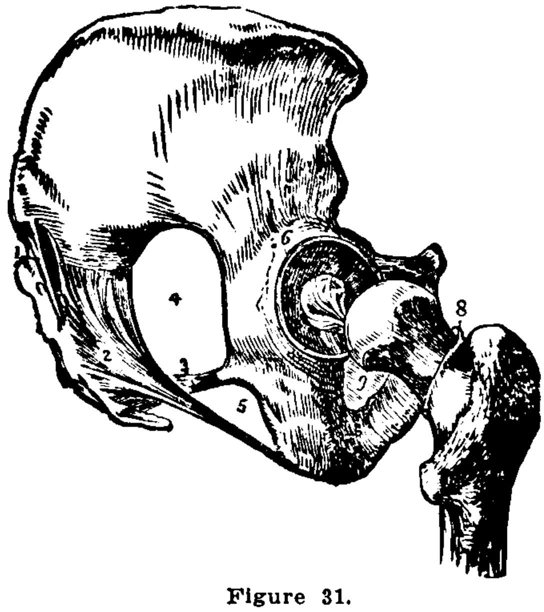


Figure 31.

Figure 30.—ACROMIO-CLAVICULAR and SHOULDER JOINTS. 1, upper acromio-clavicular ligament; 2, coraco-clavicular ligament; 3, coraco-acromial ligament; 4, coracoid ligament; 5, capsular ligament of shoulder; 6, coraco-humeral ligament; 7, long head of biceps.

Figure 31.—HIP JOINT. 1, posterior sacro-iliac ligament; 2, greater sacro-sciatic ligament; 3, lesser sacro-sciatic ligament; 4, great sciatic notch; 5, lesser sciatic notch; 6, cotyloid ligament; 7, ligamentum teres; 8, attachment for capsular ligament; 9, obturator ligament.

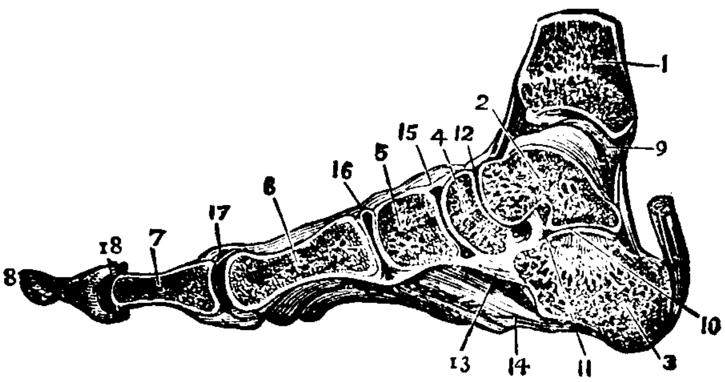


Figure 32.

Figure 32.—SECTION OF ANKLE JOINT. 1, tibia; 2, astragalus; 3, os calcis; 4, scaphoid; 5, internal cuneiform; 6, metatarsal of big toe; 7, 8, first and second phalanges of great toe; 9, articular cavity between tibia and astragalus; 10, synovial capsule between astragalus and os calcis; 11, calcaneo-astragaloid ligament; 12, synovial capsule between astragalus and scaphoid; 13, calcaneo scaphoid ligament; 14, calcaneo-cuboid ligament; 15, synovial capsule between scaphoid and internal cuneiform; 16, synovial capsule between internal cuneiform and first metatarsal; 17, metatarso-phalangeal articulation of great toe; 18, phalangeal articulation of great toe.

in rings like the muscle which closes the mouth, and in some the fibres spread out like a fan.

Muscle Attachments.—They are attached by fibrous cord, the tendons, or by broad fibrous bands, the aponeuroses. The end of the muscle which has the firmer attachment is called its origin (Fig. 34), the other end its insertion; this is, as a rule, merely relative, as in most cases the muscles act from either extremity; for instance, the sterno-cleido mastoid, the muscle which forms the prominent cord at either side of the neck, has its

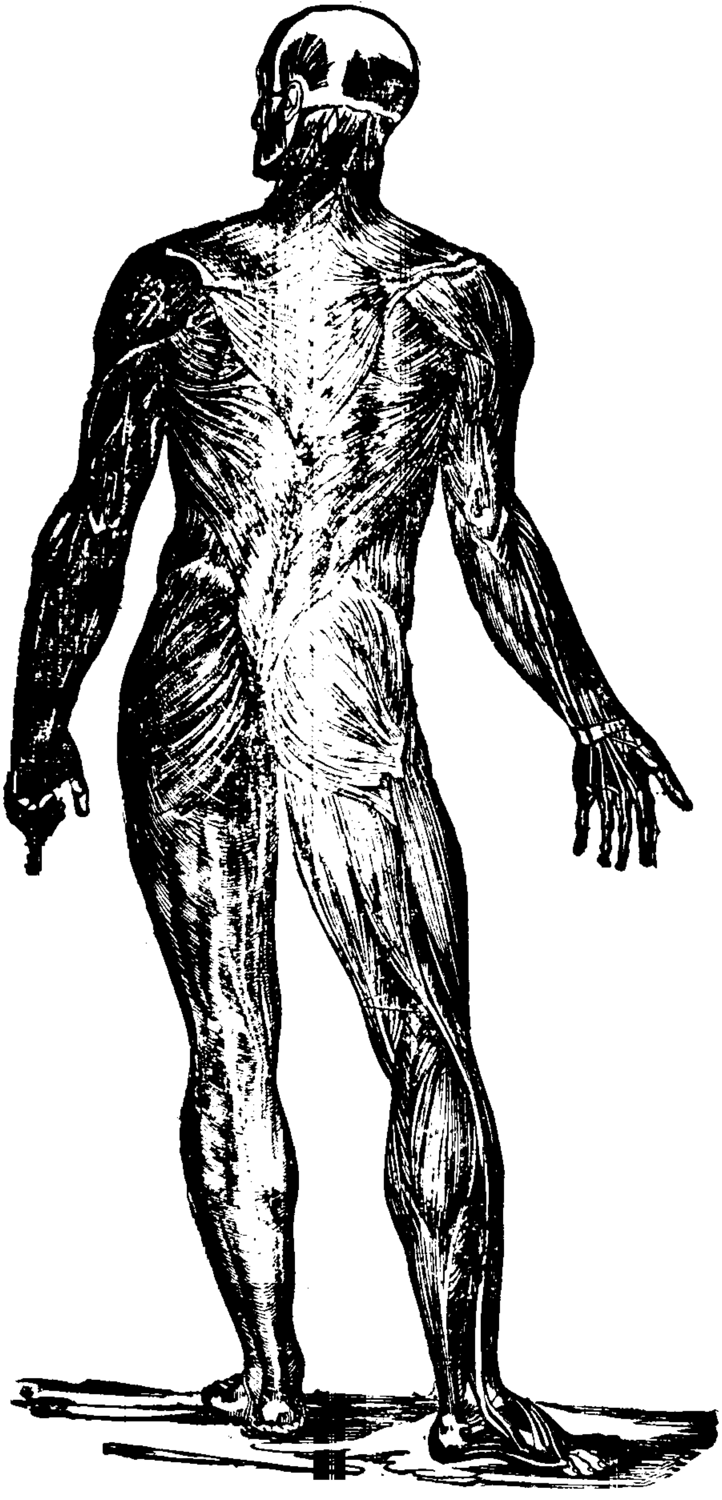


Figure 33.

Figure 33.—MUSCLES, BACK VIEW. The fascia is left upon the left limbs; removed from the right.

origin from the top of the breast bone and the end of the collar bone, and its insertion into the bony prominence of the skull behind the ear, its action is to bow the head and turn the face to the opposite side; but if the head be fixed it serves to raise the ribs and is thus an accessory muscle of respiration.

Face Muscles.—Of the numerous small muscles of the face (Fig. 35), it is not necessary to speak here; as a rule they arise from the bones of the

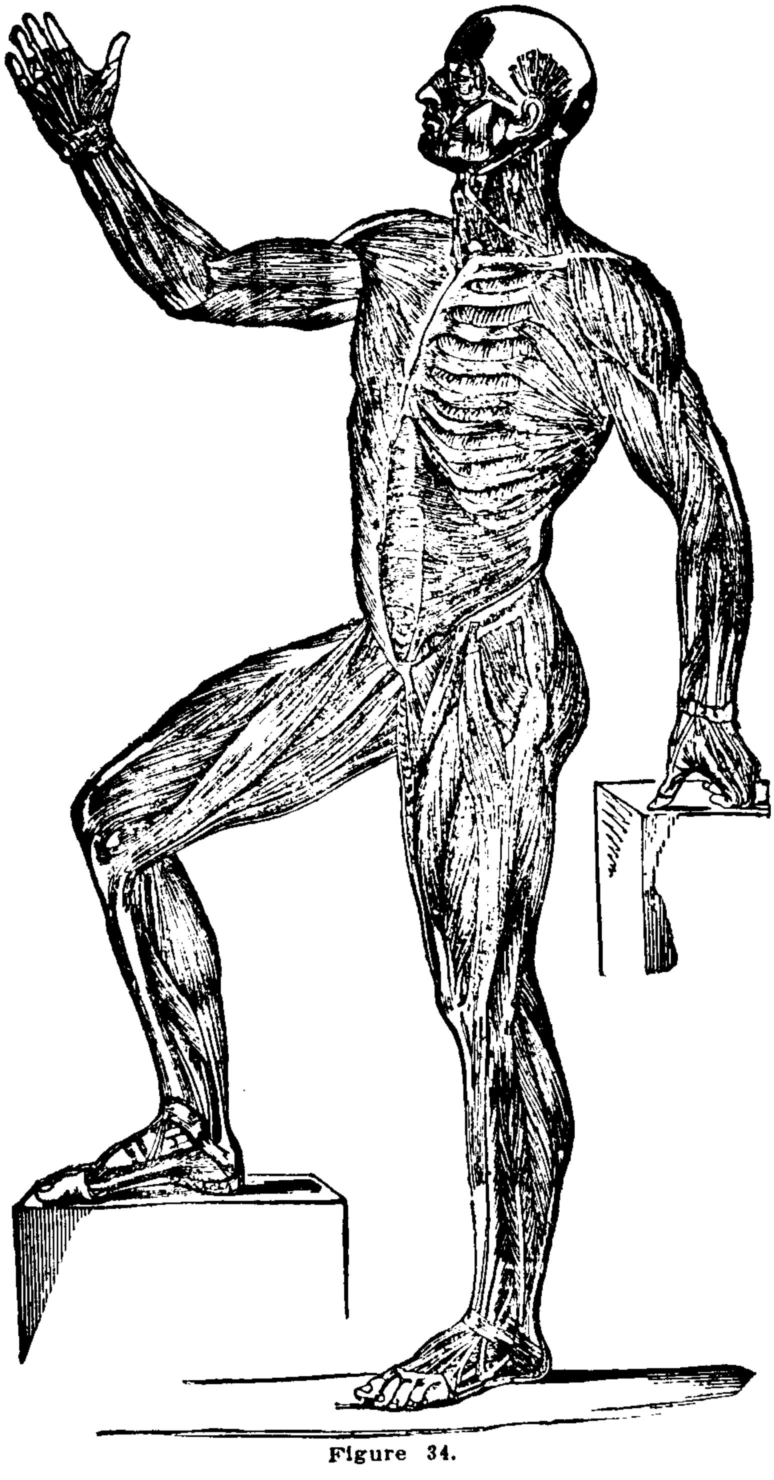


Figure 34.

Figure 34.—MUSCLES, FRONT VIEW. On the right half, superficial muscles; left half, deep muscles.

face and are inserted into the skin, by their mobility giving expression to the countenance.

Muscles of Chewing.—The muscles of the orbit will be taken up in connection with the eye. The muscles of mastication are the temporal, masseter, the two pterygoids and the buccinator. The temporal arises from the side of the head above the ear and is inserted into the top of the lower jaw. The masseter runs from the bony process external to the orbit, to the angle of the jaw and forms the hard mass felt in the cheek when the jaw is tightly closed.

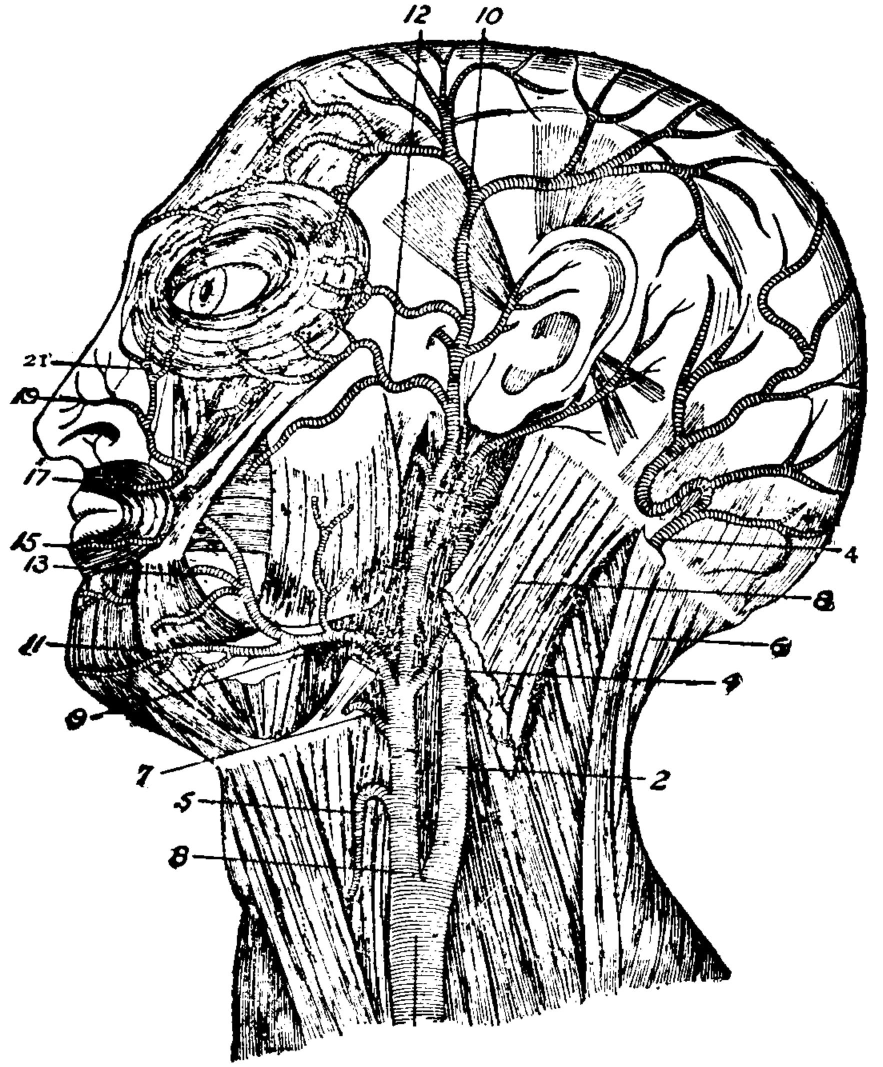


Figure 35.

Figure 35.—MUSCLES OF FACE, JAW AND NECK. 1, longus colli; 2, trapezius; 3, sterno-hyoid; 4, sterno-mastoid; 5, crico-thyroid; 6, trapezius; 7, constrictor of pharynx; 8, sterno-mastoid; 9, digastric; 10, attrahens aurem; 11, mylo-hyoid; 12, masseter; 13, depressor of lower lip; 15, orbicularis oris; 17, levator of upper lip; 19, levator of angle of mouth; 21, orbicularis palpebrarum.

Muscles of the Jaw.—The pterygoids run from the base of the skull to the lower jaw, moving it laterally. The buccinator is a broad, flat sheet in the cheek compressing the cheeks as when blowing or whistling, etc.

The sterno-cleido mastoid has already been mentioned above. The muscles of the larnyx will be spoken of in connection with diseases of the throat.

Muscles of the Back.—The most important muscles of the back are the trapezius, which pulls the head back or the shoulder upward or backward and which runs from the occipital bone and the spine as far as the middle of the back, to the shoulder bones; the latissimus dorsi, which draws the arm downward and backward, and which arises from the lower ribs, the lower half of the spine and the haunch bone and is inserted into the arm bone near its head; and the erector spinæ which arises from the pelvis and lumbar vertebræ and is inserted into all the vertebræ above; it maintains the spine erect.

Muscles of Thorax.—Concerning the thorax we may mention the

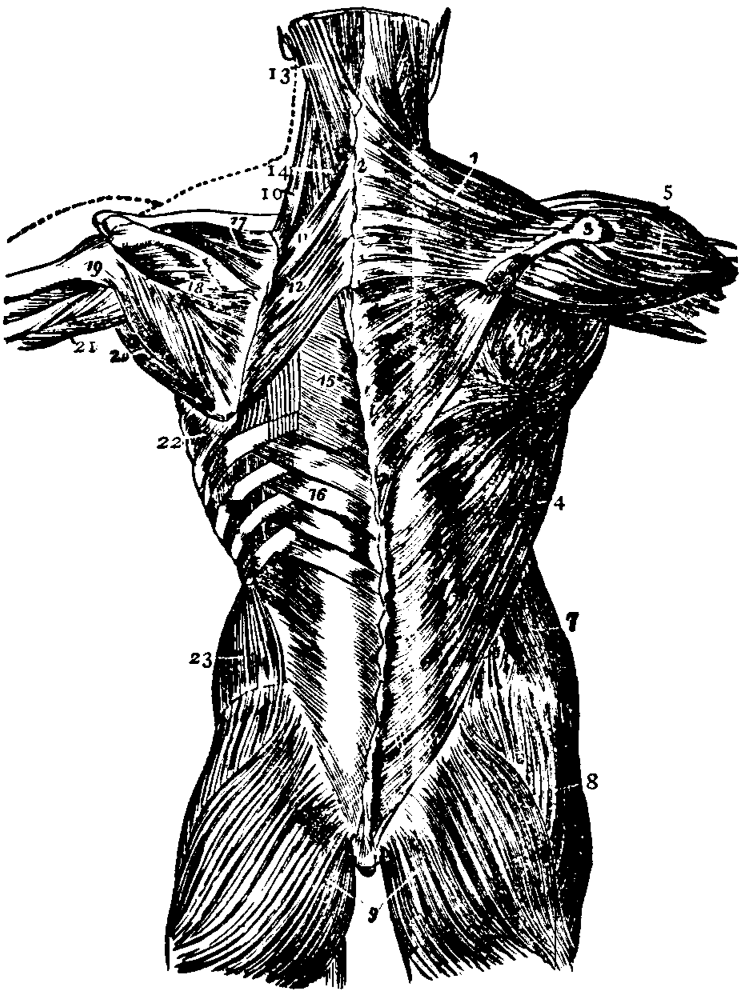


Figure 36.

Figure 36.—MUSCLES OF BACK. 1, trapezius; 2, its origin; 3, spine of scapula; 4, latissimus dorsi; 5, deltoid; 6, infra-spinatus; 7, external oblique; 8, gluteus medius; 9, gluteus maximus; 10, levator scapulæ; 11, rhomboideus minor; 12, rhomboideus major; 13, splenius capitus; 14, splenius colli; 15, origin latissimus dorsi; 16, serratus inferior posticus; 17, supra-spinatus; 18, infra-spinatus; 19, teres minor; 20, teres major; 21, long head triceps; 22, serratus major anticus; 23, internal oblique.

intercostal (between the ribs) muscles, external and internal, the external set raising the ribs and the internal set depressing the ribs in respiration.

The Diaphragm.—The diaphragm is a musculo-fibrous partition forming the dome of the abdomen and separating it from the thorax. It is attached to the lower ribs and spinal column and is perforated by tne aorta, inferior vena cava and gullet. It is a muscle of respiration and expulsion.

The Abdomen.—The abdomen is completed in front and at the sides by a thick wall of muscles which not only aid in protecting the underlying structures but assist in expelling the urine, feces, etc., from the body. This wall is made of the external oblique muscle which runs from the ribs downward and inward to the pelvic bones and linea alba—the linea alba or white line occupies the midline of the abdomen and is formed by the union of the various muscular structures of the abdominal wall; the internal oblique muscle arises from the ilium and lower fibrous part of the external oblique (Poupart's ligament), runs upward and inward to be inserted into the linea alba and lower ribs; the transversalis which runs transversely between the brain, spine, ribs and pelvis to the linea alba, and the rectus abdominalis which is situated near the middle line of the body and runs from the ribs to the pelvis.

Breast Muscles.—The pectoralis major and minor muscles form the fleshy masses of the breast. They run from the collar-bone, breast-bone and ribs to the caracoid process of the scapula and the humerus, the fibres converging from their origins to their insertions. They draw the shoulder forward and the arm across the chest.

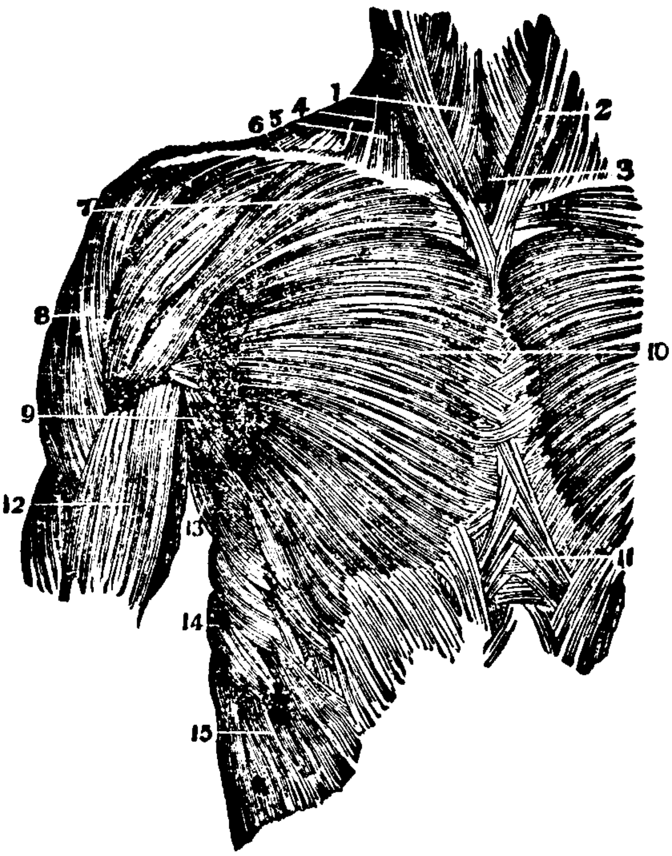


Figure 37.

Figure 37.—CHEST MUSCLES. 1, sterno-hyoid; 2, sterno-mastoid; 3, sterno-thyroid; 4, sterno-mastoid; 5, trapezius; 6, clavicle; 7, origin pectoralis major; 8, deltoid; 9, lower edge pectoralis major; 10, middle pectoralis major; 11, fibres external oblique; 12, biceps; 13, teres major; 14, serratus major anticus; 15, external oblique interlocking with serratus major.

Deltoid Muscle.—The deltoid (Fig. 37) forms the prominence of the shoulder. It arises from the clavicle and scapula, the fibres converging to be inserted into the humerus just above the middle. It raises the arm from the side.

The Biceps.—The biceps forms the prominence on the front of the arm when the forearm is flexed. It arises from the scapula by two heads and is inserted into the upper end of the radius. It flexes the forearm and assists in supinating or turning it over.

The Triceps.—The triceps arises from the shoulder blade and the back of the humerus by three heads, and is inserted into the upper end of the ulna. It extends the forearm.

Muscles of Forearm.—The muscles of the forearm are very numerous, and give the forearm and hand a multitude of movements. The muscles which turn the palm downward are called pronators, the most important of these is the pronator radii teres which runs from the inner part of the lower end of the humerus to the radius. The most important supinator

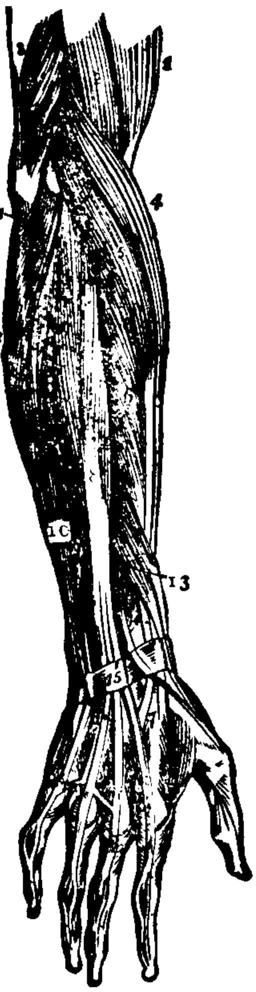


Figure 38.

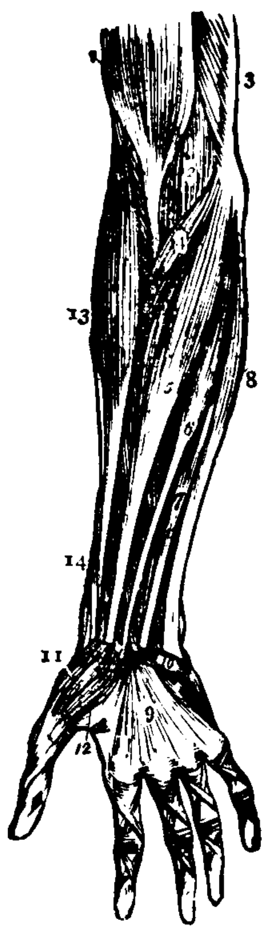


Figure 39.

Figure 38.—MUSCLES OF BACK FOREARM. 1, biceps; 2, brachialis internus; 3, biceps; 4, supinator longus; 5, extensor carpi radialis longior; 6, extensor carpi radialis brevior; 7 insertion of these muscles; 8, extensor communis digitorum; 9, extensor communis digitorum; 10, extensor carpi ulnaris; 11, anconeus; 12, flexor carpi ulnaris; 13, extensor minor pollicis; 14, extensor major pollicis; 15, posterior annular ligament.

Figure 39.—MUSCLES OF FRONT FOREARM. 1, biceps; 2, brachialis internus; 3, triceps; 4, pronator radii teres; 5, flexor carpi radialis; 6, palmaris longus; 7, flexor sublimus digitorum; 8. flexor carpi ulnaris; 9, palmar fascia; 10, palmaris brevis; 11, abductor pollicis; 12, flexor brevis pollicis; 13, supinator longus; 14, extensor ossis metacarpi pollicis.

or muscle which turns the palm upward (Fig. 38), is the supinator longus which runs from the outer part of the lower end of the humerus to the lower end of the radius.

Flexors.—The radial and ulnar flexors (of the wrist) come from the inner part of the arm bone and are inserted into the hand bones. Beneath these muscles lies the flexor sublimus digitorum which divides into four tendons or leaders, one for each finger. These leaders are split so as to give passage to the leaders of the flexor profundus digitorum which are inserted into the ends of the fingers. The thumb is moved by special muscles.

Radial Extensors.—The muscles on the back of the forearm are the longer and shorter radial extensors (of the wrist), which lie behind the long supinator and whose tendons are inserted respectively into the metacarpal bones of the first and second fingers. The ulnar extensor of the wrist lies on the ulnar side of the forearm, and is inserted into the metacarpal bone of the little finger. Between these muscles, in the middle of the forearm (Fig. 39), is the common extensor of the fingers which is inserted by four tendons into the backs of the last two bones of the fingers. The index and little fingers have special extensors. The hand is supplied by a number of short muscles, which give it marvelous dexterity.

MUSCLES OF THE LOWER EXTREMITY.

The muscles of the lower extremity consist of those of the hip, thigh, leg and foot. The psoas magnus and the iliacus, the former from the lumbar vertebræ, the latter from the inside of the ilium, are inserted together into the upper part of the femur. They flex the thigh and roll it outward. The buttocks are composed of the three glutei muscles. They arise from the pelvic bones and are inserted into the upper part of the femur. They extend the hips, raise the body from the stooping posture, and hold the trunk on the thigh bones. Partly beneath them lies a group of muscles (Fig. 41), the rotators of the hip; they are the pyriformis, gemelli, the internal and external obturators, and the quadratus femoris.

Thigh Muscles.—The rectus femoris with the vastus externus and internus form the mass of muscle on the front of the thigh. The rectus arises from the ilium, the vastus from the femur; they join to form a common tendon which is attached to the upper end of the tibia. They extend the leg, flex the thigh, and raise the body from the sitting to the standing posture.

The Tailor's Muscle.—The sartorius, the longest muscle in the body, runs from the ilium downward and inward across the thigh to the inner side of the shin bone below the knee. It flexes the thigh and crosses the legs.

The biceps femoris arises from the ischium and is inserted into the head of the fibula (Fig. 40). The semimembranosus and the semitendinosus take origin from the ischium and are inserted into the inner part of

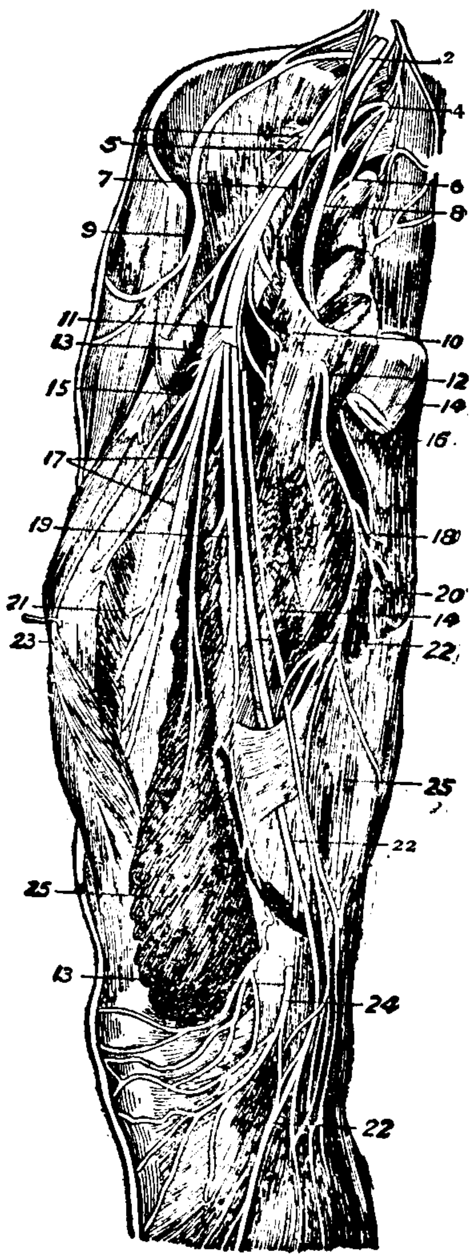


Figure 40.

Figure 40.—NERVES OF THIGH. 1, sympathetic ganglia; 2, third lumbar; 3, branches to iliacus; 4, fourth lumbar; 5, anterior crural; 6, lumbo-sacral; 7, branch to the psoas; 8, obturator; 9, external cutaneous; 10, nerve to pectineus; 11, branch anterior crural; 12, superficial division of obturator; 13, sartorius muscles; 14, adductor longus; 15, branch to rectus; 16, deep division of obturator; 17, branches to vastus externus and crureus; 18, adductor brevis; 19, branch to vastus internus; 20, adductor magnus; 21, vastus externus; 22, internal saphena; 23, rectus femoris; 24, patellar branch of saphena; 25, vastus internus; 26, gracilis.

the head of the tibia. They extend the hips, flex the knee, and raise the body from the stooping position.

Muscles of the Calf.—The calf of the leg is made of the soleus arising from the upper back part of the bones of the leg, and the gastrocnemius, arising from the lower end of the femur; they unite in a common tendon of great size, tendo-achillis, which is attached to the back of the heel bone. They extend the foot and raise the weight of the body in walking and running. Beneath them lie the popliteus and the flexors of the toes corresponding to the flexors of the fingers in the forearm. The extensor

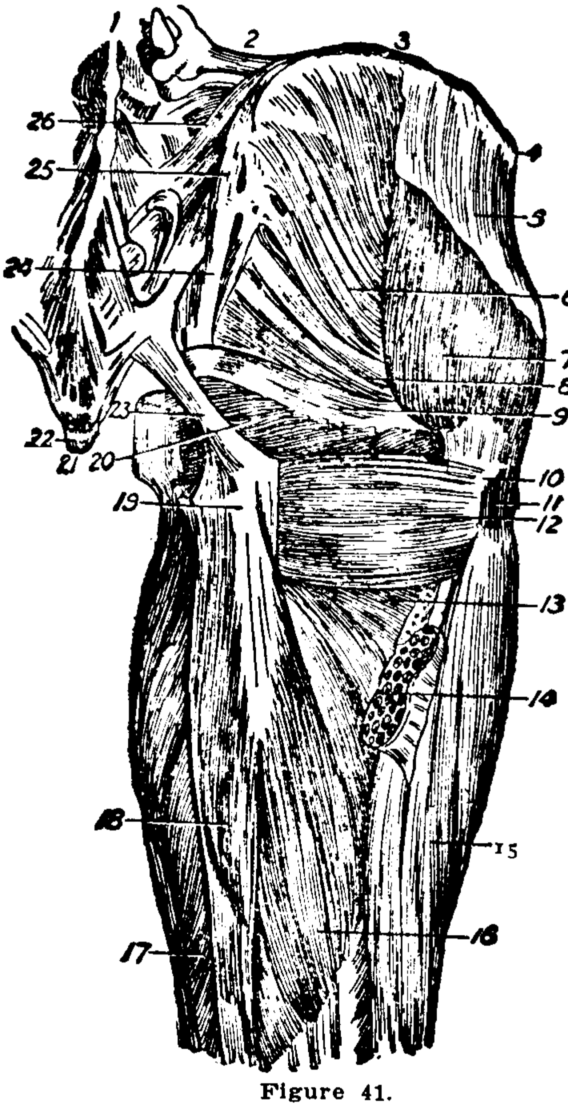


Figure 41.

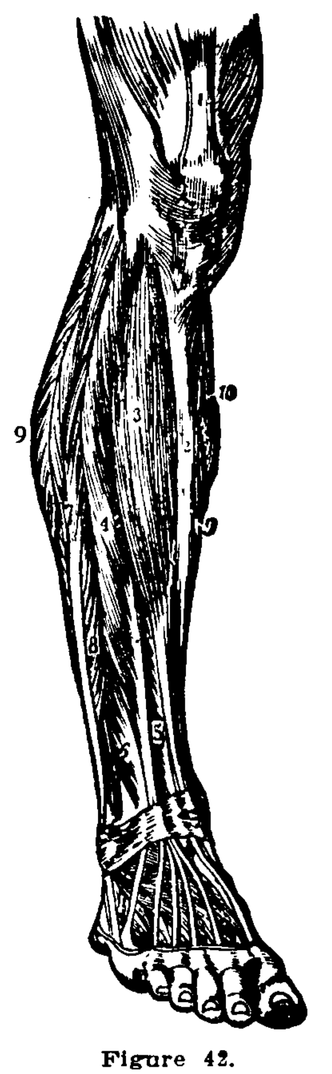


Figure 42.

Figure 41.—MUSCLES BACK OF THIGH. 1, fifth lumbar vertebra; 2, ilio-lumbar ligaments; 3, crest of ilium; 4, anterior superior spinous process; 5, origin of fascia femoris; 6, gluteus medino: 7, its lower and anterior portion; 8, pyriformis; 9, gemini; 10, trochanter major; 11, insertion gluteus medius; 12, quadratus femoris; 13, adductor magnus; 14, insertion gluteus maximus; 15, vastus extensus; 16, long head biceps; 17, semimembranous; 18, semitendinosus; 19, tuber ischii; 20, obturator internus; 21, point of coccyx; 22, posterior coccygeal ligament; 23, 24, great sacro-sciatic ligament; 25, posterior superior spinous process; 26, posterior sacro-iliac ligaments.

Figure 42.—MUSCLES FRONT OF LEG. 1, tendon of quadriceps; 2, spine tibia; 3, tibialis anticus; 4, extensor communis digitorum; 5, extensor proprius pollicis; 6, peroneus tertius; 7, peroneus longus; 8, peroneus brevis; 9, soleus; 10, gastrocnemius; 11, extensor brevis digitorum.

longus digitorum is attached to the leg bones and to the second and third phalanges (Fig. 42) of the four lesser toes by four tendons. The great toe has two special flexors and a special extensor and the little toe a special flexor.

On the back of the foot is one muscle only, the extensor brevis digitorum, which assists the long extensor of the toes.

Sole of the Foot.—The sole of the foot, like the palm of the hand, is covered by a dense fibrous sheath, the plantar fascia, running from the heel bone to the metatarsal bones in front; it sustains the arch of the foot, and protects the vessels and nerves beneath. Immediately beneath it lies the flexor brevis digitorum, arising from the heel bone and being inserted into the sides of the second bones of the lesser toes by four tendons which are perforated by the long flexor tendons; and just below this is the flexor accessorius, which is attached to and aids the tendon of the long flexor. There are numerous other small muscles in the foot which give it complicated movements.

THE DIGESTIVE APPARATUS.

What it Consists of.—The digestive apparatus consists of the alimentary or food canal (Fig. 72) which extends from the mouth to the anus and is between twenty and thirty feet in length, and of the various glands which open into it. The alimentary canal is divided into the mouth, pharynx, œsophagus, stomach, small intestine and large intestine. Its function is to digest or convert the food into an assimilable form.

The Mouth.—The mouth is an oval cavity containing the tongue and teeth. In it the food is ground up and mixed with saliva (Fig. 68), which

Figure 68.

Figure 68.—SALIVARY GLANDS. 1, carotid; 2, Steno's duct; 3, submaxillary; 4, its duct; 5, sublingual.

not only moistens it so that it may be readily swallowed but acts on the starchy foods, changing them to sugar. The teeth are described in the chapter on teeth. The saliva is secreted by the parotid glad below and in front of the ear, and by the submaxillary and sublingual glands, which lie in the floor of the mouth.

The Tongue.—The tongue (Fig. 69) is a muscle covered by mucous membrane, containing many mucous glands and little projections called papillæ in which are lodged the ends of the taste nerves. The tongue is the organ of taste, assists in articulation, and aids in mixing the saliva with food and keeping the food between the teeth.

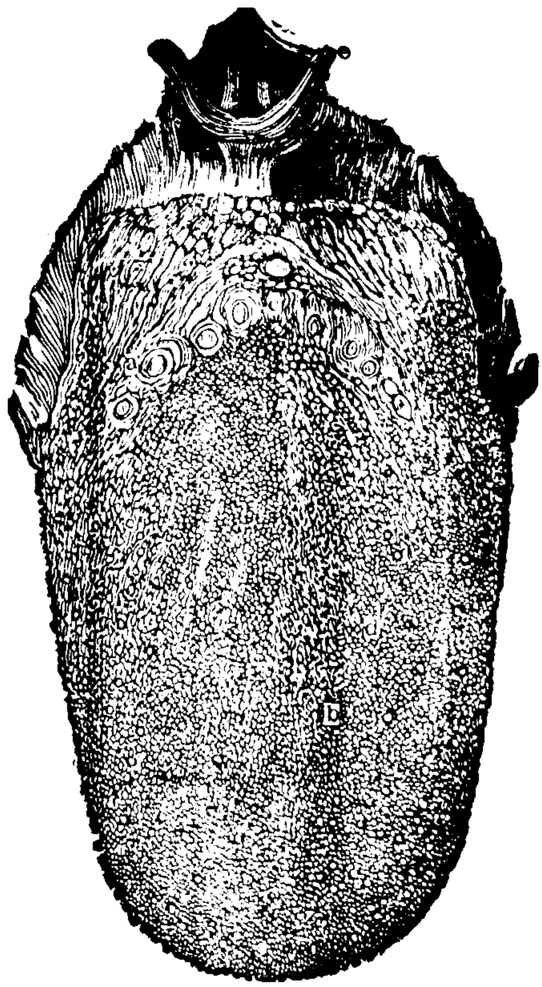


Figure 69.
THE TONGUE.

The Pharynx.—The pharynx is really the upper part of the œsophagus, expanded into a muscular bag. It hangs from the skull above, is four and a half inches long, and communicates with the nose, ear, mouth, œsophagus and larynx.

The Gullet.—The œsophagus or gullet is nine inches long, of same construction as the pharynx, and empties into the stomach. After the food is chewed it is forced into the pharynx which contracts and pushes it down into the œsophagus, which propels it onward to the stomach. During swallowing the opening into the larynx is closed by a little trap door called the epiglottis.

The Stomach.—The stomach (Fig. 70) is roughly pear-shaped; the big end, lying on the left side, measures twelve inches transversely and four inches vertically, is situated just below the diaphragm, receives the œsophagus in its upper left wall (cardiac opening), and empties into the small intestine at the extreme right (pylorus), the opening being guarded by a circular valve reinforced by muscular fibres.

The Stomach Walls.—The stomach wall is made of four layers: externally the peritoneum prevents friction; next is the muscular coat which churns the food, then the cellular coat which carries the blood-vessels, and internally is the mucous membrane (tripe of cow) containing thousands of little glands (Fig. 71), the peptic or gastric glands, which secrete the gastric juice. When food reaches the stomach, the cardiac orifice and pylorus close, the stomach contracts and mixes it with the gastric juice, which is now freely secreted.

The Gastric Juice.—Gastric juice is made of water, salts, hydrochloric acid and pepsin. It changes albumen to peptone, which is readily ob-

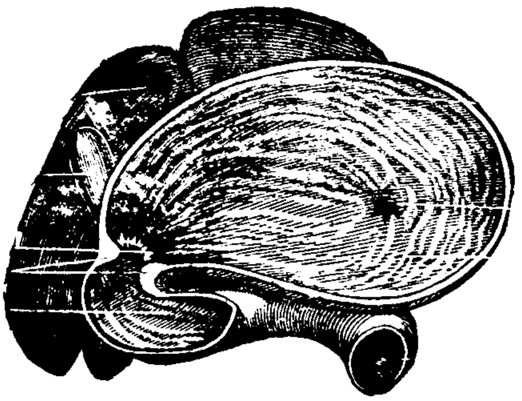


Figure 70.

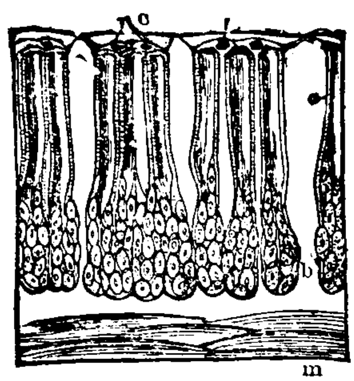


Figure 71.

Figure 70.—STOMACH.
Figure 71.—STOMACH TUBULE. a, neck; b, fundus; c, orifice; m, muscular coat.

sorbed, dissolves the cellulose of vegetable and the fibrous tissue of meats. Water and some of the peptones are absorbed by the stomach. The remaining portion of the food, now a liquid, passes on into the intestines.

Small Intestine.—The small intestine is about twenty feet in length, one inch in diameter, and extends from the stomach to the cecum, into which it empties. It is connected to the spine by a fold of peritoneum, the mensentery, and is contained in the lower and central portion of the abdomen. It is divided, beginning above, into the duodenum, jejunum and ileum.

Duodenum.—Into the duodenum empty the ducts of the liver and pancreas. The small intestine has four coats similar to those of the stomach. In the small intestine the albumens are changed to peptones, fat emulsified, and starches converted into sugars by the action of the bile from the liver, the pancreatic juice and the intestinal juices. The peptones, fat and sugar are absorbed by the intestinal walls and the remaining portion of the food passes into the large intestine, which also absorbs to a slight extent the nutritious portions of its contents, which are now sensusated and are called feces.

Large Intestine.—The large intestine is five feet in length, runs from an enlarged pouch, the cecum, into which the small intestine empties, to the anus. It is about three times as large in calibre as the small intestine. The cecum is situated in the right lower corner of the abdomen, ending

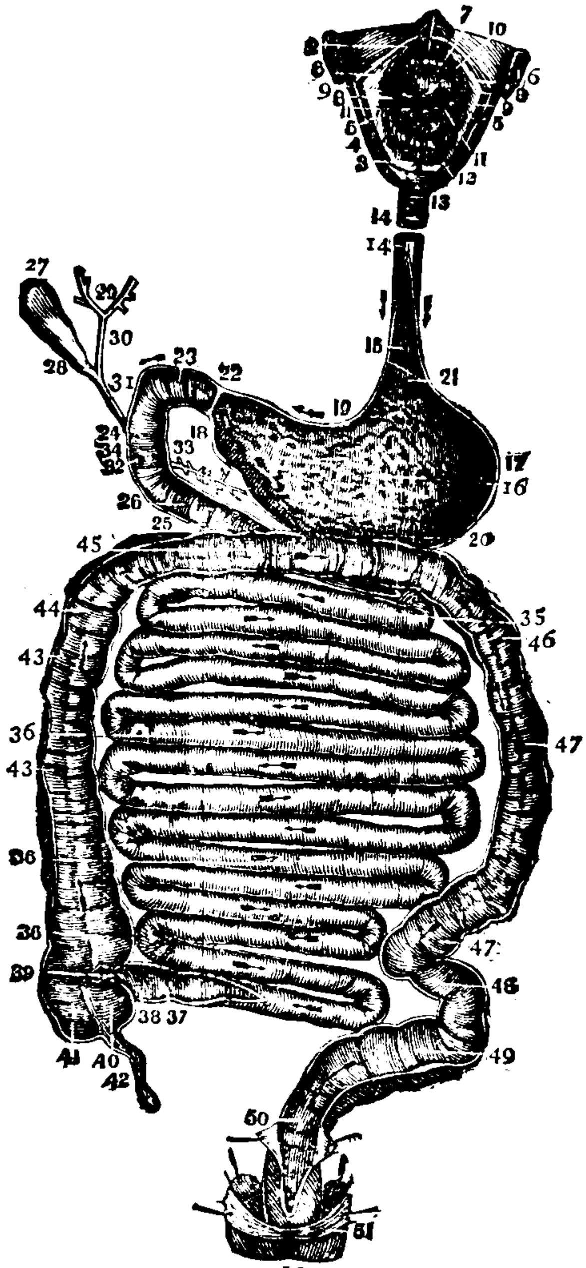


Figure 72.

Figure 72.—ALIMENTARY CANAL. 1, 3, lips; 2, 4, frænum; 5, cheek; 6, Steno's duct; 7, roof of mouth; 8, half arches; 9, tonsils; 10, velum; 11, tongue; 12, papillæ; 13, trachea; 14, œsophagus; 15, its interior; 16, stomach; 17, its greater end; 18, its lesser end; 19, lesser curvature; 20, greater curvature; 21, cardiac orifice; 22, pylorus; 23, 24, 25, duodenum; 26, valvulæ conniventes; 27, gall bladder; 28, cystic duct; 29, 30, hepatic duct; 31, common bile duct; 32, its opening; 33, 35, jejunum; 34, opening of pancreatic duct; 36, 38, ileum; 37, v. conniventes; 39, ileo-cecal valve; 40, 41, cecum; 42, appendix vermiformis; 43-48, colon; 49, 50, rectum; 51, levator ani; 52, anus.

below in the vermiform appendix, which varies from three to six inches in length and is about one-quarter inch in diameter. In the cecum the large intestine ascends to the liver (ascending colon), passes over to the spleen on the left side (transverse colon), descends on the left side (descending colon) to the pelvis, where it curls like an S (sigmoid flexure) and then ends in the rectum which reaches the surface of the body as the anus. As the feces accumulate in the large intestine they are forced downward to the sigmoid flexure and rectum, where they remain until expelled from the body.

The Sweetbread.—The pancreas (sweetbread) is a long, narrow gland about seven inches in length lying behind the stomach. Its duct opens in common with the bile duct, into the duodenum.

The Liver.—The liver (Fig. 74), the largest gland in the body, weighs about four pounds, and is situated in the upper right corner of the abdomen, where it is retained by the peritoneum which, after forming its outer coat, runs to the abdominal walls as ligaments. It is divided into five lobes, which are made up of lobules, each about one-twentieth of an inch in diameter, between which the vessels and ducts ramify. The bile duct has appended to

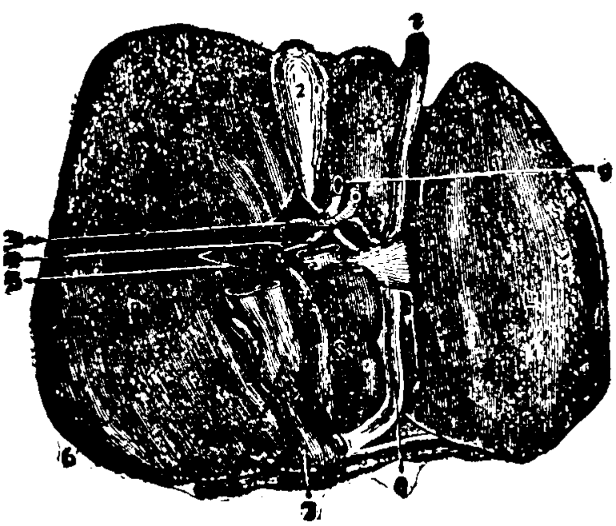


Figure 74.

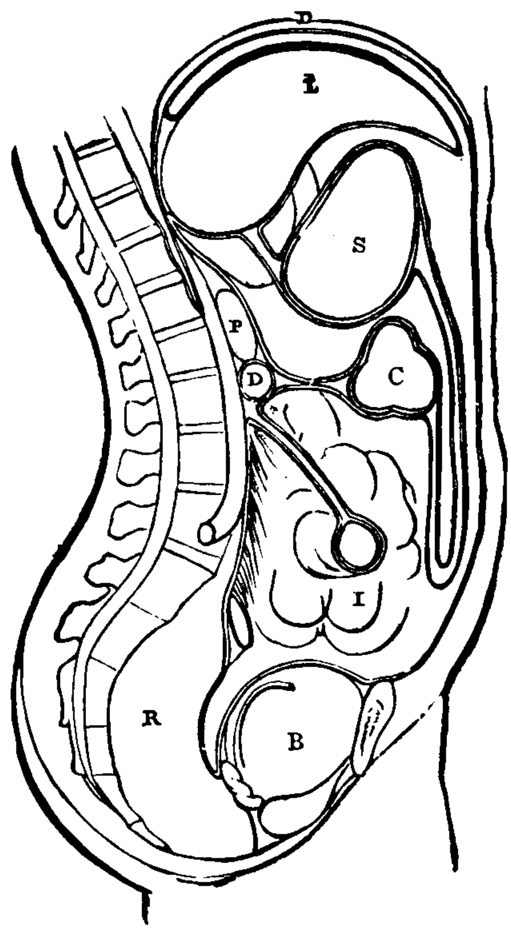


Figure 75.

Figure 74.—LIVER. R, right lobe; L, left lobe; Q, quadrate lobe; S, lobus Spigelii; C, lobus candatus; 1, umbilical vein; 2, gall bladder; 3, hepatic artery; 4, hepatic duct; 5, portal vein; 6, reflexion of peritoneum; 7, vena cava; 8, ductus venosus; 9, common bile duct.

Figure 75.—PERITONEUM. D, diaphragm; L, liver; S, stomach; C, transverse colon; D, transverse duodenum; P, pancreas; I, small intestine; R, rectum; B, bladder.

it a pear-shaped bag, the gall bladder, which, lying on the under surface of the liver, acts as a reservoir for the bile during the intervals of digestion. The bile duct unites with the pancreatic duct and empties into the duodenum. The liver secretes bile, stores up sugar from the blood, helps make blood, destroys poison in the blood and excretes urea and allied products.

Peritoneum.—The peritoneum (Fig. 75) covers all the abdominal organs; it is a serous sac containing a small quantity of fluid which pre-

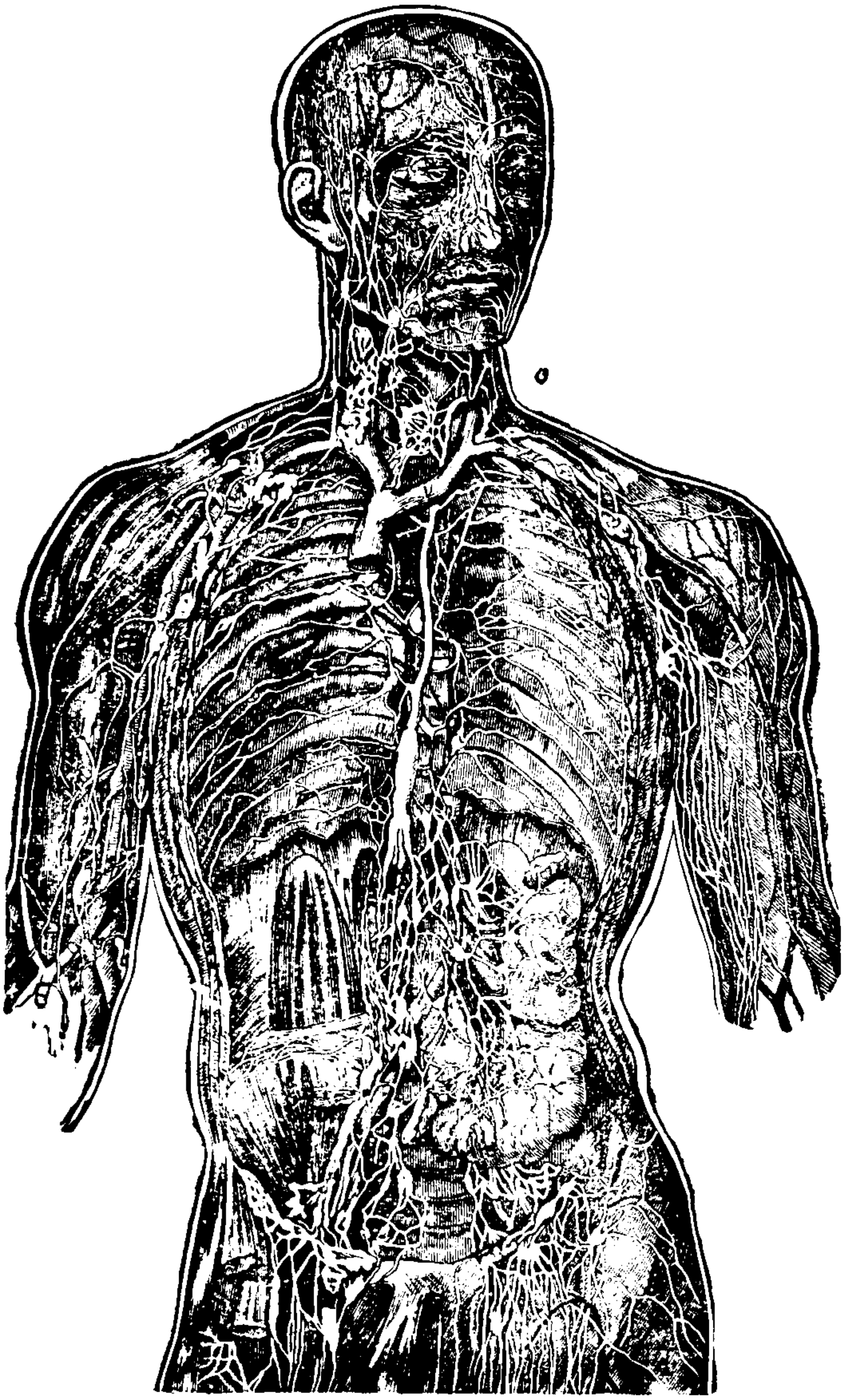


Figure 73.

Figure 73.—LYMPHATICS. a, receptaculum chyli; c, thoracic duct; v, innomonate vein.

vents friction between the organs it covers. The omentum is a double fold of peritoneum, which falls from the front of the stomach nearly to the bladder, then ascends to the transverse colon.

Absorption.—Absorption means the passage of materials from mucous surfaces, serous cavities or tissues into the lymph or blood-vessels.

The Lacteals.—The digested fat in the intestines is absorbed by lymph vessels, called lacteals, because their contents resemble milk. These lacteals converge from various parts of the intestine to form the thoracic duct which passes up and empties into a large vein in the neck. The dilated lower end of the thoracic duct is called the receptaculum chyli. The lymph from the tissue all over the body is collected into the lymphatic

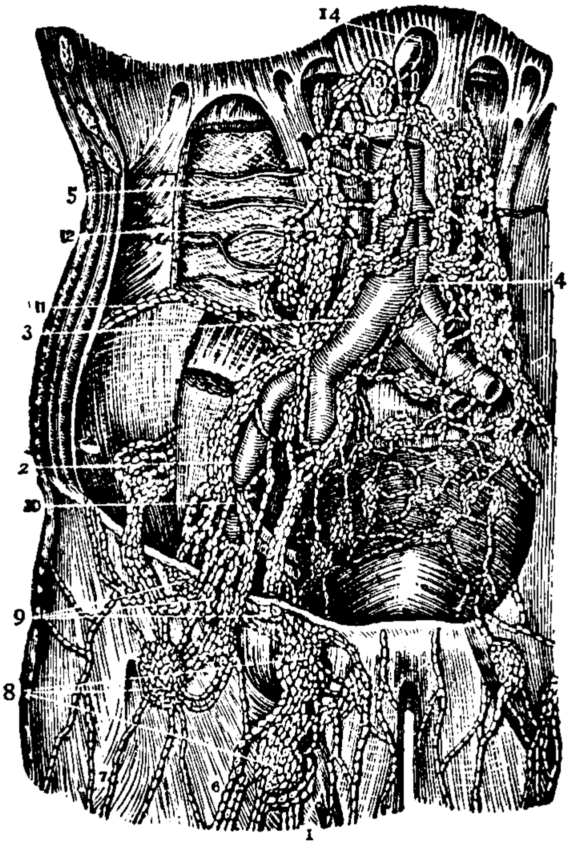


Figure 56.

Figure 56.—LYMPHATICS. 1, saphenous vein; 2, external iliac; 3, common iliac; 4, aorta; 5, ascending vena cava; 6, 7, lymphatics; 8, lower set of inguinal glands; 9, superior set of inguinal glands; 10, chain of lymphatics; 11, lymphatics with circumflex iliac vessels; 12, lumbar and aortic lymphatics; 13, origin thoracic duct; 14, thoracic duct.

vessels (Fig. 56) which, finally by two big trunks, the thoracic duct and the right thoracic duct, into the veins of the neck. On its way to the blood the lymph passes through the lymph glands which frequently swell when any poison passes through them, the kernels felt in the neck during an attach of tonsilitis, for example.

BLOOD—CIRCULATORY SYSTEM.

Composition of Blood.—The blood is made from the food we eat, and it in turn feeds all the tissues of the body and drains away all their waste products. It consists of liquor sanguinis (liquid of blood) and corpuscles (little bodies), the former containing water, proteids, salts, nutritive and excrementitious matter. The corpuscles (Fig. 54) are red, which are $\frac{1}{3200}$ of an inch in diameter, circular and biconcave, or white, which exist in the proportion of one to three of four hundred reds, are $\frac{1}{2500}$ inch in diameter and possess amœboid motion. When blood is exposed to air it clots, a stringy material proteid in nature, fibrin, which exists in solution in the liquor sanguinis, entangles the corpuscles, forming a semisolid mass.

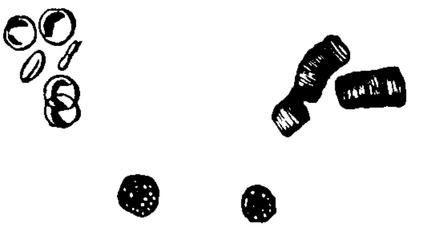


Figure 54.—BLOOD CORPUSCLES.

Function of Corpuscles.—Blood corpuscles carry oxygen from the lungs to the tissues and the liquor sanguinis carries food; the blood drains carbon dioxide and other waste products from the tissues to the excretory organs: skin, kidney, liver and lungs.

Circulatory Apparatus.—The blood is carried to and from the tissues by the circulatory apparatus, which consists of the heart, arteries, capillaries and veins. The heart pumps the blood through the arteries to the thin-walled capillaries where the food passes out to the tissues and waste is given to the blood; from the capillaries the blood drains into the veins which run to the heart. The heart then sends the blood to the lungs to be purified, to the intestines for food and again pumps it out to the tissues.

The Heart.—The heart is a hollow muscular organ of conical form, placed in the chest between the lungs and inclosed in a serous sac, the pericardium. It is placed obliquely; the base, to which is attached the great vessels, is directed upward and backward; the apex is directed downward and to the left, and corresponds to the interval between the fifth and sixth ribs, one inch to the inner side and two inches below the nipple.

In a grown person (Fig. 51) the heart is about five inches in length, three and a half inches in breadth at its broadest part and two and a half inches thick. In the male it weighs from ten to twelve ounces and in the female about two ounces less.

Heart Divisions.—The heart is divided longitudinally by a muscular partition into two halves and a transverse partition divides these halves into two cavities. The lower cavities are called ventricles and the upper ones auricles. The walls of the auricles are thinner than those of the ventricles and the walls of the right side of the heart are thinner than those of the left.

Right Auricle.—The right auricle receives the blood from the two main veins of the body—the two vena cava. From the auricle the blood is forced into the right ventricle through the auriculo-ventricular orifice. This opening is guarded by the tricuspid valve, to prevent the reflux of blood into the auricle when the ventricle contracts. This valve is com-

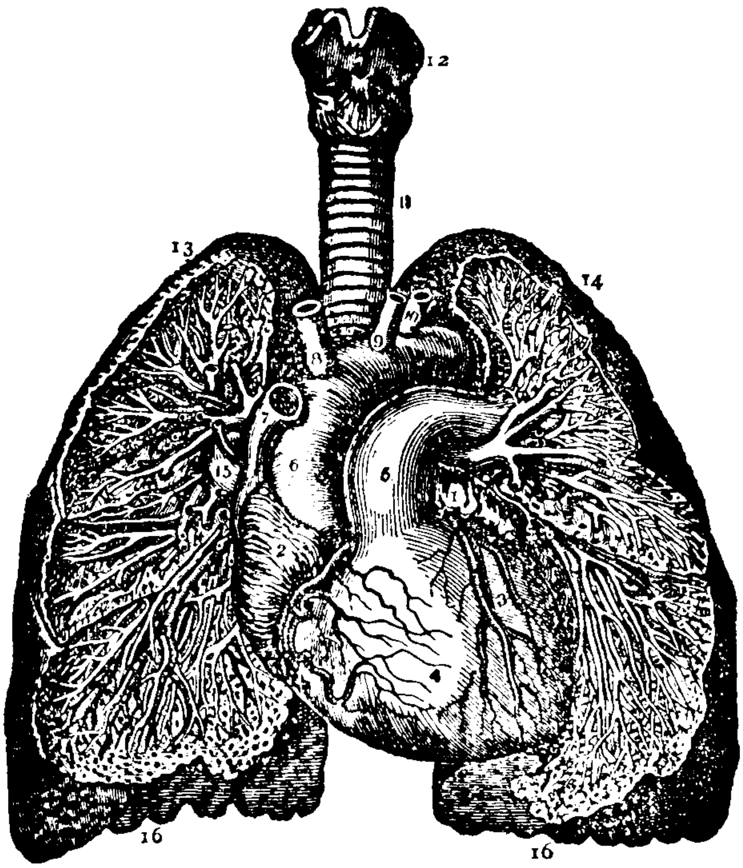


Figure 51.

Figure 51.—HEART AND LUNGS. 1, left auricle; 2, right auricle; 3, left ventricle; 4, right ventricle; 5, pulmonary artery; 6, arch of aorta; 7, superior vena cava; 8, innominate artery; 9, common carotid; 10, subclavian; 11, trachea; 12, larynx; 13, upper lobe right lung; 14, upper lobe left lung; 15, right pulmonary artery; 16, lower lobes of lungs.

posed of three segments, to the free margin of which are attached tendinous cords, which, springing from the muscular ridges projecting from the inner surface of the ventricle, the columnæ carneæ, give support to the valves.

Right Ventricle.—The walls of the right ventricle (Fig. 52) are about one-third as thick as those of the left ventricle. Beside the opening into the auricle there is the opening into the pulmonary artery which is guarded by the semilunar valves, three semicircular folds of the lining membrane of the heart.

Course of the Blood.—The blood is forced from the right ventricle through the pulmonary artery to the lungs, the semilunar valves closing after each contraction of the ventricle so preventing any backward flow.

Left Auricle.—The left auricle is smaller than the right. but thicker; it receives the blood which returns from the lungs by the pulmonary veins and forces it into the left ventricle through an opening, guarded by

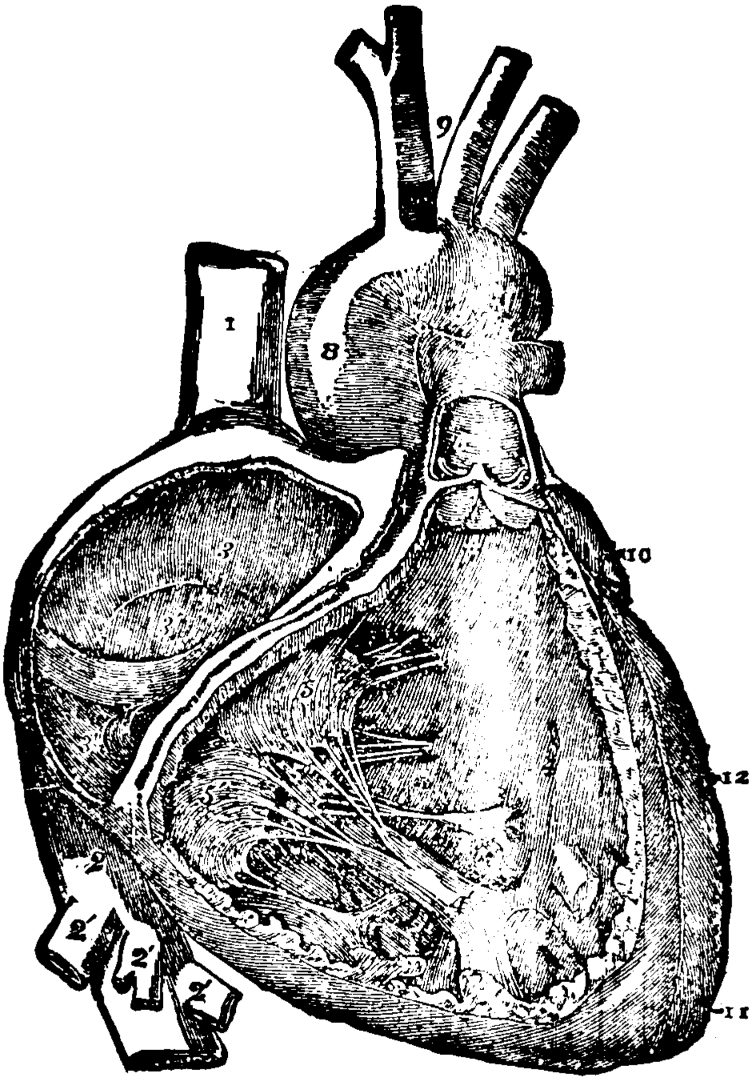


Figure 52.

Figure 52.—HEART. 1, superior vena cava; 2, inferior vena cava; 2′, hepatic veins; 3, right auricle; 3′, fossa ovalis; 3″, aperture coronary vein; +, +, in auricula-ventricular groove; 4, 4, cavity right ventricle; 4′, columnæ carnæ; 5′, 5″, tricuspid valve; 6, pulmonary artery; 7, concavity aortic arch; 8, ascending aorta; 9, between innominate and left carotid; 10, auricular appendage; 11, 11, left ventricle.

valves, similar to the right auriculo-ventricular orifice, except that the valve, called the mitral valve, has but two segments.

Left Ventricle.—The left ventricle is the thickest and strongest portion of the heart. The blood received by it through the auriculo-ventricular orifice is discharged into the main artery of the body, the aorta, through an opening which is guarded by semilunar valves (Fig. 53) as in the case of the pulmonary artery. The cavities of the heart are lined by a delicate endothelium, which is continuous with that of the blood-vessels.

Pulsation.—The heart pulsates from seventy-five to eighty times per minute in the adult; in childhood it is more rapid. The strength and rapidity are governed by the nerves which supply the heart with force.

Heart Sound.—Upon listening to the heart two sounds are heard. The first sound, dull and heavy, is caused by the contraction of the heart, the shutting of the auriculo-ventricular valves and the rush of blood. The second sound, sharp in character, is due to the snapping shut of the semilunar valves.

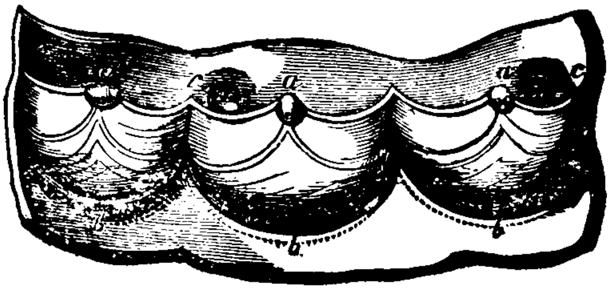


Figure 53.—SEMILUNAR VALVES.

ARTERIES.

Function of Arteries.—The arteries carry the blood from the heart to all parts of the body. It has three coats, an outer areolar elastic coat, a middle muscular coat and an inner endothelial coat.

The Aorta.—The main artery of the body is called the aorta (Fig. 43). It springs from the left ventricle, runs up toward the neck, then turns and descends along the spine and divides in the lower abdomen into the two common iliac arteries.

Coronary Arteries.—Just after leaving the heart it sends the two coronary arteries to the heart muscle. Then as it arches through the chest it gives off on the right side the innominate artery and on the left side the left common carotid and the left subclavian arteries. The innominate divides into the right common carotid and subclavian arteries.

Cardiacs.—The carotids (Fig. 44) run up the neck to the top of the larynx where they divide into the external carotid which supplies the outside of the head and the internal carotid which supplies the brain, ear and eye.

Subclavian.—The subclavian (Fig. 45) supplies the chest, neck and upper extremity; when it reaches the armpit it is called the axillary artery and in the arm it is called the brachial. This trunk, called subclavian axillary and brachial, according to its situation, gives off numerous branches to the various structures of the shoulder and arm. At the elbow it divides into the radial and ulnar branches. The brachial lies on the inner, protected side of the arm just beneath the biceps muscle. It is important to know its location when making pressure to stop hemorrhage lower down the arm.

Radial Artery.—The radial artery (Fig. 46) from the bend of the elbow down the radial side of the arm to the wrist, where it is frequently

Figure 43.

Figure 43.—ARTERIES OF HEAD. 1, common carotid; 2, internal carotid; 3, external carotid; 4, occipital; 5, superior thyroid; 6, trapezius; 7, lingual; 8, sterno-mastoid; 9, facial; 10, temporal; 11, submental; 12, transverse facial; 13, inferior labial; 15, inferior coronary; 17, superior coronary; 19, lateral nasal; 21, angular.

felt to determine the character of the pulse; it then winds around the base of the thumb, enters the palm between the thumb and metacarpal bone of the index finger and forms an arch (deep palmar arch), which sends branch to the thumb, index finger and palm.

Ulnar Artery.—The ulnar artery, larger than the radial, passes down the inner side of the forearm, giving off branches to the muscles. In the palm it also describes an arch (superficial palmar arch) which sends branches to the fingers.

Thoracic Aorta.—The portion of the aorta in the thorax is called the thoracic aorta, that in the abdomen the abdominal aorta. The thoracic aorta supples the pericardium, lungs, œsophagus and intercostal structures with nourishment.

Abdominal Aorta.—The abdominal aorta (Fig. 47) supplies the diaphragm, stomach, liver, spleen, intestines, kidneys, ovary or testicle and muscles of the abdominal wall by branches whose names correspond to the organ it supplies.

Common Iliacs.—Opposite the fourth lumbar vertebræ the aorta divides into the two common iliacs, short trunks which again divide into the internal and external iliac arteries, giving off no branches.

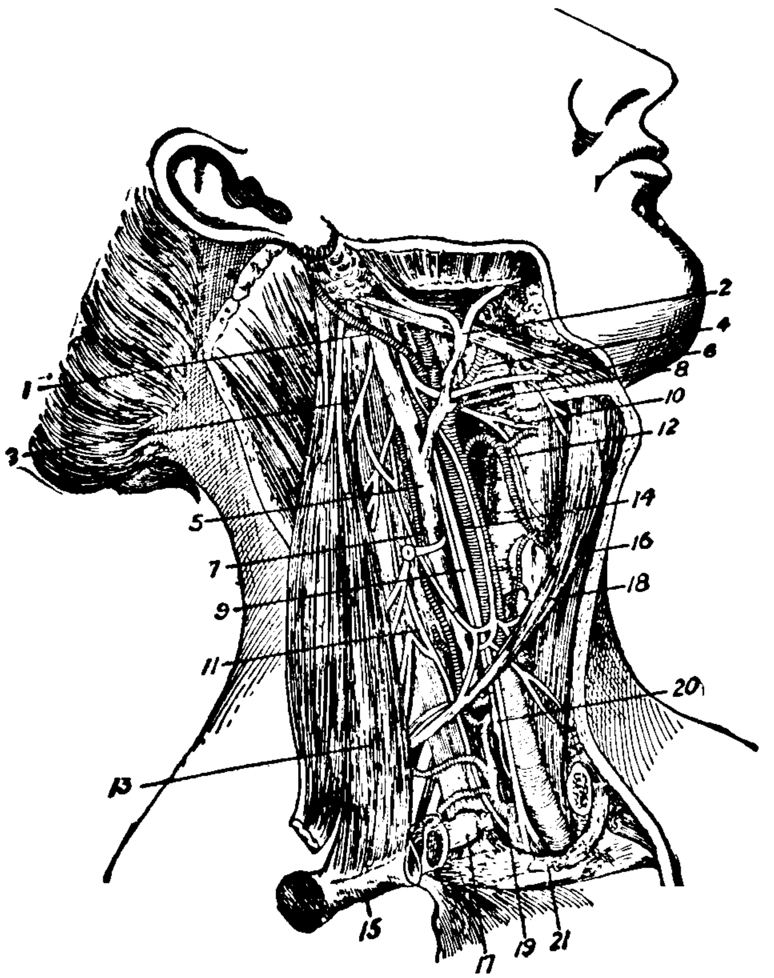


Figure 44.

Figure 44.—ARTERIES OF NECK. 1, occipital artery; 2, facial vein; 3, spinal accessory nerve; 4, facial artery; 5, internal jugular vein; 6, hypoglossal nerve; 7, communicans noni nerve; 8, lingual artery; 9, pneumogastric; 10, superior laryngeal nerve; 11, phren·o; 12, superior thyroid artery; 13, sterno-mastoid; 14, common carotid; 15, clavicle; 16, sterno-hyoid; 17, subclavian; 18, omo-hyoid; 19, subclavian; 20, sympathetic ganglia; 21, apex lung.

The internal iliac dips into the pelvic cavity and divides into two trunks; the anterior gives off branches to the bladder, rectum, anus, genital organs, buttocks and upper part of the thigh; the posterior trunk sends branches to the buttocks, sacrum and muscles in the pelvis.

External Iliac.—The external iliac (Fig. 48) runs across the pelvis and escaping below Poupart's ligament is continued down the thigh as

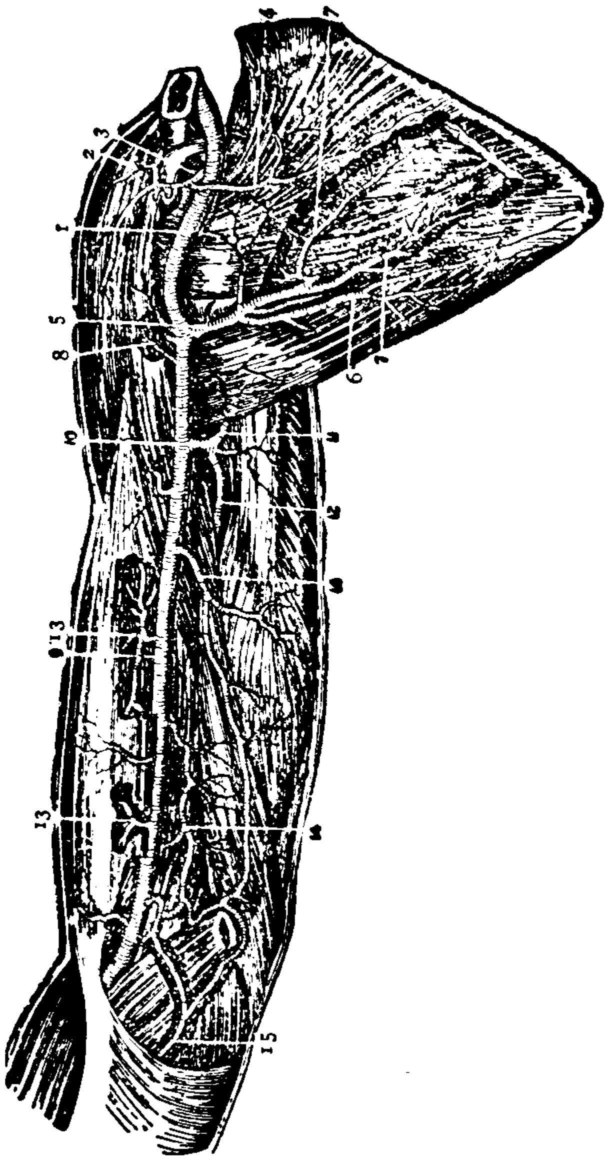


Figure 45.

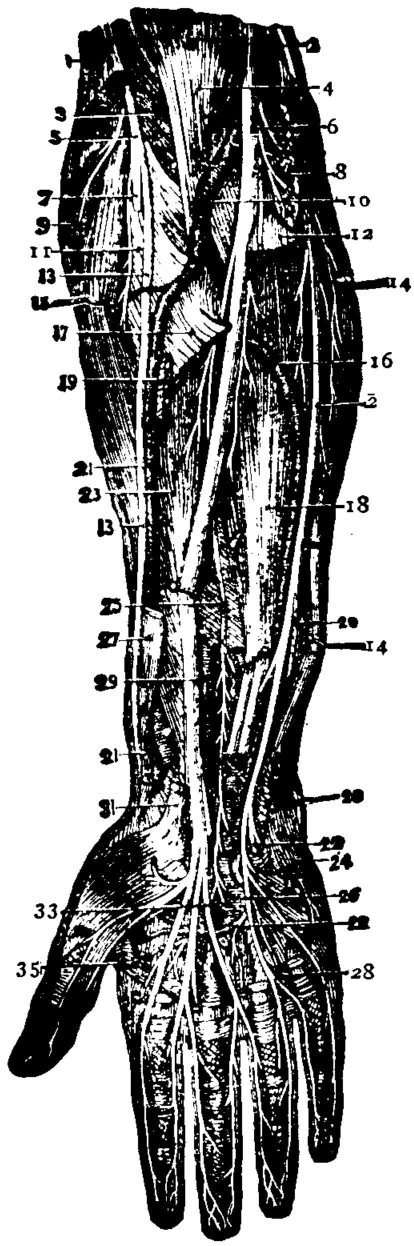


Figure 46.

Figure 45.—ARTERIES OF ARM. 1, axillary artery; 2, thoracica acromialis; 3, superior thoracic; 4, subscapular; 5, inferior scapular; 6, 7, branches to the teres and subscapularis; 8, anterior circumflex; 9, brachial; 10, profunda; 11, posterior circumflex; 12, profunda; 13, muscular branches; 14, branches to brachialis internus; 15, recurrent ulnar.

Figure 46.—DEEP DISSECTION FRONT OF FOREARM. 1, supinator longus; 2, ulnar nerve; 3, brachialis anticus; 4, biceps; 5, musculo-spiral; 6, median nerve; 7, posterior interosseous nerve; 8, pronator teres and flexor carpi radialis; 9, extensor carpi radialis longior; 10, brachial artery; 11, supinator brevis; 12, flexor sublimus digitorum; 13, 13, radial nerve; 14, flexor carpi ulnaris; 15, extensor carpi radialis brevior; 16, ulnar artery; 17, radial origin of flexor sublimus digitorum; 18, flexor profundus digitorum; 19, pronator teres; 20, dorsal branch ulnar nerve; 21, radial artery; 22, deep branch ulnar nerve; 23, flexor longus pollicis; 24, abductor minimi digiti; 25, anterior interosseous nerve; 26, digital branches of ulnar nerve; 27, supinator longus; 28, one of lumbricales; 29, pronator quadratus; 31, flexor carpi radialis; 33, digital branches median nerve; 35, abductor pollicis.

the femoral artery. It gives off two large branches to the muscles of the belly.

Femoral Artery.—The femoral artery runs a straight course down the thigh from the middle of the groin to the lower third of the femur, where

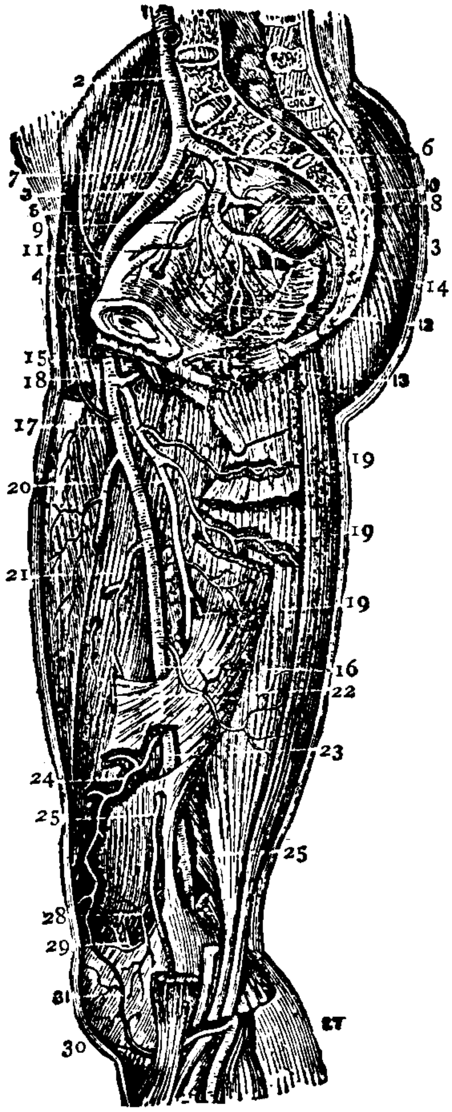


Figure 47.

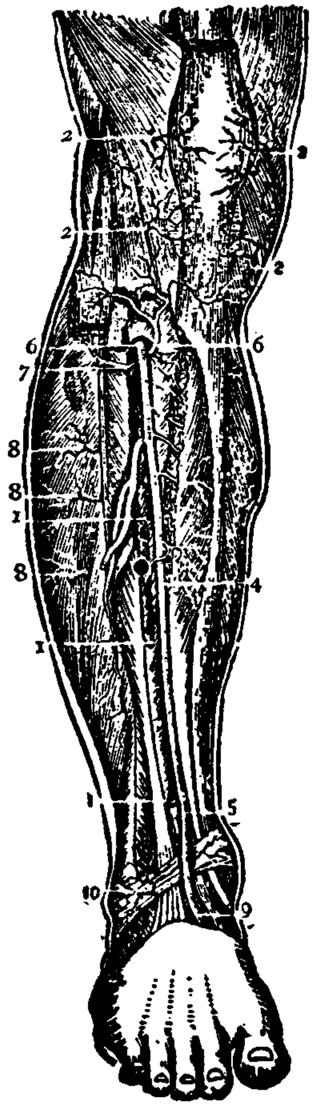


Figure 48.

Figure 47.—ARTERIES OF THIGH. 1, aorta; 2, common iliac; 3, external iliac; 4, epigastric; 5, circumflex iliac; 6, internal iliac; 7, ilio-lumbar; 8, gluteal; 9, obturator; 10, lateral sacral; 11, vesical arteries; 12, middle hemorrhoidal; 13, internal pudic; 14, ischiatic; 15, femoral; 16, foramen for femoral; 17, profunda; 18, internal circumflex.

Figure 48.—ARTERIES OF LEG. 1, extensor proprius pollicis; 2, articular arteries; 3, anterior tibia; 4, 5, same artery; 6, recurrent branch; 7, 8, muscular branches; 9, dorsalis pedis; 10, external malleolar artery.

it passes through an opening in the muscles and becomes the popliteal. After giving off several small vessels to the muscles of the thigh it sends out a large trunk, the profunda, which gives off two, the circumflex and three perforating branches, which supply the muscles.

Popliteal Artery.—The popliteal is the continuation of the femoral running in the hollow behind the knee joint, dividing just below the knee joint into the anterior and posterior tibial arteries.

Anterior Tibial.—The anterior tibial passes forward between the bones of the leg at its upper part, passes down the front of the leg, and on the front of the foot, becomes the dorsalis pedis.

Dorsalis Pedis.—The dorsalis pedis runs along the back of the foot and terminates in the artery of the great toe; it gives off branches to the tarsus and metatarsus, the latter forming an arch and giving branches to the toes.

Posterior Tibial.—The posterior tibial descends along the inside of the back of the leg to the hollow behind the inner ankle, where it divides into the two plantar arteries. It gives branches to the muscles of the leg, tibia and ankle.

Plantars.—The internal and external plantar arteries crossing the foot form an arch, from which branches are given to the toes, in a manner analagous to those in the hand.

Pulmonary Artery.—From the right ventricle of the heart arises the pulmonary artery, which conveys the impure blood to the lungs to be purified.

THE VEINS.

Vein Function.—After the blood flows through the capillaries it is collected by the veins, which are made by small branches joining to form larger branches and these again joining larger trunks, and so on.

Vein Structure.—The veins have three coats, like the arteries, but are thinner, less elastic, and when empty collapse. They have valves at intervals to prevent the backward flow of blood.

Jugular Vein.—The small veins of the exterior of the head follow the arteries and have similar names. They empty into the external jugular which runs down the neck and empties into the subclavian vein.

Internal Jugular.—The internal jugular receives the veins from the interior of the cranium, passes down the neck with the carotid artery and unites with the subclavian vein to form the innominate vein.

Innominate Veins.—The two innominate veins are in the chest and join to become the superior vena cava.

Veins of Upper Extremity.—The veins of the upper extremity (Fig. 49) besides those accompanying are a radial, an anterior and posterior ulnar and a median vein. They collect the blood from the hand and fore-arm, and just above the bend of the elbow the ulnar veins unite to form joint into the anterior and posterior tibial arteries.

the basilic vein, which passes up the inner side of the arm and empties into the axillary vein.

Radial Vein.—The radial vein forms the cephalic, which passes up the

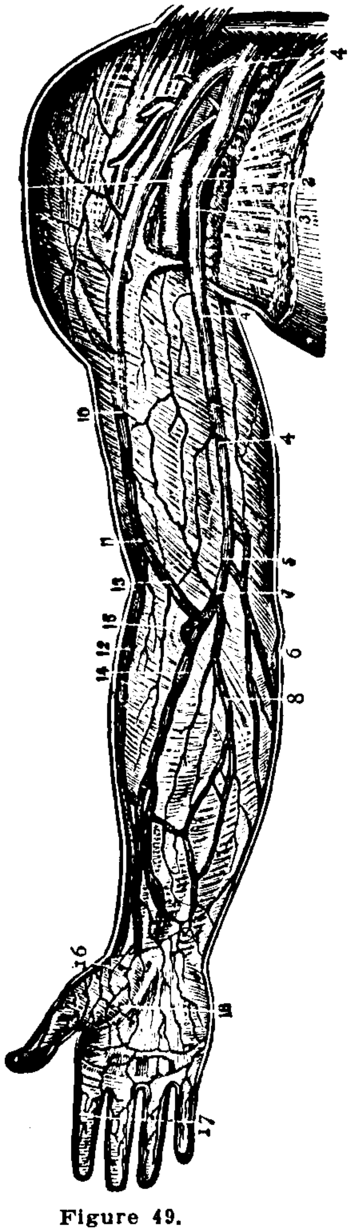


Figure 49.

Figure 50.

Figure 49.—VEINS OF UPPER EXTREMITY. 1, axillary artery; 2, axillary veins; 3, 4, basilic; 5, point where median basilic joins basilic; 6, posterior basilic vein; 8, anterior basilic vein; 9, point where cephalic enters axillary; 10, portion same vein; 11, point where median cephalic enters cephalic; 12, lower portion cephalic vein; 13, median cephalic vein; 14, median vein; 15, anastomosing branch; 16, cephalica-pollicis veins; 17, veins of fingers; 18, palmar veins.

Figure 50.—VEINS OF LEG. 1, saphenous; 2, collateral branch; 3, anastomosis; 4, internal saphenous; 5, origin of saphenous; 6, anastomosing branch; 7, branches on back leg; 8, internal vein of foot; 9, arch veins on metatarsal bones; 10, branch from heel; 11, branches on sole of foot.

outside of the arm and winding around the shoulder-joint empties into the axillary vein.

Median Vein.—Below the bend of the elbow the median and a branch from the deep veins empty into a large V-shaped vein; running from its apex into which these veins empty it unites together the basilic and cephalic veins, one arm being called the median basilic and the other the median cephalic.

Axillary Vein.—The axillary vein, in the armpit, runs up to form the subclavian which joins the internal jugular to form the innominate.

The internal saphenous vein (Fig. 50) commences on the back of the foot, and running straight up the inner side of the leg and thigh joins the femoral vein just below Poupart's ligament.

Saphenous Vein.—The external or short saphenous vein begins at the outer side of the foot, runs up the middle of the calf of the leg and empties into the popliteal vein.

The deep veins follow the arteries and have similar names.

Femoral Vein.—The femoral vein receives all the veinous blood from the leg, runs with the femoral artery into the abdomen, becomes the external iliac which joins with the internal iliac to form the common iliac. The two common iliacs join to form the inferior vena cava which runs up the spine and empties into the right auricle, receiving in its course the various abdominal veins.

Portal Vein.—The veins from the stomach, spleen and intestines are collected into a short trunk, the portal vein, which enters the liver. The blood from the liver is collected by the hepatic vein, which empties into the inferior vena cava.

Pulmonary Veins.—The four pulmonary veins start as capillaries in the walls of the air cells of the lungs, carry pure blood and empty into the right auricle.

RESPIRATORY APPARATUS.

In order to reach the lungs air passes through the nose, pharynx, larynx and trachea, which warm it and filter it of impurities.

The Larynx.—The larynx (Adam's apple) is the organ (Fig. 55) of voice, and will be described in connection with disease of the throat.

Windpipe.—The trachea (windpipe) is made of rings of cartilage, joined by connective tissue. It is five inches long and lies just beneath the skin of the neck until it enters the chest, where it divides into the two bronchial tubes, one going to each lung. These divide and subdivide into numerous branches.

The Lungs.—The lungs are conical, slate colored in adult life and are separated in the middle of the thorax by the heart, gullet and great blood-vessels. The outer surface of the lungs is convex and smooth, the inner surface concave. Above it extends into the neck, below it rests upon the diaphragm. The right lung is the larger and is divided into three lobes, the left into two.

Lung Lobes.—Each lobe is made of little lobules which consist of a little ramification of a bronchial tube communicating with air cells.

Lung Membrane.—The surface of the lung is covered by a smooth serous membrane, the pleura, which is reflected upon the walls of the

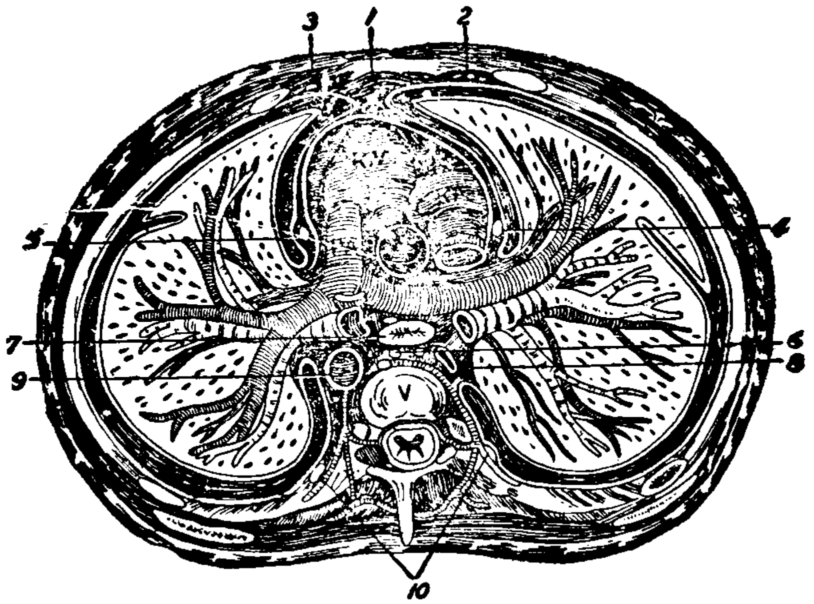


Figure 55.

Figure 55.—TRANSVERSE SECTION THORAX. 1, anterior mediastinum; 2, internal mammary vessels; 3, triangularis sterni; 4, 5, phrenic nerves; 6, thoracic duct; 7, œsophagus; 8, vena azygos major; 9, thoracic aorta; 10, sympathetic; R. V., right ventricle; R. A., right auricle; P. A., pulmonary artery; A., aorta; C., superior vena cava; V., dorsal vertebra.

chest; the intervening space contains a small quantity of fluid which prevents friction during the respiratory movements.

Breathing.—When the chest is enlarged by elevation of the ribs and descent of the diaphragm the lungs follow the chest wall and expand, air rushing into them. When the muscles relax the elastic and over-distended lungs discharge the air through the windpipe.

Air Vesicles.—In the air vesicles the blood is separated from the air by a very thin partition through which oxygen passes to the blood corpuscles. The expired air contains the carbon dioxide and other impurities with which it has been charged while in the air vesicles.

Oxygenized Blood.—The blood, after passing through the lungs, is a brighter red, richer in oxygen, cooler and is rid of its impurities.

NERVOUS SYSTEM.

Function of Nerves.—The nervous system presides over all functions and harmonizes them. It permits the environs to be recognizable. It may be compared to a telegraph system, of which the brain is the central station, to a rider on a horse, or to the captain of a steamship. It is divided into the cerebro-spinal system (brain and spinal cord with their nerves which presides over the animal functions, motion, sensation, etc., and the sympathetic system which controls the organic functions, nutrition, growth, etc.). The sympathetic system is composed of a series of ganglia (large mass nerve cells) in the head and along the front of the spine, connected by nervous cords.

The Brain.—The brain is a huge mass of white and gray nervous matter combined in and protected by the cranium. It is surrounded by

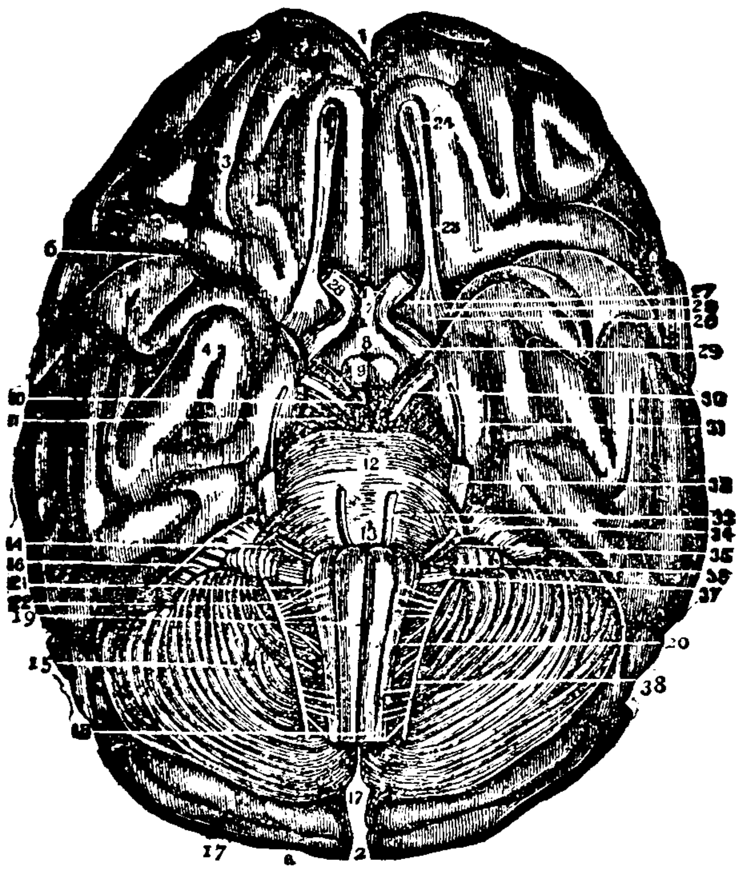


Figure 61.

Figure 61.—BASE OF BRAIN. 1, 2, longitudinal fissure; 3, anterior lobes cerebrum; 4, middle lobe; 5, fissure Sylvius; 6, posterior lobe; 7, infundibulum; 8, its body; 9, corporo albicantia; 10, cineritious matter; 11, crura cerebri; 12, pons Varolii; 13, medulla oblongata; 14, posterior prolongation of pons; 15, middle of cerebellum; 16, anterior part of cerebellum; 17, its posterior part and fissure; 18, medulla spinalis; 19, middle fissure medulla; 20, pyramidal body; 21, retiform body; 22, olivary body; 23, olfactory nerve; 24, its bulb; 25, its external root; 26, middle root; 27, internal root; 28, 29, optic nerve; 30, third nerve; 31, fourth nerve; 32. fifth nerve; 33, sixth nerve; 34, facial nerve; 35, auditory nerve; 36, 37, 38, eighth nerve.

three membranes (meninges): the dura mater, externally, dipping into the fissures to form the falx cerebri, tentorium. cerebelli and falx cerebelli which separate and support portions of the brain; the arachnoid, the serous membrane, supplying a fluid which acts as a water cushion for the brain; and the pia mater, the layer carrying the blood-vessels.

Weight of Brain.—The average weight of the brain is fifty ounces in males, and six ounces less in females.

Divisions of Brain.—The brain is divided into the cerebrum, cerebellum, pons varolii and medulla oblongata.

The Cerebrum.—The cerebrum is the largest part of the brain, resting on the roof of the orbit, base of skull, and tentorium cerebelli. It is

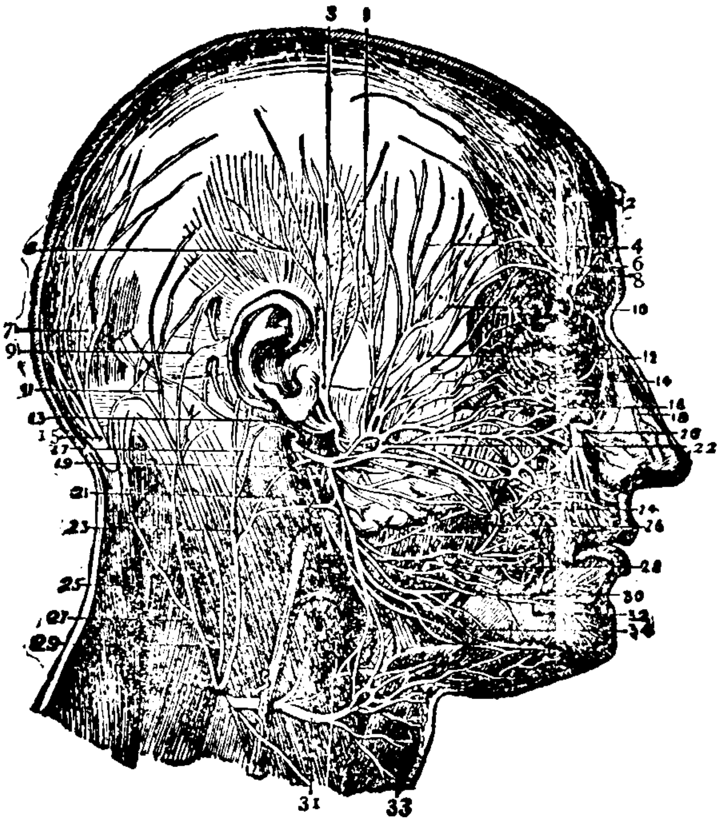


Figure 62.

Figure 62.—NERVES OF FACE AND SCALP. 1, attrahens aurem; 2, anterior belly occipito-frontalis; 3, auriculo-temporal nerve; 4, temporal branches of facial nerve; 5, attolens aurem; 6, supra-trochlear; 7, posterior belly occipito-frontalis; 8, supra-orbital; 9, retrahens aurem; 10, temporal branch of orbital nerve; 11, small occipital nerve; 12, malar branches of facial nerve; 13, posterior auricular nerve; 14, malar branch of orbital; 15, great occipital; 16, infra-orbital branches; 17, facial nerve; 18, nasal nerve; 19, cervico-facial division of facial; 20, infra-orbital nerve; 21, branches to digastric and stylo-hyoid; 22, temporo-facial division of facial; 23, great auricular; 24, buccal branches of facial; 25, trapezius; 26, buccinator nerve; 27, splenius capitis; 28, masseter; 29, sterno-mastoid; 30, supra-maxillary branches of facial nerve; 31, superficial cervical nerve; 32, mental nerve; 33, platysma; 34, infra-maxillary branches of facial nerve.

divided into lateral halves by the falx cerebri. The halves are joined by the corpus callosum. Internally it is composed of white, and externally of gray, nervous tissue. The gray tissue is wrinkled into convolution and is the active portion of the brain, the white matter conducting the nerve impulses to and from it. It is the seat of memory, intelligence, reason. will, motion and sensation.

The Cerebellum.—The cerebellum lies beneath the posterior portion of the cerebrum, is gray outside and white inside. It coördinates muscular movements.

The pons varolii connects the various parts of the brain. It conducts impulses to and from the brain.

Medulla Oblongata.—The medulla oblongata is the enlarged upper end of the spinal cord resting in the cranium. It is made of blended white and gray tissue, conducts the nerves from the brain to the spinal cord and contains independent nervous centres which regulate the heart, lungs, blood-vessels, sweating, etc.

Nerves of Brain.—The brain gives off twelve nerves on each side. The nerves pass out through holes (foramen) in the skull and supply the organs of sight, smell, taste and hearing, and also motion and sensation to certain parts. They are: the olfactory (smell), optic (sight), motor oculi (motion to eye), patheticus (motion to superior oblique muscle of eye),

Figure 63.

Figure 63.—FIFTH NERVE. 1, orbit; 2, antrum of Highmore; 3, tongue; 4, lower jaw; 5, Gasserian ganglion; 6, first branch of fifth; 7, second; 8, third; 9, frontal branch; 10, lacrymal branch; 11, nasal branch; 12, internal nasal nerve; 13, external nasal; 14, external and internal frontal nerve; 15, infra-orbital; 16, posterior dental branches; 17, middle dental; 18, anterior dental; 19, terminating branches infra-orbital nerve; 20, orbital branch; 21, ptyregoid nerve; 22, five anterior branches; 23, lingual branch; 24, inferior dental; 25, mental branches; 26, superficial temporal nerve; 27, auricular branches; 28, mylo-hyoid.

trifacial (sensation to face, motion to chewing muscles and nerve of taste), abduces (rolls eye out), facial (motion to face), auditory (hearing), glosso-pharyngeal (taste and sensation), pneumogastric (presides over swallowing, heart, lungs, etc.), spinal accessory (motion to muscles, neck and back and the hypoglossal (motion to tongue).

Spinal Cord.—The spinal cord is a long tail hanging from the back

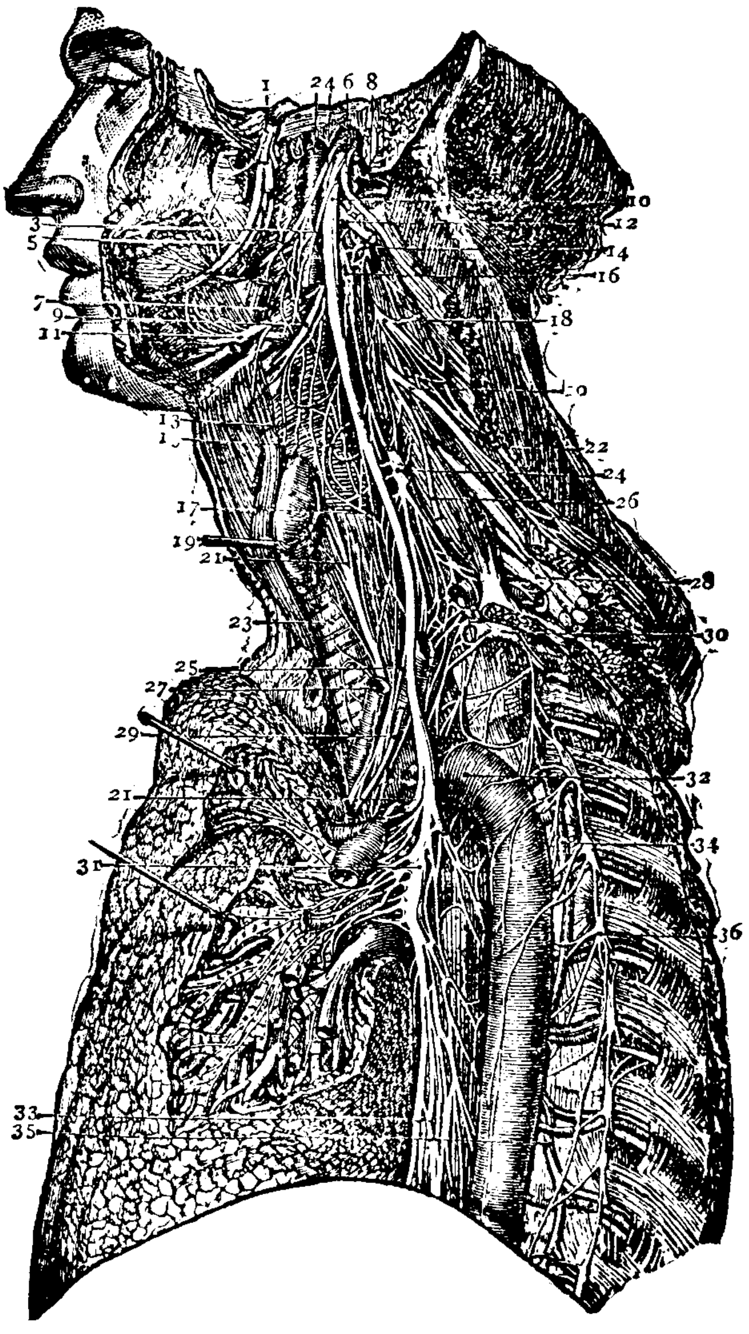


Figure 64.

Figure 64.—NINTH, TENTH AND ELEVENTH NERVES. 1, Gasserian ganglion; 2, internal carotid; 3, pharyngeal branch of pneumogastric; 4, glosso-pharyngeal; 5, lingual; 6, spinal accessory; 7, middle constrictor of pharynx; 8, internal jugular vein; 9, superior laryngeal nerve; 10, ganglion of pneumogastric; 11. hypoglossal; 12, ditto communicating with eighth and first cervical; 13, external laryngeal; 14, second cervical; 15, pharyngeal plexus; 16, superior cervical ganglion; 17, superior cardiac nerve; 18, third cervical; 19, thyroid body; 20, fourth cervical; 21, recurrent laryngeal; 22, spinal accessory; 23, trachea; 24, middle cervical ganglion; 25, middle cardiac nerve; 26, phrenic; 27, left carotid; 28, brachial plexus; 29, phrenic; 30, inferior cervical ganglion; 31, pulmonary plexus; 32, aorta; 33, œsophageal plexus; 34, vena azygos 35, vena azygos minor; 36, gangliated cord of sympathetic.

of the brain and contained in the spinal canal. It is sixteen to eighteen inches long and surrounded by three membranes like the brain.

Upper Section.—Upon section the cord (Fig. 59) is seen to be composed externally of white nervous tissue, and internally of the gray, which is arranged somewhat in the shape of the letter II. The cord is divided by two antero-posterior fissures into two equal lateral halves, which are united in the centre by a bridge of gray matter.

The spinal cord is a great nerve cable carrying fibres to and from the brain; it also coördinates motion, presides over the nutrition of certain parts and contains independent nervous centre.

From the anterior horn of the gray matter arises the motor roots of the spinal nerves and from the posterior horn the sensory roots.

Spinal Nerves.—Each spinal nerve, of which there are thirty-one pairs, consists of the anterior or motor and the posterior or sensory root. These unite within the spinal canal and form a single cord (Fig. 65), which passes through the opening between the vertebræ and divides into two trunks, one for the anterior and the other for the posterior surface of the body.

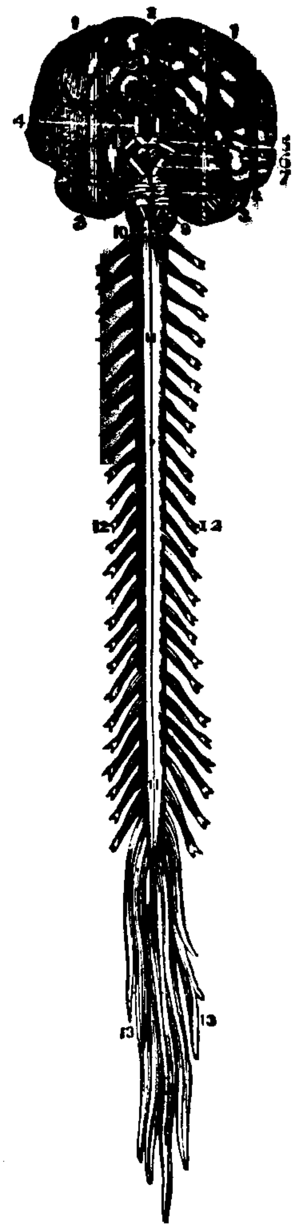


Figure 59.

Figure 59. — BRAIN and CORD. 1, 1, hemispheres of cerebrum; 2, great middle fissure; 3, cerebellum; 4. olfactory nerves; 5, optic nerves; 6, corpora albicanlia; 7, motor oculi; 8, pons Varolii; 9, fourth nerve; 10, medulla oblongata; 11, 11, medulla spinalis; 12, 12, spinal nerves; 13, cauda equina.

Cervical Plexus.—The anterior branches of the four upper cervical nerves unite with each other to form the cervical plexus which gives off branches to the side of the head, neck, shoulders, chest and diaphragm. The anterior branches of the fifth, sixth and seventh cervical nerves unite, the fifth receiving a branch from the fourth; the eighth cervical and first dorsal nerves unite; these cords form the brachial plexus, and after sending nerve trunks to the muscles of the neck and sides of the chest below the collar bone, these two trunks each send off a trunk which unite to form a third or posterior trunk which divides into two branches, supplying the muscles and skin of the outside and back of the arm, forearm and hand.

Inner and Outer Trunks.—The inner and outer trunks are continued down the inside of the arm, and again each sends a branch to form a

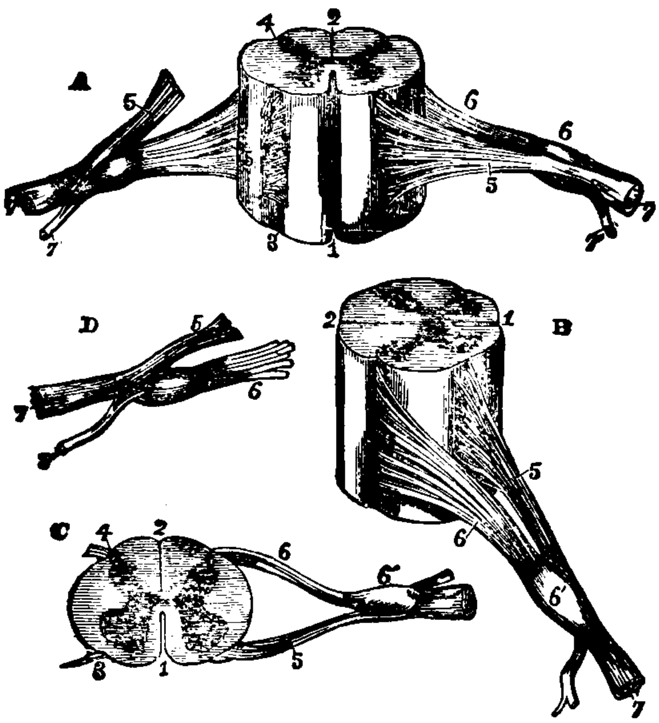


Figure 60.

Figure 60.—VIEWS OF SECTION OF CERVICAL CORD. A, anterior surface; B, right side; C, upper surface; D, nerve roots; 1, anterior median fissure; 2, posterior median fissure; 3, anterior lateral depression; 4, posterior lateral groove; 5, anterior roots; 6, posterior roots; 6′, ganglion; 7, spinal nerve; 7′, posterior branch.

middle cord, the median nerve. The external cord then becomes the musculo-cutaneous, and the internal, the ulnar.

Median Nerve.—The median nerve (Fig. 66) gives off branches to the muscles and to the skin of the hand. The ulnar nerve is placed on the inner side of the arm and supplies the forearm and hand. The musculo-cutaneous supplies the skin and muscles of the forearm and wrist.

Spinal Nerves.—The twelve dorsal spinal nerves send branches along the ribs and supply the muscles of the back.

Lumbar Nerves.—The five lumbar nerves send posterior branches to the muscles of the back; the anterior branches unite to form a plexus which sends branches to the muscles of the belly and the genital organs; the largest branch, the crural nerve, is distributed to the front of the thigh.

Sacral Nerves.—The fifth lumbar joins the sacral nerves to form the sacral plexus; its largest branch is the great sciatic which passes down the back of the thigh, dividing at the knee into the external and internal

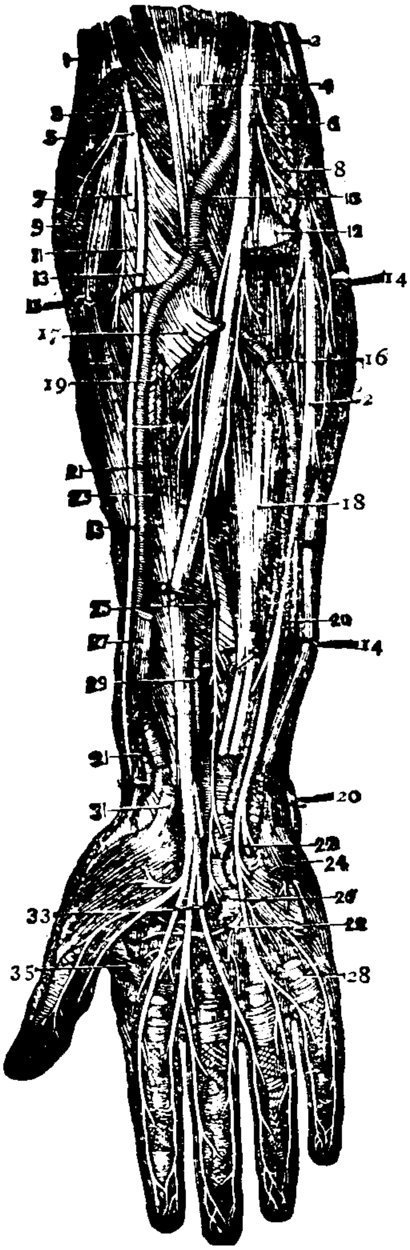


Figure 65.

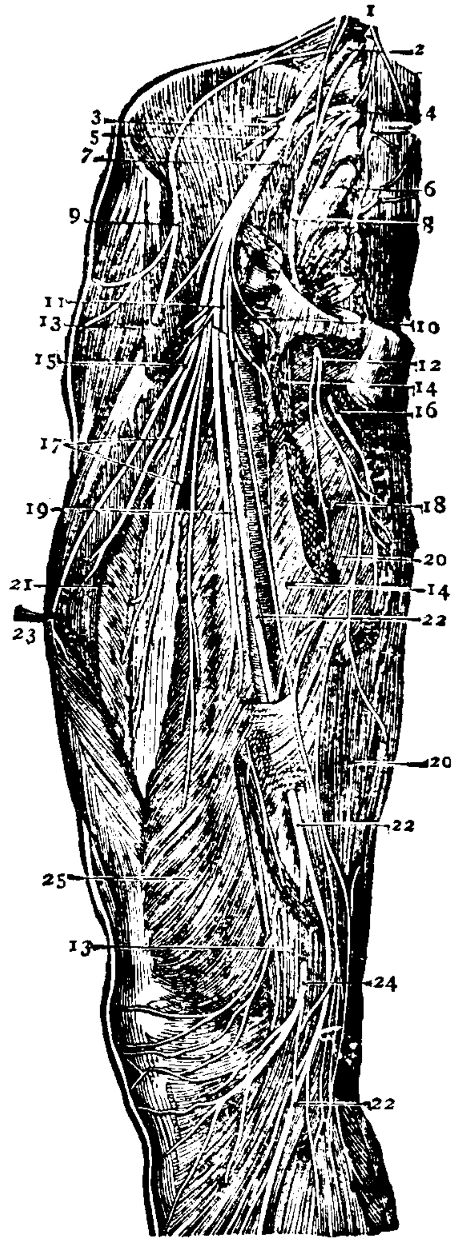


Figure 66.

Figure 65.—DEEP DISSECTION OF FRONT OF FOREARM. 1, supinator longus; 2, ulnar nerve; 3, brachialis anticus; 4, biceps; 5, musculo spiral; 6, median; 7, posterior interosseous; 8, pronator teres; 9, extensor carpi radialis longior; 10, brachial artery; 11, supinator brevis; 12, flexor sublimus digitorum; 13, radial nerve; 14, flexor carpi ulnaris; 15, extensor carpi radialis brevior; 16, ulnar artery; 17, origin flexor sublimus digitorum; 18, flexor profundus digitorum; 19, tendon pronator teres; 20, dorsal branch of ulnar nerve; 21, radial artery; 22, deep branch of ulnar nerve; 23, flexor longus pollicis; 24, adductor minimi digiti; 25, anterior interosseous nerve; 26, digital branches of ulnar nerve; 27, tendon of supinator longus; 28, one of the lumbricales muscles; 29, pronator quadratus; 31, tendon flexor carp iradialis; 33, digital branches median nerve; 35, abductor pollicis.

Figure 66.—NERVES OF THIGH. 1, sympathetic ganglia; 2, third lumbar; 3, branches to iliacus; 4, fourth lumbar; 5, anterior crural; 6, lumbo-sacral; 7, branch of the psoas; 8, obturator; 9, external cutaneous; 10, nerve to pectineus; 11, branch anterior crural; 12, superficial division of obturator; 13, sartorius muscle; 14, adductor longus; 15, branch to rectus; 16, deep division of obturator; 17. branches to vastus externus and crureus; 18, adductor brevis; 19, branch to vastus internus; 20, adductor magnus; 21, vastus externus; 22, internal saphena; 23. rectus femorio; 24, patellar branch of saphena; 25, vastus internus; 26, gracilis.

popliteal nerves; these are continued down the leg as the anterior and posterior tibial nerves supplying the leg and foot.

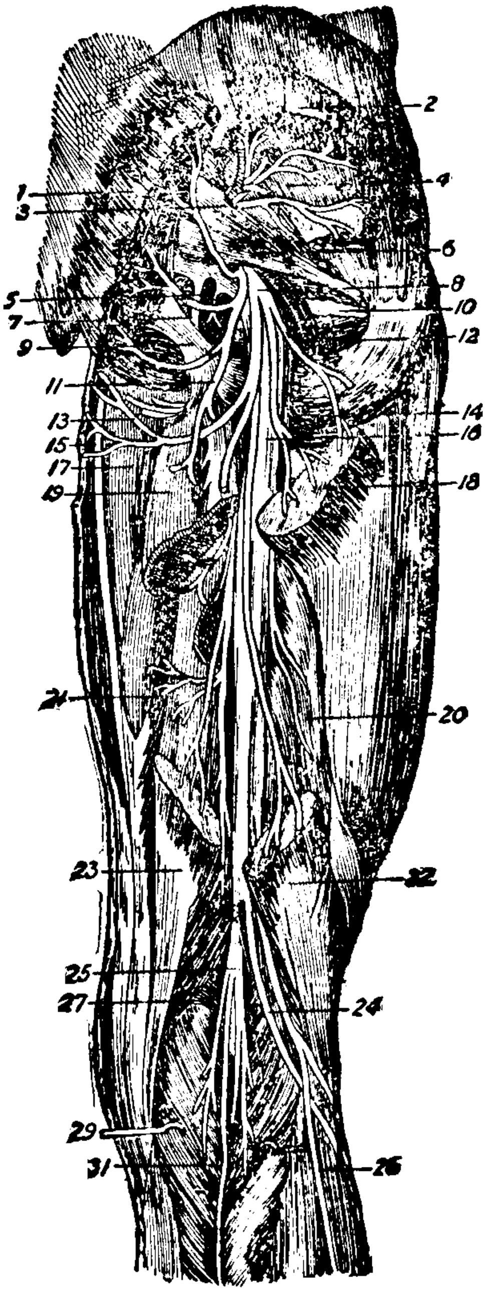


Figure 67.

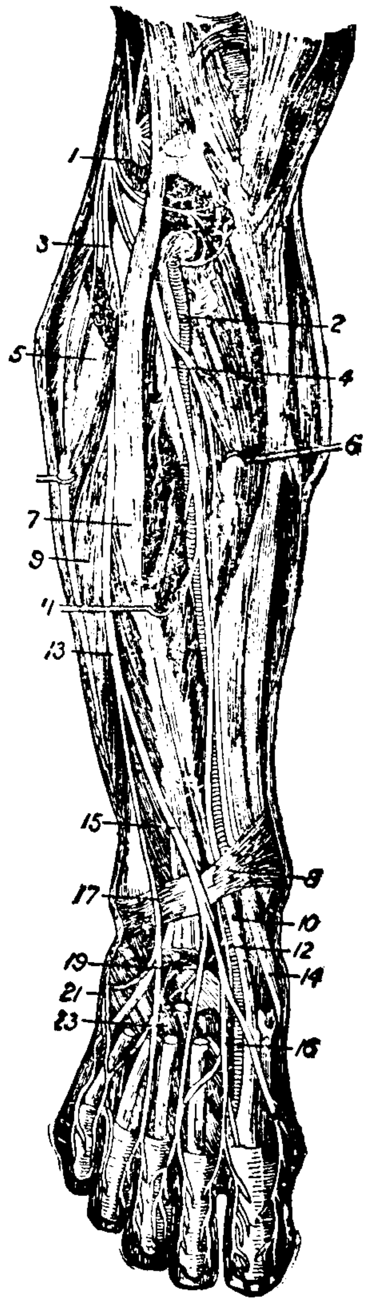


Figure 67a.

Figure 67.—BUTTOCK AND BACK OF THIGH. 1, gluteus maximus; 2, gluteus medius; 3, glutial artery; 4, gluteus minimus; 5, nerve of obturator internus; 6, pyriformis; 7, pudic nerve; 8, small sciatic nerve; 9, great sacro-sciatic ligament; 10, obturator internus; 11, inferior gluteal nerve; 12, tendon obturator internus; 13, inferior pudendal nerve; 14, quadratus femoris; 15, gracilis; 16, great sciatic nerve; 17, adductor magnus; 18, insertion gluteus maximus; 19, origin of semitendinosus and semimembranosus; 20, short head of biceps; 21, semimembranosus; 22, tendon of biceps; 23, tendon of semitendinosus; 24, external popliteal nerve; 25, internal popliteal nerve; 26, communicans fibrelaris; 27, popliteal artery; 29, gastrocnemius; 31, external saphenous nerve.

Figure 67a.—FRONT OF LEG. 1, external popliteal nerve; 2, anterior tibial artery; 3, musculo-cutaneous nerve; 4, anterior tibial nerve; 5, peroneus longus; 6, tibialus anticus; 7, extensor longus digitorum; 8, anterior annular ligament; 9, peroneus brevis; 10, tendon of extensor proprius pollicis; 11, extensor proprius pollicis; 12, dorsal artery of foot; 13, musculo-cutaneous nerve; 14, tendon of tibialus anticus; 15, internal branch of musculo-cutaneous nerve; 16, cutaneous branch of anterior tibial nerve; 17, external branch of musculo-cutaneous nerve; 19, deep branch of anterior tibial nerve; 21, external saphenous nerve; 23, extensor brevis digitorum.

INDEX TO PART I OF BOOK III

Preventive Medicine

The Prevention of Disease by Elimination of Disease Carriers

Part I of Book III tells of how disease is carried by insects and other seemingly harmless means.

Consult the Part, Index and the Reference Index, also General Index.

SUBJECTS OF THE TEXT

Book III.

PREVENTIVE MEDICINE.

PART I.

THE PREVENTION OF DISEASE BY ELIMINATION OF DISEASE CARRIERS.

When speaking of preventive medicine, we include the methods used by physicians, State and Federal Government Boards of Health, etc., to prevent the spread of disease, but most important is the work done by past and present men of science and their willing patients who have given their time, labor, and in many cases, their lives to discover the underlying causes of disease, for the latter, like everything else in this world, has its reasons for existence. Thus it can readily be understood that disease cannot be properly prevented when the underlying cause is unkown.

Before dissection of the human body and experiments on animals were permitted, man's knowledge of his own body and disease, its causes and symptoms and treatment was mere guesswork. Thus in past centuries the arteries were thought to contain air instead of blood; disease was believed to be a curse from heaven or the king and everything lay in the hands of the Gods as to whether a person recovered or not.

In the last century, man began to awaken from his sleep and by means of the discovery of the microscope and the permission to experiment upon living animals more and more the cause of disease, its transference from one animal to another and then from animal to man and man to man was tried, and always the same symptoms occurred in the animal or man into which the blood of the animal suffering from the original disease had been placed by injection into their blood, etc. By these methods gradually the cause of disease was found to be due to the presence of minute living bodies called bacilli or germs, etc., which were only visible when the blood, spit, urine, etc., of the sufferer was examined under the microscope and from this beginning are due the marvelous results of the present day in the prevention, treatment and cure of disease.

Health.—Disease can be prevented by the individual doing everything in his power to keep in the best physical condition. Disease is a common enemy of all of us, waiting to destroy, but Nature is in league with us if we obey her laws. With a normal body and pure blood should the invader arrive, the fight is on our side. But once the body is weakened by heredity as a result of our parent's or forefather's neglect of the body, through the abuse of alcohol, tobacco or immoral living, lack of exercise, overeating and loss of sleep, overwork or lack of work or improper food, then will the soil be fertile for the planting of the germs of disease. When exposed and once planted the fight will be in their favor, as the rundown body will not have sufficient vitality to overcome the invader and sickness and death result.

How Can We Keep Healthy?—The best answer to that question is. to be the child of healthy parents and come from a sturdy stock. To be nursed at the mother's breast and raised out of doors in the sunshine and fresh air, to sleep with plenty of air in the room at night. To have a natural movement of the bowels once a day. And through childhood to receive three meals a day consisting of pure wholesome food, plenty of milk, free from germs, pure water and sleep from ten to twelve hours a night throughout childhood, depending on the age. To play and do work which will be in the air and develop the muscles gradually. Every child should be vaccinated any time after the sixth month and repeat at the seventh year, to be done at once, in addition during an epidemic of small pox. It is not necessary or right for a child to have scarlet fever, measles, diphtheria, etc., as so many people think. They are often followed by deafness, heart disease, nervous diseases and paralysis which Nature never meant to inflict a child with to go through life.

Children's teeth, eyes and throat should be examined at intervals and many defects corrected. The tonsils and adenoids (growths which stop up the nose and prevent air being breathed properly) should be removed. Enlarged tonsils often cause deafness by preventing air from the throat reaching the ear cavity due to stopping the opening of the Eustachian tube which leads from the throat to the ear.

Children should not be taught too many branches at school. Every school should be well lighted with plenty of fresh air. Many of the smaller schools are now being built on open roofs of buildings in large cities or on platforms placed out of doors with just a roof overhead to protect the children. All schools should be held in the open where possible. There is absolutely no chance of cold if the children are warmly dressed and experiments have proven that the children are healthier, more attentive and mentally efficient where they have been in school in the open air.

How May Adults Remain Healthy?—In this day and generation the struggle for existence is becoming more and more complex, the occupations are more enacting and confining, exposure to accidents more frequent, due to modern machinery and its difficult handling. Competition in all lines is great and therefore more strain is put upon the brain and nerves of man in all walks of life. This leads in time to state of "Overwork," nervous prostration or worry, if the individual has not the physical strength to stand the battle or fails to keep himself in a normal state of body and mind by careful living.

When in the latter condition, man is a suitable soil for development of disease which makes short work of the rundown system, and such a person when exposed to disease or accident is very apt to succumb unless some reserve vitality comes to the aid of him or her and the physician or surgeon in attendance in the uneven battle for life.

Man can keep his health and thus prevent disease by insisting on getting the best and purest of foods, working in factories or shops, dairies, barns, etc., which are well lighted and ventilated, free from dust, smoke, irritating vapors from paints, gases, acids, etc. By insisting upon regular working hours, eight hours sleep, dry and warm clothing if exposed during outdoor work, but not too warmly dressed for indoor work. Tea or coffee in moderation is not harmful. Light beers, Porter, Stout, Ale; wines, as Sherry, Port, Claret, without strong preservatives or alcohol, except in small proportions, are not harmful and refresh and cheer the tired nerves. Whiskey, brandy, cognac, gin, except as medicine, are absolutely harmful and the whiskey which the Government allows to be sold in this country is a disgrace and a poison. More and more corporations and business men are insisting on their employees abstaning from its use. It causes a sense of stimulation or well being, which is temporary and is soon followed by a sense of depression which can only be relieved by a renewal of the dose and thus stupid man continues to be temporarily stimulated, while the total effect of his imbibing is to lower his vitality, destroy his mind, cloud his judgment and render him vicious; ruin his appetite by its action upon his stomach, harden his liver and destroy his kidneys.

COMMON CARRIERS OF DISEASE.

Why is it that Disease Spreads?—It has been found by scientists that certain definite living bodies (germs) are the cause of certain diseases, as tuberculosis, smallpox, typhoid fever, diphtheria, etc.; and other diseases must be caused by other undiscovered bodies, which will some day be known. These minute living bodies are active and give off poisonous material which destroys the tissues, organs, etc., of the body. When a person is ill, these germs are being continually thrown off in the waste materials of the body, in the spittle, bowel movements, sweat, saliva, urine, etc. If these products of disease are allowed to remain in a vessel, the carpets, floor, soil, etc., they dry and in the form of dust are blown about in the air of the house, street or country road. If they come in contact with clothing or household furniture, they can be carried. Should a nurse or attendant upon a case be careless about disinfecting the hands or clothing during or after the management of a contagious disease, he or she can become a common carrier by touching food, dishes, clothing, etc., used by other members of the family.

Water is a common carrier of disease, particularly typhoid fever, cholera, etc. Therefore, to prevent the spread of disease, every farmer, dairyman, occupant of a dwelling, factory, citizens of villages, cities and States, should see that they have a clean water supply free from germs and not contaminated by dirty water or refuse from a toilet, pig pen, stable, etc., which might contain germs carried from a patient or animal suffering from any one of the contagious diseases. One case of typhoid fever along the edge of a mountain stream, carelessly managed, thus permitting bowel movements to be thrown into or washed into the stream by rain, melting snow, etc., could cause an epidemic in every village which received its water supply from that stream or the river into which it emptied.

Milk can be a common carrier of disease, such as tuberculosis, typhoid fever, scarlet fever, measles, diphtheria, etc. Most States, however, have protected the supply of milk by the enactment of laws covering the inspection of cattle, the erection of well lighted, clean and ventilated dairies, boiling and sterilization of all utensils used in its handling, even the wearing of sterile gowns by the milkers and attendants, cleansing of the cows' udders before and after milking and currying and brushing the cattle and covering them with light blankets. Milk should be kept at even temperature after being placed in sterile cans to prevent the formation of germs which will develop even in transit to the consumer in the country or by train or in the milk bottles prior to city delivery. Railroads are compelled in some States, and should be in all States, to furnish refrigerator cans with ice and the dealers in the city should particularly during the warm weather, have a refrigerator or ice in the delivery wagons to maintain an even temperature for all milk delivered.

How Can the Housewife Protect Her Children from Drinking Germ-Laden Milk?—First make sure that the dairy from which the milk is supplied is clean and up-to-date and the city dealer delivers the milk at her doorstep in clean bottles. Do not allow it to sit in the sun in the early morning in warm weather, or about the kitchen at any time of the year, but place it immediately on ice in a clean refrigerator until ready to use. When taking a certain quantity of milk out of the bottle, if for the baby use a Chapin dipper, and do not allow it to stand uncovered for flies to contaminate. Milk may also be contaminated by water from any source of pollution if dairy utensils are carelessly washed with a supply of water from an infected water supply as any dirty well or one contaminated by cess pool, out-house, manure pit which is infecting water through the soil or from drainage.

It is absolutely vital to a country to protect its milk supply as two thirds of the deaths under two years of age are traceable to either germ-laden milk from dairies or not properly handled by dealers, nurses, mothers, etc., who are careless or too ignorant to appreciate the danger of allowing baby's milk bottle nipple being dirty, contaminated by flies or who allow a milk bottle to sit in the hot morning sun,—result a sick baby, followed by death.

Insects as Common Carriers.—Great strides have been made in recent years by scientists in regard to the further prevention of disease by studying the life habits of insects. It has been clearly proven that the poison or germ of certain diseases are carried by them, such as tuberculosis, typhoid fever, bowel complaints of children, by the common house fly; malaria and yellow fever by the mosquito; the bubonic plague by the rat flea, of which there are several varieties, and the squirrel flea, of which there are also several.

It is easily understood that to prevent the spread of a contagious disease from one individual to another, the precautions are not complete unless he or she be protected against either the bite of a mosquito or flea which has received into its own blood the poison or the germ causing the disease, which it conveys by biting another person. Flies should be kept out as, by coming in contact with the spittle or discharges from a patient, they carry the germ or poison upon their feet, etc., to the food, milk, water and by direct contact to another person.

Thus to aid in the prevention of disease, the numerous Boards of Health of City and State have issued regulations and instructions whereby these insects can be destroyed and then every person, sick or well, can be protected. If well, the fly is a danger by bringing disease into our home, if ill, it can convey our disease to another screenless home and start an epidemic.

The Common Fly (Musca Domestica).—The only way to prevent the fly carrying disease is to destroy his breeding place, keep him out of the home, etc., when developed, by screens and swat or catch by fly paper, etc., every one seen in a room.

House flies are a danger to human life. They are born in filth, feed upon garbage, sewage and waste matter of all kinds. They carry germs on the proboscis of their bodies, and a single fly is known to have carried as many as 350,000 germs and given them off into the liquid food in which it was floating. They also carry numerous germs inside their bodies which they convey to food, etc., in their vomit and bowel matter.

Flies can carry disease germs of typhoid fever, consumption, diarrhœa, dysentery and other diseases from a sufferer to you. They come in contact with your food, milk, water, etc., your sleeping child, or alight on an open wound, direct from the garbage can, the cuspidor, the spit in the street, etc., from decaying animal and vegetable matter and from the sick room. Thus every individual should do everything possible to aid the physician, city and state in destroying these known carriers of filth and disease and thereby prevent sickness, due to carelessness and indifference by permitting flies to breed and live.

How to Eliminate the Breeding Places of Flies.—Flies breed by laying larvæ or eggs which can be seen as Maggots in all undisturbed filth. It requires eight days for the millions of eggs to grow. Keep garbage can tightly covered, protect by screens so that flies cannot reach the garbage. See that garbage is collected promptly and cleanly. If you live in the country, burn or bury it. Allow no filth or decaying matter of any kind to accumulate in or near your premises. Keep stable clean, place manure, old straw, etc., in screened pits, vault, or in boxes or barrels, which should be well covered. Screen all privies, vaults and openings to cesspools or drainage structures. See that they do not overflow and use chloride of lime freely. Pour kerosene into drains, keep drainage systems in good order and repair all leaks at once. Destroy sawdust cuspidors, they are unsanitary. Clean cuspidors daily and keep a five per cent. carbolic acid solution in them all the time. Permit no dirt to accumulate in corners, behind doors, back of radiators, under stoves, etc. If there is a nuisance in the neighborhood, notify the nearest health authority.

What to Do to Get Rid of Flies.—Screen your windows and doors. Do it early in the Spring before fly time and keep it up until cold weather comes. Screen all food, especially milk. Do not eat food that has been in contact with flies. Screen the baby's bed and keep flies away from the baby's bottle, nipple and food, rattle, toys, etc. Keep flies away from the sick, especially those ill with typhoid fever, scarlet fever, diphtheria and tuberculosis, etc. Screen the patient's bed. Kill every fly seen to enter the sick-room. Disinfect all discharges, dressings, bandages, etc., from the patient and burn where possible. Catch all flies by use of sticky fly papers, traps and liquid poisons. A good poison to destroy flies is two teaspoonfuls formaldehyde in a pint of water sweetened with sugar and placed in saucers throughout the house. Be sure and have poisons out of reach of children and family pets. To rid an infected house of flies, burn in each room pyrethrum powder. Darken the room allowing only ray of light to enter at edge of window shades. Sprinkle pyrethrum powder over hot coals and carry about room. The flies will be stunned by the fumes and can be readily swept up. This is done because the flies will seek the light to escape the fumes and fall near the windows. Swat the fly whenever seen. A paddle can easily be made to kill the flies with by taking an oblong sheet of wire gauze and nailing it to a stick of suitable length for a handle.

The Mosquito.—The mosquito is a common carrier of Yellow Fever and Malaria or "Chills and Fever" as it is sometimes spoken of by the public. Malaria is caused by a tiny parasite which can only be seen by the microscope in the blood of man and the mosquito. It lives and multiplies in the blood of an individual suffering from the disease.

How is Malaria Carried by the Mosquito?—Let us imagine that a man has returned from some malarial country and takes up his abode in a healthy, yet mosquito infested village. This man may be fairly over his attack yet he still suffers from an occasional chill with fever. He has no screens in his house, nor have his neighbors, unless previously told to follow such precautions. A female mosquito or several attack him and suck his blood which contains these tiny parasites. The mosquito takes millions of these little parasites which then undergo a development in the body of the insect and can be seen microscopically in the stomach, intestine, and the small glands in its mouth, which secrete the saliva. Now let us follow this mosquito and see what harm it can cause in a community. It flies through a screenless door or window and lights on the arm, etc., of an unsuspecting neighbor. In biting a person the mosquito ejects or gives off its saliva into the wound to aid in diluting the blood of the person which it has bitten, as the blood is too thick to be sucked up through the tiny tube in the bill (proboscis) of the mosquito. In this way the bite of the female mosquito whose body contains the small animal parasites which cause Malaria, pass by means of the saliva into the blood of the person during the act of sucking up the blood. Thus the mosquito sucks up the blood of the individual and in exchange injects into his blood the saliva containing the parasites. These parasites multiply in the blood of the person bitten and produce poisons which give rise to the chills, fever, aching limbs, etc., known as Malaria, Malarial Fever or "Ague," (chills and fever). It can readily be seen how malaria will spread when individuals in a community have millions of parasites in their blood, and at the same time mosquitoes are carrying around in their bodies, millions of the same living germs which they suck from the blood of the infected person, develop and inject them into the blood of every person they bite.

How Mosquitoes Develop.—A female mosquito lays from 200 to 300 eggs at a time and always in standing water, as the eggs must have still water and no matter how filthy the water, it will not destroy the eggs or prevent their development.

How to Destroy the Breeding Places of Mosquitoes.—No breeding places, no eggs and consequently no mosquitoes. When we consider that one female mosquito can lay 200 to 300 eggs at a time and then figure the number of living pests we have seen in one evening, it can readily be seen how rapidly they can develop and in what numbers increase if their breeding places are allowed to remain about any premises. Mosquitoes lay their eggs in standing water, such as is found in cesspools, drains, open sewers, catch basins, foul street gutters, stable yard pools, tin cans, rain barrels or any object which holds water. In from a few hours to a day, depending upon the temperature and surrounding conditions, the eggs open and what we know and have seen as "wrigglers" come out and can be seen in the water in which the eggs have developed, as tiny slender living bodies ⅛-inch in length. In five to seven more days, the "wrigglers" become "tumblers." In another five to seven days the covering of the head of the "tumblers" cracks and the fully developed adult winged mosquito comes out and, in the case of the female of the species, flies off ready to annoy and bite.

Every individual should do everything possible to get rid of all breeding places. Examine your premises and be sure that they are free from any vessels, etc., which will receive and contain still water for one week or longer, that will afford a breeding place for mosquitoes. A loose brick causing a depression in the pavement, defective plumbing, cups, buckets, barrels, water pans in chicken yards, etc., a horse trough, a gutter on the eaves or roof of a house, bottles, barrels, tin cans, water spouts out of repair or clogged up and so do not drain properly. These collectors of water should be removed and all plumbing, drains, roofs, etc., repaired.

Mosquitoes will breed indoors as well as outside. Any water left in clogged sinks, toilet fixtures, water pitchers in bed rooms, slop jars buckets, tubs, spittoons, aquariums without fish, or in fact any vessel which is capable of holding a few teaspoonfuls of still water, will afford a breeding place for the mosquito. Neglect to remove or repair the above structures is only allowing a large crop of mosquitoes to develop and annoy you and your neighbors by bites, disturbing your comfort, preventing rest and sleep and subjecting you to the malaria and yellow fever if you are in a district where these diseases are known to exist.

Every citizen should use his influence to have every village, city and State corporation appropriate money to eliminate all marshes by filling with soil, drain all stagnant streams and have kerosene oil spread on the surface of lakes, ponds or any other body of standing water, no matter how small. The object of using oil is to prevent the "wrigglers" and "tumblers" from getting air, for after leaving the eggs, they require air to develop. A film of oil prevents the "wrigglers" from getting the needed air and they are destroyed by choking. One ounce of oil is sufficient to cover 15 square feet of water. Oil should be applied and removed once a week during the breeding season. When standing water must be kept, screen the containers or keep tightly covered, so the females cannot deposit their eggs. Screen all doors and windows. Put screens up early in the spring.

How to Destroy Existing Mosquitoes.—Kill every mosquito seen about the house. Every mosquito killed in the winter or spring will lessen the number of mosquitoes in the summer by thousands. Use a paddle, made of an oblong sheet of wire gauze tacked on to a strip of wood, to serve as a handle, to kill both the fly and mosquito whenever seen. One of the best means of killing female mosquitoes (as they survive from one season to another) is to begin in the winter or early spring to fumigate the air with the following mixture:—Equal parts (by weight) of carbolic acid crystals and gum camphor. Liquify the carbolic acid crystals by gentle heat, break up gum camphor into small pieces and then pour the liquid acid slowly over the camphor. The acid will dissolve the camphor completely and the solution formed is permanent and will evaporate slightly at ordinary temperatures. To fumigate a tightly sealed room, three ounces of this liquid will suffice for 1000 cubic feet of air space. Place it in a tin over an alcohol or other lamp and in addition place the lamp on a tin waiter or old pie plate, heat and it will require about one half hour to evaporate these three ounces of liquid. This solution is death to the mosquitoes and flies. It is not poisonous to man and is not destructive to fabrics and materials, furniture, etc. It is not explosive, but is inflammable and precaution should be taken to prevent fire. Mosquitoes found upon the ceilings of bedrooms in the evening may be quickly killed by taking a shallow tin cup or lip of a tin can, tacking it to a stick and then fill it with kerosene. Place quietly under the resting mosquito which either falls into or flies against the oil and is killed. Burn Chinese punk and mosquitoes will be driven away temporarily. Equal parts of olive oil and oil of citronella applied every half hour or so to the skin of the face, neck, hands and ankles will keep away mosquitoes. This method is useful to farmers, hunters, lumbermen or laborers about woods, swamps, etc., where mosquitoes are an annoying and disease carrying pest.

Fleas.—There are one hundred varieties of this pest which live on dogs, cats, birds, squirrels, rats, mice, etc. It has been proven that fleas carry the germs of Bubonic Plague, which has caused as high as 113 deaths in 119 cases during an epidemic. The disease was found to be spread by means of rats, mice and squirrels of all species and the flea (*pulen fasciatus*) in the fur of the animals was the medium by which the disease was conveyed to human beings by biting them and injecting the germs of Plague into their blood.

The forms which pester the American homes are the House Flea (*Pulen Irrilans*), the Cat Flea (*Pulen Felinius*), and the Dog Flea (*Pulen Canis*). Each female flea deposits from eight to twelve whitish ovoid eggs in dust or lint, under carpets and the larger crevices of woodwork. In the summer they develop in about four weeks from the egg to the adult flea, in winter they develop in about six weeks. Four to six broods, as a rule are hatched out during each summer.

The House Flea occurs in dwellings, breeding in bedding, clothing, carpets, window curtains, etc. They attack their victims at night. The Cat and Dog Flea, though they annoy only their respective victims, are as troublesome to human beings as the human flea.

To Get Rid of Fleas.—Remove and clean rugs, etc. Dust Pyrethrum powder into all cracks and crevices where dust or dirt may be lodged to destroy the larvæ. Scrub the floor and *footboards* with hot soap and water to kill the adult fleas. To eliminate fleas on cats or dogs, dust Pyrethrum powder into the hair. The fleas will fall off while stupefied and should be immediately swept up and burned. Sleeping places of dogs and cats should be cleaned and covered with a carpet or matting that can be shaken into an open fire and the eggs, larvæ and fleas with which it is generally covered, destroyed. During an epidemic of Bubonic Plague destroy all rats, mice, stray dogs and cats, etc., and protect your house by killing all fleas whether in the furnishings or on your family pets. Flea bites are painful and if scratched may cause an abscess, followed by blood poisoning. The pain and itching of a flea bite can be counter-acted by touching the wound with ammonia water. To prevent infection, bathe the wound with a 5 per cent. solution of carbolic acid in water and bandage until healed.

Cockroaches.—Cockroaches are brownish or black in color, broad and flattened in shape and smooth and hard to the touch. All cockroaches should be destroyed. They not only annoy, but, even though it has not been proven, they, no doubt, carry disease germs by coming in contact with discharges, etc., from ill persons and convey filth and germs to food, etc. They are very numerous in pantries, kitchens and in the walls near a stove and fire places. They are apt to be abundant in oven rooms or bakeries and wherever the temperature is kept above normal. They usually appear at night or wherever light is absent and thus are protected from their common enemies. Owing to their shape they can squeeze into tiny cracks. They scurry away when surprised and generally escape capture or destruction, due to their speedy gait. They feed on animal matter, cereals and any food material; also eat woolens, leather cloth and leather bindings of books (due to the presence of paste). They give off a fetid, nauseous odor, which persists even after thorough cleaning. They taint food supplies, stain shelves and dishes and when present in large numbers, render the air of a room unbearable. This is due not only to their excretion, but mostly to an oily liquid secreted in the scent gland and a dark colored fluid in the mouth. They will destroy bedbugs. No contagious disease can be said to be properly treated or isolated, if cockroaches are scurrying about the walls, carpets, food, etc., of a sickroom and allowed to persist and possibly convey the germs of the disease to others in the house or to neighbors.

How to Destroy Cockroaches.—Take a quarter of a teaspoonful of phosporous, two level tablespoonfuls of flour, mix and make into paste with well sweetened water. Phosporous is very inflammable and should not be allowed near fire and being poisonous must not be placed where children and family pets can touch or eat it. Place the paste where the roaches can reach it.

Bed Bugs.—The bedbug is a small but plainly visible ovoid-shaped bug, giving off a peculiar nauseous odor. It is of a reddish brown or rusty color with some discoloration on the abdomen and is furnished with a puncturing or sucking apparatus. The eggs are tiny white oval bodies. As many as 6 to 50 batches are laid in cracks of beds, furniture, picture frames, wall paper, crevices of woodwork, floors, etc. Each batch of eggs develops in from 6 to 11 weeks, and several batches may be hatched in a season. One generation succeeds another as long as the temperature remains sufficiently elevated. They hibernate during cold weather, during which season the insect is merely stupefied and renews its activities upon the return of warm surroundings. It is found in the dwellings of man, but other species of the same family have been found upon birds, as the common chimney swallow, pigeons and bats.

The bedbug comes out at night and begins to bite and annoy. It conceals itself very cleverly and quickly in the day time or when surprised by a sudden light at night. It lives on the blood of man particularly, but can exist on food of other insects. It thrives best on filth and in old houses can keep alive without food for a year.

Bedbugs are said to transmit smallpox. There is a possibility of their carrying the germs of typhoid fever and leprosy, but this fact has not been proven as yet. The bite is poisonous to some individuals, resulting in inflammation at the seat of the bite. This is supposed to be due to the same secretion which gives the characteristic nauseous odor.

How to Destroy Bed Bugs.—Spray with pure spirits or crude turpentine or benzine by using an ordinary nose and throat atomizer which can be bought in a drug store, all brass or wooden beds after scalding where possible with hot water, spray the crevices of floor, back of picture frames and where a house is "alive" with the pests repaper and paint rooms. Spirits of turpentine will kill where carbolic acid has failed. After each spraying, watch for the bedbugs as those which are not destroyed will hasten to escape and can be killed. Remember benzine and turpentine are inflammable and poisonous. No lights should be permitted in the rooms during or immediately following the use of these drugs. When articles cannot be sprayed, as books, etc., seal up the room and burn a sulphur candle. Place sulphur candle in a tin cup and place cup in a tin or metal pie plate containing water.

Lice.—The body louse has been found to be a carrier of typhus fever. It carries the germ in its body after biting a sufferer from the disease and by biting a person can inject the germ into his blood. Lice belong to the insect family. The species which infest human beings are about 1-10 of an inch in length and are found on the covered regions of the body and clothing. Lice always grow from the eggs laid by an adult louse and never originate from filth or other matter. They hatch out within a week and the young are capable of reproduction in less than two weeks. A single adult female will produce 5,000 lice within eight weeks.

The annoyance of these pests biting a human being will cause, if sufficiently prolonged, a nervous irritation, and a condition of ill health follows. There are three types of lice which infest man. The Head Lice (*Pediculus Capitis*), the Body Lice (*Pediculus Vestimentorum*) and Crab Lice (*Pediculus Inguinalis*).

The Head Lice.—They are grayish in color with blackish margins and show a reddish tinge due to the blood they have sucked from their victim. The eggs or nits are seen attached to the hair shafts on the scalp at some distance from the end of the hair and are tiny white or grayish pear-shaped bodies seen upon close examination.

TREATMENT.—It is necessary to remove eggs and adults at the same time, so wet the hair thoroughly with crude petroleum (from any drug store) keep hair wet for three hours, then wash whole head with warm water and soap. Repeat this wash once a day for three successive days. The eggs can then be removed by combing the hair with a fine tooth comb wet with vinegar. Where possible the treatment can be made more thorough and permanent if the hair is cut short.

Body Lice.—The Body Lice are larger than the head lice and are commonly found upon the body. This type has bands across the back.

Crab Lice.—They usually develop in the seams of clothing, however, the eggs have been found upon the hairs on the body's surface. They live in concealed portions of the clothing where the skin is most conveniently reached, where the various bites are to be found most often, as around the neck, across the shoulders, the upper part of the back, around the waist and outer side of the thighs.

TREATMENT.—All clothing worn should be boiled and gone over with a hot iron to destroy them. A hot bath should be taken by the person annoyed by the parasites. Bathing suits should be carefully boiled as they often become infested with the eggs and body lice from a person who may have worn the suit and had them upon his or her clothing or person.

The Crab Lice.—These are a smaller type of the former species, as head or body lice. They are nearly as wide as long. They have strong legs spread out on the sides of the body, which makes them appear like crabs. They are of whitish color, slightly shaded on the shoulders and legs with a red tinge. Crab lice are found upon the hairy regions of the body other than the scalp. The spread of these pests can be checked by washing all toilet seats with scalding water, and boiling towels and linen from suspected persons. Laundries should be especially careful as to the thorough boiling and disinfection of all clothing, as the eggs of these parasites can be conveyed in bed clothing, towels, etc.

TREATMENT.—Shave the hair in the region of the itching and wash twice a day with a lotion made of

Tincture of Larkspur..................	½ ounce
Commercial Ether	8 ounces

The Itch Mite.—This parasite which afflicts man causes the condition spoken of as "Itch," "Seven Years Itch," "Army Itch," "Jackson Itch," etc. It has an oval body with spine-like projections. The female is larger than the male and measures 1-70 of an inch in length by 1-50 of an inch in width. The female causes the development and pain of the afflicted person. She burrows into the superficial skin, forming a tortuous or a straight dotted line, slightly elevated which varies from 1/8 to 1/2 inch in length. This line if observed closely appears dark gray or blackish in color and is slightly more elevated at one end. The eggs are laid in this furrow and at the elevated end is usually found the female, which has perished, as a rule. It takes almost 13 to 20 days for the eggs to develop into adult mites. The young mites feed upon the tissues of the body and move about causing discomfort until they reach the surface of the skin where they mate and females start a fresh burrow and deposit more eggs.

The Itch Mite is commonly found in the skin between the fingers, hands, folds of the wrist, arm pits, around the stomach and about the neck. It is not known as a carrier of disease, but can be dangerous to health by causing burrows in the skin and abrasions due to scratching which afford an opening for germs to enter the system of the bitten individual.

The Itch Mite can be conveyed from one person to another by means of towels, clothing, bathing suits, etc., carelessly washed, handled, or worn by anyone afflicted with the pests.

TREATMENT.—To destroy them, have all bed linen and clothing used by the individual infested, thoroughly boiled or baked. Treat the region of the body by taking a bath, washing first with warm water and castile soap, using a brush to thoroughly open up the burrows and expose the eggs for destruction. After this, apply an ointment,

Sublimed sulphur.......	one drachm	(teaspoonful)
Balsam of Peru.........	one drachm	(teaspoonful)
Vaseline	one ounce	(2 tablespoonfuls)

Rub in morning and evening for from two to four days and repeat at end of a week if any itching continues.

THE PUBLIC DRINKING CUP.

The drinking cup is a common carrier of disease. It can and does spread consumption, syphilis and typhoid fever. Any child or adult suffering from tonsilitis, diphtheria, scarlet fever or other communicable diseases can infect another by using a public tumbler or cup, whether at a public railroad station, school house, ball park, pump, railroad train, ferry boat or steamship of any kind, etc.

The most of the State Boards of Health have had laws passed in recent years to abolish the public drinking cup and those states which have not done so are neglecting the public health by not enforcing this preventive measure, which would aid in checking the spread of disease.

The drinking cup should be replaced by a sterile paper cup which can be purchased in sealed packages or containers and are given away free of charge in trains, etc., and can be purchased for one penny from the slot machines in stations. They are destroyed after use and a more refreshing and sanitary drink is obtained and the danger of contracting disease eliminated. The Public Drinking Cup Must Go.

THE PUBLIC TOWEL.

The towels in toilets, bedrooms of hotels and boarding houses can spread disease unless they are thoroughly boiled and laundered after use, Most hotels, railroad stations, Pullman cars, etc., have done away with the public towels in toilets and use a heavy tissue paper, either as a single towel or in rolls and torn off as needed, which is not expensive and is thrown away after use.

In Pennsylvania the State Board of Health has urged saloonkeepers, etc., to do away with the forks and spoons which are placed in a tumbler of water and are used by all comers at the free lunch counter and then replaced in the tumbler of dirty water for the next victim to use.

Disease can be controlled better when our proprietors of saloons, restaurants, hotels, soda fountains, etc., employ only healthy employees, free from disease and take pains to boil or scald every public glass and chinaware used by not only dirty, but disease-spreading persons. The barroom towel which hangs in front of the bar in the cheaper saloons for customers to wipe their mouth and hands upon, must not be permitted.

VENEREAL DISEASES.

Syphilis, gonorrhœa and a host of diseases which follow in their train, come within the scope of Preventive Medicine. They are not spread by water, air, food, or insects as are so many diseases, but develop only from contact with a sufferer (usually by co-habitation, but possible by non-sexual contact), or by the germs from a sufferer being imparted to another by towels, clothing or other articles. They may be communicated to an innocent wife by a diseased husband and *vice versa,* and many serious diseases and infirmities depending on these diseases may be transmitted to the children of the diseased, as instance the disease of Opthalmia or Blindness in Children, which occurs at or shortly following birth, and which is usually attributable to one or both of the parents suffering from gonorrhœa, although it may arise from other causes (see Index for article on Opthalmia, its cause, treatment and prevention).

Syphilis and gonorrhœa are so largely dependent on immoral intercourse that their prevention is largely a matter of moral uplifting of the people. But, pending this moral uplifting, much is possible by the State and municipal governments placing these diseases on the list of contagious diseases which must be reported to the authorities, as is now required in respect of small-pox, scarlet fever and other diseases which are neither so loathsome nor have such far-reaching results for ill to mankind.

All parents should carefully read the articles on Syphilis, Gonorrhœa and Opthalmia, to be found elsewhere in this work (see Index), and then they should carefully guard their children and at proper age thoroughly instruct them in the fearful ravages of venereal disease. There is too much false modesty in these matters on the part of parents. The general discussion of sexual matters in novels, in sensational books on eugenics and in ordinary conversation is to be condemned, but it is the duty of every mother to her daughter and of every father to his son, to not only keep constant guard over them in these matters, but, at the beginning of puberty, to instil into their minds the real truths that they may become imbued with the horrors of venereal disease, yet realize the nobility of true sexual life. Professors and teachers in resident schools and colleges where youth is congregated should also have regard to this vital subject and take means to properly impart useful knowledge, and not only adopt every possible precaution to prevent students from meeting lewd persons, but by periodical medical examination discover if any venereal disease is existent, and if found in any individual then suspend such student until the disease be eradicated beyond the possibility of contagion.

Syphilis is a more horrible disease than small-pox and may be easily communicated to the innocent by a common towel, by a brother kissing his sister or a son his mother, and in many other ways, and yet the syphilitically diseased may go where they please and little or no precautions are taken as to the spreading of the disease. It is estimated that in New York City alone 250,000 people are suffering from this loathsome disease, either inherited or acquired, and when it is borne in mind that large numbers of these have innocently acquired it and are now in turn transmitting it to others, the enormity of the evil and the imperative need of preventive measures, will be realized.

INDEX TO PART II OF BOOK III

Preventive Medicine

Water In Its Hygenic Relations

Part II of Book III treats of pure and impure water and its various effects upon the human body, both as respects internal and external uses.

SUBJECTS OF THE TEXT

PREVENTIVE MEDICINE

PART II.

WATER IN ITS HYGIENIC RELATIONS

THE USES OF WATER.

Adaptation of Water to Human Needs.—Few people who enjoy the benefits of water think what a wonderful and unanswerable argument is afforded by them in favor of the goodness of an all-wise Creator to his creature, man. Of all the fluids with which we are acquainted water is by far the best adapted to the almost infinite variety of human wants, and it is the one of all others most abundant in nature, constituting as it does about three-fifths of the surface of our globe, and nearly seven-tenths of the bodies of man and of most animals. If the common fluid upon which we had to depend were quicksilver, or oil, its boiling-point would be so high that articles of food which we attempted to cook in it would be seriously injured in the effort to prepare them by its aid; and, on the other hand, nearly all the advantages of ice would fail us, in consequence of the exceedingly low temperature at which these substances remain fluid.

Water in All Substances.—Water was considered by the ancient philosophers as one of the four elements out of which all visible objects were constructed; and, in reality, it enters to a greater or less extent into the composition of nearly all natural substances. Thus, for example, some vegetables, like cabbage or celery, contain as much as ninety-five per cent. of water; and, on the other hand, close-grained marble may contain as much as four per cent. of water, or almost a quart to the cubic yard. On account of its remarkable solvent powers, which enable it to take up a smaller or larger quantity of nearly every substance with which it comes in contact, water is never found pure in a natural state; and, indeed, absolutely pure water for chemical purposes can only be obtained by repeated careful distillations.

Air and Gases in Water.—A considerable amount of air generally exists in water, and is taken up by the gills of fishes, assisting them to accomplish the proper aeration, or rather oxygenation, of their blood. The air usually mingled with water may be expelled by boiling, but is absorbed again if the boiled water is agitated with access of the atmosphere.

Boiled Water.—The insipid taste of water which has been boiled is due to the absence of air. Many gases besides air may be artificially or naturally mingled with water, and some, like ammonia or nitric acid, are freely soluble in it. In sea-water, the presence of common salt, with small quantities of sulphate of soda or Glauber's salt, and, of the compound of magnesia and chlorine, called chloride of magnesium, render it entirely unfit for drinking, as many a hapless shipwrecked sailor has found to his cost.

Distilled Water.—At the present day, most sea-going vessels are provided with apparatus for distilling the water of the ocean, and so producing a pure and wholesome but insipid water, which can be rendered, however, more palatable by agitation with plenty of fresh air. Hence, the horrible agony of death by thirst among sailors is now much less frequent than formerly, although mariners in open boats, or cast upon small uninhabited islands, still sometimes scan with anxious eyes the briny waste around them, beholding—

"Water, water everywhere, but not a drop to drink."

Sea-Water.—Sea-water varies considerably in composition, being, of course, more concentrated, as a rule, in the tropical regions, where evaporation is most active, such, for example, as in the Mediterranean Sea and the Atlantic Ocean near the equator. According to analysis, the water in the English Channel contains in 1000 parts—

Chloride of Sodium	28.05
Chloride of Magnesium	3.66
Sulphate of Magnesia	2.29
Sulphate of Lime	1.40
Other Saline Materials	.76
Total Solid Matter	36.16

Besides these, and perhaps contributing largely to the healthful qualities of sea-water, there exist in the ocean small quantities of iodine and bromide, and extremely minute amounts of some of the common metals. It has been found that, by dissolving a little common salt and carbonate of soda, lime and magnesia in distilled sea-water, its taste is rendered much more agreeable; and this plan, it is said, is adopted in the Russian navy.

Purity of Rain-Water.—The water, which rises in vapor into the atmosphere from all the oceans, seas, lakes and rivers of the globe is condensed after a longer or shorter time, and falls to the earth again as rain. Rain-water, being in reality a distilled fluid, is the nearest approach to a pure water which we find in nature, and when caught in clean vessels placed upon elevated objects is almost free from contamination.

Impurities in Rain-Water.—It contains, however, small quantities of organic matter, nitric acid and ammonia, all of which are washed out of the air through which it descends as rain. The source of the nitric acid is believed to be the nitrogen of the atmosphere, which combines with oxygen under the influence of the electric spark during thunder-storms. Nitric acid in rain-water exists in such insignificant amount as to be entirely unimportant in itself; but it adds very seriously to the danger of impregnation with lead from lead pipes, roofs and cisterns by rapidly dissolving that metal and forming the very soluble and highly poisonous salt, nitrate of lead.

SOURCES OF DRINKING WATER.

Evaporation.—Our supplies of drinking water are, of course, derived originally entirely from the rainfall. We need not consider now how the water found its way into the air. Without entering into the details of the process of evaporation, all that the present object requires is, that we clearly recognize the fact that spring, fountain, river and lake are all alike fed from the clouds which float over our heads and send their rain upon the just and upon the unjust. Hence, then, man is wholly dependent for his supply of this vital element upon the rain which comes down from heaven. He may dwell upon the most arid plains, but he drinks from the stream which flows beside or underneath his feet—which stream is itself fed by floods that fell perhaps a thousand miles away—and whatever mystery attaches to subterranean waters, we may be sure that, by a long enough circuit, we can trace every drop back to the clouds.

VARIETIES OF WATER.

Rain-Water.—In classifying waters, we have first to consider them as regards their sources. Rain-water, as already mentioned, is sweet and soft, and when filtered is perfectly adapted to all the purposes of life; the one difficulty about its use being the impossibility of collecting it pure and preserving it without contamination for the long periods of time and in the large quantities which would often be necessary.

Spring- and Well-Waters.—Spring- and well-waters are almost always more or less impregnated with the soluble ingredients of the earth and rocks through which they pass, and are therefore sometimes very unsuitable for the ordinary wants of life. As a general rule, they are colder than other waters, although hot springs are found in various parts of the world, some with a temperature as high as the boiling point.

Mineral Springs.—Mineral springs, notwithstanding they are much used for drinking, are properly medicinal agents. They comprise all those waters which contain sufficient quantities of dissolved matters, such, for example, as iron or sulphur, as to produce thereby a positive effect upon the systems of persons partaking of them. The mineral springs of this country are frequently valuable remedial agents in some chronic diseases.

River-Water.—River-water is, to a certain extent, similar to spring-water, but is much more apt to be contaminated with sand and clay, organic material from decomposing vegetable or animal remains, the refuse of manufactories, and especially with the sewage of cities and towns, to which it is probable immense amounts of sickness and death are annually due in all civilized countries. Unfortunately, river-water is that which is chiefly supplied to towns and cities, and therefore finds its way into the systems of vast numbers of our fellow-beings.

Stagnant Water.—Stagnant water is, from the large quantity of organic matter in a decomposing state which it holds in suspension or solution, exceedingly unfitted for drinking and culinary purposes, no matter how transparent it may appear; and it should, in consequence, be carefully avoided whenever running water can possibly be procured. Pond-water, canal-water, ditch-water and marsh-water all come under this category, and should be scrupulously shunned, under penalty of suffering from fever and ague, dysentery, typhoid fever, and many other dangerous maladies.

Quantity of Water Needed.—The quantity of water needed by man and animals must therefore be very carefully calculated. Repeated experiments upon a very extended scale in England have shown that a healthy man requires daily as drink from two to four pints of water, this amount being in addition to that which is swallowed as moisture in food. The amount required for cooking is estimated at from half a gallon to a gallon or more. To this quantity, Dr. Parkes considers should be added for daily ablution, including a sponge bath, five gallons; daily share of kitchen and other utensils, and house washing, three gallons; and share of clothes washing, another three gallons; making up a total of a little over twelve gallons for each individual daily. In the poorer districts of the city of London, the amount used is stated to be only about five gallons daily. A shower-bath will require about four gallons extra, and a plunge-bath from forty to sixty gallons. Where water-closets are used an additional quantity of from four to six gallons daily for each person must be provided.

DISEASES FROM MINERAL IMPURITIES IN WATER.

Purifying Ingredients.—Since all rivers, spring- and well-waters contain a certain amount of dissolved matters, taken up from the soil through and over which they pass, it becomes a very important consideration to determine what these ingredients are in any particular sample of water, and also the kind and degree of such impurity which will not prove injurious to health. Dr. Letheby, from investigations made in sixty-five English and Scotch towns, arrived at the conclusion that from five to twenty grains to the gallon of the compounds of lime and magnesia are necessary to render drinking water in the highest degree wholesome.

Saline Impurity.—But any quantity of saline impurity exceeding thirty-five grains to the gallon renders a water unfitted for the freest domestic use. Such water would be popularly designated as a very "hard" water, but a good deal of indifference is caused by the nature of the hardness, that due to sulphate of lime, and called the permanent hardness because it is not removable by boiling, being decidedly most prejudicial to health.

Diseases Caused by Alkaline Waters.—The symptoms referable to an excess of alkalinity, arising from the presence of these earthy salts in a drinking water, are mainly those of a dyspeptic nature. At first the employment of hard water by persons who are unaccustomed to it produces diarrhœa, which is occasionally serious or even dangerous in its character. But the long-continued use of such a drinking fluid is thought to cause habitual constipation, with the heavy train of evils, including piles and liver complaint, which depend upon it. Calculus, or stone in the kidney or in the bladder, which gives rise sometimes to the most horrible agony human beings are ever called upon to endure, is believed to be due, in many instances, to an excess of lime and magnesian salts in the drinking water.

Cause of Goitre.—The swelling of the thyroid gland in the neck, producing the repulsive deformity of Goitre, or Derbyshire neck, seems to be intimately connected with mineral impurities in water. In Nottingham, England, where this disease is not unfrequently met with, the common people attribute it to the hardness of the water, and in other parts of Great Britain it is found to prevail only, or at least especially, in those districts where the magnesian limestone formation abounds.

Goitre in Switzerland.—Dr. Coindet, of Geneva, Switzerland, asserts that Goitre is speedily produced in persons who drink the hard pump-water in the lower part of that town, whilst in other parts of Switzerland the use of spring-water has been followed by the development or augmentation of Goitre in a very few days. In India also it has been shown conclusively to prevail, to any marked extent, only where the magnesian limestone rocks underlie the soil; but whether it is the lime and magnesian salts, or whether, as has been suggested, it is the presence of sulphide of iron in the bed-rock formation, which is the direct cause of the development of Goitre, has not yet been positively determined. It appears certain, however, that Goitre is originated by some water impurity, and that this contamination is of an inorganic and not of an animal or vegetable nature.

Organic Impurities in Water.—A small quantity of organic matter of vegetable origin, that is to say, an amount not exceeding three grains to the gallon, is not generally found to be injurious, but even very minute quantities of organic material of *animal origin,* especially if this material is composed of the waste matters, such as urine or excrement, from man or animals, is the great cause of unwholesomeness of water. Probably one-fourth of the sickness and death in civilized communities arises directly or indirectly from this one cause, and, unfortunately, even when we are fully forewarned of this imminent danger to health, it is exceedingly difficult, in most thickly populated places, to secure a source of water supply with which sewage has not been mingled.

Effect of Metallic Impurities.—The effects of minute traces of metallic substances in drinking water have not yet been ascertained with sufficient accuracy, but it is quite possible that the entire sanitary condition of a district may depend in some measure upon impurities of this description. Mr. Wanklyn suggests that the well-known salutary effect of what is called change of air may be, in reality, partly due to the escape from some extremely small metallic impurity in the water of the section of country from which removal takes place.

Cause for Bright's Disease.—It has long seemed probable that the increasing prevalence of that terribly fatal malady, "Bright's disease," especially in cities and large towns, may be due to the poisonous effects of exceeding minute quantities of lead, dissolved from the lead pipes so generally employed as service-conduits, notwithstanding the protective coating which usually forms so promptly upon them.

Lead Poison in Water.—These are probably very common throughout our whole country, and, contrary to what at first sight might be imagined, it is likely that lead much more frequently and seriously affects the health of people inhabiting small villages and country houses, than that of residents in cities, notwithstanding the latter constantly use water which is brought into their houses through long lines of lead service-pipes. The explanation of this seeming paradox is that river-water, which is that usually supplied to citizens, contains in almost all cases a small amount of the sulphate of lime, sulphate of magnesia, or some other compound of sulphuric acid, which, when brought in contact with the lead pipes, is decomposed, and the resulting sulphate of lead which is formed has the happy faculty of clinging to the inside of the pipes where it is produced, and thus constituting an insoluble lining, which not only protects the tube from further corrosion, but also, what is of far greater importance from a sanitary point of view, prevents any further contamination of the drinking water which flows through the conduit.

Lead Poison in Rural Districts.—In rural districts, on the other hand, wherever rain-water is used for drinking purposes, it is exceedingly liable to be contaminated with lead from lead-lined cisterns, lead service- or collection-pipes, lead roofs, or from the solder of tin roofs. As a rule, the purer the rain-water, the greater is its action on lead with which it stands in contact; hence, therefore, the presence of a minute quantity of some salt of sulphuric acid in water is of very great importance, and serves as an invaluable protection against lead-poisoning to the human beings and animals who may employ it for drinking purposes.

How Lead Poisons Water.—When pure water recently boiled is placed in, or run over, lead, no action takes place; but if the water, after being boiled, is exposed for a short time to the air, from which it absorbs oxygen and carbonic acid, and is then brought in contact with lead, we soon find that a whitish film, which on chemical examination is found to be composed of the carbonate of lead, is formed upon the metallic surface. This whitish film, which easily separates from the lead on which it appears, and becomes mechanically mixed with water, is very poisonous. Since, as already mentioned, rain-water contains usually some nitric acid, in addition to the oxygen and carbonic acid which it absorbs from the air, and this nitric acid combines with lead to form a very soluble and poisonous nitrate of lead, it is much more dangerous than even pure aerated water, after standing for a short time in contact with a leaden surface. Rain-water intended for drinking or cooking purposes ought, therefore, never to be collected from lead or tin roofs, transmitted through lead pipes, nor under any circumstances stored in lead-lined cisterns of any kind.

Virulence of Lead Poison.—In the celebrated case of the accidental poisoning of the ex-royal family of France, at Claremont, by lead which was taken up in the drinking water, the amount was found not to exceed one grain of metal to the gallon of water. From cases which have since been observed, it would appear that the habitual use of water containing one-tenth or even one-twentieth of a grain per gallon, is sometimes attended with danger. In his investigation into the cause of that curious disease, as it was formerly considered, the Devonshire colic, Sir George Baker, who discovered that it was only a form of lead-poisoning due to the drinking of cider fermented in lead-lined vats and troughs, found that eighteen bottles of cider he examined contained four and a half grains of lead, or a quarter of a grain to each bottle.

Lead Palsy.—Under some special circumstances, not at present well understood, extremely minute amounts of lead in water may prove injurious. Thus, for example, Dr. Angus Smith speaks of cases in which lead-paralysis, or palsy, was apparently produced by water containing only one one-hundredth of a grain of lead to the gallon.

Detection of Lead in Water.—The method of detecting the probable presence of lead in a sample of drinking water is so simple that every reader is advised to take the first opportunity of examining their own water-supplies, and so making sure that they or their families are not liable to the insidious dangers of lead-poisoning. In order to determine whether a water is contaminated with lead, all one has to do is to drop two or three drops of the solution of sulphide of ammonium into the suspected fluid, contained in a white bowl or large cup, and observe whether a brownish or yellowish coloration is produced. If the liquid remains perfectly clear and colorless you may be sure that it either contains no lead, or that such a metallic impurity is present in a quantity of less than one-tenth of a grain to the gallon, an amount which is not generally injurious to health. If, however, a slight brownish tint is produced in the water which is being tested, it must not be too hastily condemned as poisoned, since either copper or iron might give rise to the same coloration with the reagent. Such a suspicious water ought, however, to be promptly analyzed by some good analytical chemist before being employed for either cooking or drinking purposes any further.

Applying the Test for Lead.—The sulphide of ammonium may be purchased at a small cost, say for twenty-five cents an ounce, of most dealers in chemicals; and, as its odor is extremely disagreeable, it should be kept carefully corked until the moment it is used. The experiment should be made upon half a pint of the suspected water; and, if the contamination is supposed to be caused by lead pipes, it is a good plan to test a portion of the liquid which has stood over night in the conduits. The mode of discriminating the precipitate caused by iron from those due to the dangerous metals, lead and copper, is to let fall a few drop of hydrochloric acid, called also muriatic acid, into the fluid. If the brownish or yellowish-brown tint disappears, we may know that innocent iron is the only metallic impurity; whilst if, on the contrary, no change is effected by the addition of the acid, one of the poisonous metals, lead or copper, is present. No water, however, in which the slightest tinge is produced by adding the sulphide of ammonium, should be swallowed by man or beast until a rigid investigation by a competent water-analyist has proved it to be harmless.

Difficulty of Obviating Lead Poisoning.—Attempts have been made to obviate the danger of water contamination from lead pipes in various ways, but not as yet with complete success. In some instances the pipes have been lined with other metals, such as tin or zinc; but, at least in some instances, a galvanic action has thus been set up, which corroded the conduits with great rapidity, and probably led, therefore, to still more dangerous pollution of the water supply. Coating the pipes on the inside with coal-tar, bituminous varnish, solution of gutta-percha and of India-rubber, have also been experimented with, as yet with but partial success.

Lead Diseases.—The injurious effects of lead upon the human system are displayed first, in the production of dyspepsia; later, obstinate constipation and a peculiar kind of colic, so common among painters from the influence of lead that it has received the name of "painter's colic;" and finally, disturbance of the nervous system, especially that peculiar form of lead-palsy called wrist-drop, in which the power to lift up the hand is more or less completely lost.

Iron in Water.—The presence of iron in a water, rendering it what is called Chalybeate, from the old Greek name for iron, renders it to many persons only a useful tonic, but in some people it causes severe headache and serious disturbance of the digestive organs.

Arsenic in Water.—Arsenic, copper and mercury are rarely found in drinking waters in America, except in streams flowing near chemical works, or unless they are introduced designedly with some murderous intention. These metals may, therefore, be practically ignored in the consideration of water from a hygienic point of view.

Infectious Diseases from Impure Water.—The principal acute diseases which are due to impure water are Cholera, Typhoid Fever, Diarrhœa and Dysentery; and, although it is only within a comparatively recent period that mankind has begun to realize its dangers from this source of these maladies, the accumulated evidence is already very conclusive.

Cholera Due to Impure Water.—Among the remarkable outbreaks which go to prove that this mode of cholera propagation is not at all uncommon, may be mentioned the following, condensed from Mr. Simons' eighth report as medical officer of the English privy council, during the prevalence of cholera in England in 1865: A gentleman and his wife from the village of Theydon-Bois, in Essex, had been lodging at the town of Weymouth for two or three weeks, and returned home towards the end of September. On their way home they passed through Dorchester, where the gentleman was seized with diarrhœa, vomiting and cramps, which continued more or less during the next day and the day following, when he reached his own home. During the journey the wife also began to complain of pains in the abdomen, which was followed by diarrhœa and eventually by cholera, from which she died.

Cholera Infection.—A few days after their return the same terrible disease rapidly attacked other members of the household, so that, within a fortnight, in that one little circle, eleven persons had been seized with cholera, including the mother, father, grandmother, two daughters, son, doctor, serving-lad, serving-maid, laborer and country-woman, and of these eleven only three survived, namely, the son, a daughter and the serving-lad. Later, in the country-woman's family, there was another fatal case. It cannot well be doubted, concluded Mr. Simon, but that the exciting cause of this succession of events was in some way or other the return of the parents from Weymouth—of the father with the remains of choleraic diarrhœa upon him, of the mother with apparently the beginnings of the same complaint. But this is only part of the case, and the remainder teaches a most impressive lesson. All the drinking water used in the house came from a well beneath the floor of the scullery, and into that well there was habitual soakage from the water-closet.

Another Case of Infection.—Another famous illustration is found in the history of the "tea-water pump" of Broad street, near Golden Square, London, which during the cholera visitation of 1854, killed nearly 500 persons in a single week, in one of the fashionable localities of the city. It has long been known that water containing five or six grains of lime and magnesia to the gallon is much to be preferred for making tea to water of any other quality. This is because the lime precipitates the astringent matter of the leaf, yet does not interfere with the solution of the desirable constituents; and hence certain wells which have this proper proportion of mineral matter come to be valued very highly by persons of nice taste.

The Famous London Pump.—At any rate, the Broad street pump had in London the reputation of furnishing, in its cold sparkling waters, a better medium for "the cup which cheers but does not inebriate," than was elsewhere to be found. When the cholera invaded this neighborhood the wealthy residents retired to the fashionable suburbs which were still uninfected; but, to the surprise of many, the cholera broke out among them with terrible severity. The health officers soon discovered, however, that those who were attacked had sent in every day to their favorite Broad street pump for their water-supply, and, by removing the pump-handle, they quickly put an end to the epidemic.

Avoiding Cholera.—A first and highly important warning, therefore, which these and many other similar occurrences give us is never to drink any water which, by any possibility, could have become contaminated with the smallest particle of discharge from the bowels of a person suffering from cholera or choleraic diarrhœa.

Typhoid Fever from Polluted Water.—The remarks which have been already made with regard to the influence of impure water on the spread of cholera, apply still with greater force to the causation of typhoid fever. So common is this mode of propagation that the assertion may be ventured that few readers of these pages have not lost some near relative or beloved friend from this dreaded disease arising in this way, although the true source of the infection was perhaps, at the time it occurred, quite unsuspected.

Spread of Typhoid.—Sir William Jenner, than whom no higher medical authority could well be quoted, in commenting upon this point, says: The spread of typhoid fever is, if possible, less disputable than the spread of cholera by the same means; solitary cases, outbreaks confined to single houses, to small villages and to parts of large towns, cases isolated it seems from all sources of fallacy, and epidemics affecting the inhabitants of large though limited localities, have all united to support, by their testimony, the truth of the opinion that the admixture of a trace of excrement, but especially of excrement from a typhoid-fever patient, with the water supplied for drinking purposes, is the most efficient cause of the spread of the disease, and that the diffusion of the malady in any given locality is limited or otherwise, and limited just in proportion as the dwellers in that locality derive their supply of drinking water from polluted sources.

Deadly Effect of Water Impurity.—According to the late Dr. William Budd, it also appears to be highly probable that, when the poison of typhoid fever enters the system by drinking water, infection is much more certain than when it is disseminated by the air and is breathed into the lungs. In support of this statement, he instances an outbreak which occurred in Wales, where out of ninety or a hundred persons who attended a ball, fully one-third was shortly afterward laid up with fever. Although the water was not examined, there was satisfactory reason to believe that it was polluted with sewage.

Typhoid Poison from a Well.—In a report of the American Public Health Association, Dr. Austin Flint gives an account of an outbreak of typhoid fever in Vermont which it was possible to trace, in the most circumstantial way, to the poisoning of a well in some such method as has been described. A young man traveling through that region by stage-coach was taken ill, and, when he could go no further, was left at a tavern in a little hamlet to be cared for, his illness soon proved to be typhoid fever. A small watercourse, in a shallow valley, divided the village into two portions, each of which consisted of half a dozen houses or less. In a few days new cases of the fever made their appearance in that part of the hamlet to which the tavern belonged—every house, in fact, but *one* was invaded with this disease—whilst on the other side of the stream not a case occurred. It appears that the tavern well, which was the only one upon that side of the village, furnished the water-supply to all the families belonging there *but one*. That one family had had a quarrel with the landlord of the hotel, had consequently deserted the tavern well for a more distant supply of drinking water, and so escaped swallowing the specific poison of typhoid fever in the water by which all their neighbors were stricken down.

Typhoid from Milk.—It has also been proven in late years that typhoid is transmitted from infected milk, cows have been allowed to drink from streams that have had the discharges from typhoid patients thrown into them. The germs have been taken into the cows and finally into the milk. This milk was distributed to families and in many cases caused typhoid.

Proximity of Privy and Well.—Unless privy and well be located at considerable distance from each other, and further unless the nature of the ground be such that the flow from the privy will be away from the sources of the well, there is always grave danger of the pollution of the well water with germs from the privy. This also applies to nearby stable yards. There are many authenticated cases of typhoid which have been directly traced to the proximity of wells to privies and stables, and the danger should not be underestimated.

Danger in Farm-houses from Polluted Water.—Of course, the same conclusion holds good for country farm-houses or dwellings when, from motives of convenience, although there is space enough and to spare, but a short distance is interposed between the sides of the hole which is called the well, and which furnishes the drinking water, and the other hole nearby which is called the cess-pit, and used as a receptacle for filthy, often poisonous, excrement. Moreover, there are no doubt many instances where, owing to the inclination of beds of sand or gravel, strata of rock and so forth, impurities of these and other dangerous varieties may be carried, by underground currents, much further than the distances which have been mentioned as measured upon the surface of the earth. In other words, a cess-pool on a hill-side, 500 feet or more away from a well, may infect the water of the latter, if underground currents favor such contamination.

Diarrhœa and Dysentery from Impure Water.—The instances of outbreaks of these two diseases from contaminated water-supply are very numerous, and probably most persons can recall examples of this kind. The impurities which produce diarrhœa and dysentery are suspended earthy matters, such as are found in most river-waters after a rain; suspended animal and vegetable material; sulphates and chlorides of lime and magnesia, and nitrates of ammonia and of lime. Besides the numerous outbreaks traceable to direct sewage contamination, there are several instances recorded of indirect poisoning of a water-supply from this source, as in the following curious case.

Outbreak at Salford Jail.—In the Salford, England, jail there was a sudden outbreak of diarrhœa of a choleraic type, which affected more than half of the prisoners; while of the officers and their families, who were distributed throughout the building, not one was attacked. The food of the convicts was examined and found to be good; it was evident, also, that the air did not contain the cause of the disease, because both classes above mentioned were under the same conditions in that respect. Suspicion was therefore directed to the drinking-water. It was then discovered that, though the water supplying all parts of the prison was derived from the same source, there was one cistern for the use of the officers, and another covered cistern for furnishing to the prisoners their allowance, and that the untrapped overflow-pipe of the latter communicated with an open sewer. On the day of the outbreak of diarrhœa in the jail, the water from this cistern was observed to be colored and to taste unpleasantly.

Sewer-Gas Poison.—It had obviously absorbed sewer gas, which had ascended through the overflow-pipe, and that this had been the real cause of the disease was indicated by the fact that the diarrhœa disappeared almost as rapidly as it had broken out, when the cistern was emptied and the pipe efficiently trapped.

Diarrhœa in Country Districts.—Dr. Wilson declares that, according to his experience, much of the diarrhœa which prevails in country districts during the summer and autumn amongst children is due to polluted water, drunk either as it is drawn from the well or when mixed with milk, fraudulently or by accident.

Impure Ice as a Cause of Diarrhœa.—The fact that ice is now used by almost all classes to an extent which entitles it to rank rather as a necessity than, as formerly, as a luxury of life, renders it important that its purity should be as jealously guarded as the water-supply. It is popularly believed that water frees itself from dangerous organic matter, as it does to a great degree from certain saline contaminations during the process of freezing, and also that the vegetable or animal germs of typhoid and other fevers are killed, or at least rendered sterile, by congelation of the water in which they exist. Both these ideas are, however, unquestionably erroneous, as has been repeatedly proved by the various experiments which ignorant hotel-keepers try without the least intending it, upon their guests, on a scale which would make the boldest vivisector stand aghast before the suffering inflicted, even if it were only upon the brutes which form the subjects of his researches.

A Case of Impure Ice Poison.—Such was notably the case in an epidemic of intestinal disorder which occurred at the watering-place of Rye Beach, N. H. From the account of Dr. Nichols, who attended most of the patients, it seems that, early in the season, a mild form of disturbance of the stomach and bowels made its appearance among the guests of a particular hotel at this favorite summer resort. The symptoms were in general giddiness, nausea or vomiting, diarrhœa and severe abdominal pain, accompanied by fever, loss of appetite and mental depression. The well and drainage system of the establishment, which had recently been put in complete order, was found almost faultless, and the milk-supply of unquestionable purity; but on the attention of the physician being directed to the stock of ice provided for the guests, conclusive proof of its dangerous quality was promptly obtained.

The Contaminated Ice Pond.—Both the house in which the ice was stored and the water from the melted ice gave off a decidedly disagreeable or even offensive odor. Finally, a visit to the pond from which the ice had been gathered disclosed the fact that much of the water in it was dark-colored, foul and highly contaminated with filthy marsh-mud and decomposing saw-dust. Chemical analysis showed that both it and the suspected ice contained a large excess of organic and volatile impurities, including four one-hundredths of a grain per gallon of albuminoid ammonia.

Fever Germs in Ice.—In Connecticut, the Board of Health informs us that, in several instances, attention has been drawn to sewage-contaminated ponds with ice-houses upon their borders, and that several isolated cases of typhoid fever, and one death, from the free use of ice polluted by sewage, had been recorded in that State. The curious natural experiment of the United States steamship Plymouth, elsewhere detailed, shows conclusively that fever germs are not infallibly destroyed by a freezing, probably not by a zero temperature, and contributes its share of proof that impure ice, especially when gathered from ponds polluted by sewage, may constitute a prolific cause of disease.

Dangers in Snow-Water.—Snow-water, pure and fresh as it seems may be very dangerous to health in consequence of organic impurities contained in it.

Mountain Fever, Rocky Mountain Spotted Fever or Tick Fever.—An acute infectious disease characterized by chill, continued fever, headache, pains in the joints and bones and an eruption on the ankles and wrists; later all over the body. It attacks all ages and both sexes usually in the months of May and June.

SYMPTOMS AND TREATMENT.—The disease follows a course of two to three weeks with a temperature of 103 to 105. The bowels are constipated and crushing pains in the limbs are quite common. The tongue is furred and nose bleeding is quite common. Nausea and vomiting may appear during the second week. A mild type of the disease without any eruption is said to occur at times.

There is no specific treatment. The patient should be protected from noise and kept in a dark room. The diet should be liquid. When temperature is high sponge baths should be used. Phenacetine and other antipyretics are used. Free purgation with calomel and salines are frequently used.

Ague from Impure Water.—Although the poison of fever and ague is probably, as a general rule, conveyed into the human system by the bite of mosquitoes, some cases seem to show that it may also enter the body by drinking water.

Diarrhœa Outbreak from Impure Water.—As general conclusions in regard to contaminated water, it may be stated that: 1st. An outbreak of diarrhœa arising in a community is almost always owing to impure air, impure water, or bad food. If it affects a number of persons suddenly it is probably due to one of the last two causes, and if it extends over many families, almost certainly to water. But, as the cause of impurity may be transient, it is not always easy to find experimental proof.

Dysentery Outbreaks from Impure Water.—2d. Diarrhœa or dysentery constantly affecting a community, or returning periodically at certain times of the year, is far more likely to be produced by bad water than by any other cause.

Cholera Outbreaks from Impure Water.—3d. A very sudden and localized outbreak of either typhoid fever or cholera is almost certainly owing to the introduction of the poison by water.

Malarial Outbreaks from Impure Water.—4th. The same statement is true in cases of ague or malarious fever; and, especially if the attacks are serious, a possible introduction by foul water should be carefully inquired into.

Worms from Impure Water.—5th. The introduction of the eggs of some of the intestinal worms, by means of drinking water, is proved in some instances and rendered highly probable in many others. People residing in districts where shallow-dip- and draw-wells are in common use, seem to be particularly subject to parasitic worms in the bowels.

Pure Water a Sanitary Necessity.—6th. Although it is not possible at present to assign to every impurity in water its exact share in the production of disease, or to prove the precise evil influence on the public health of water which is not extremely impure, it appears certain, says Dr. Parkes, that the health of a community always improves when an abundant and pure water-supply is given; and, apart from this actual evidence, we are entitled to conclude from other considerations, that abundant and good water is a primary sanitary necessity.

Rocks Yielding Pure Water.—As a general guide to the water impurities that may be expected in waters from the various geological formations enumerated, the following condensed summary of the best known facts, as given by Dr. Parkes, will prove useful. The granitic, metamorphic, trap-rock and clay-slate waters are generally very pure, often not containing more than from two to six grains per gallon of solid matter, which is chiefly made up of carbonate and chloride of sodium, with a little lime and magnesia. The organic matter is very small in amount usually, but shallow wells in disintegrated trap-rock may, of course, be fouled by surface washings or soakage. The water from millstone grit and hard oolite is also very pure, sometimes containing only four grains per gallon of mineral matters, which comprise the same saline materials as are found in granitic waters, with the addition of sulphates and a trace of iron.

Rocks Yielding Impure Water.—Soft sand-rock waters, on the contrary, are often impure, containing much sodium chloride or common salt, sodium carbonate, sodium sulphate, iron and a little lime and magnesia, amounting altogether to from thirty to eighty grains per gallon. The organic matter may also be abundant; that is, to the extent of from four to eight grains to the gallon, or even more. Occasionally, however, these waters are quite pure.

Sand and Gravel Waters.—The loose sand and gravel waters also vary much in their composition, and in tolerably pure gravels, not near towns, the water is often very free from contamination. In many sands, which are rich in salts, the water percolating through them is, of course, much affected, the dissolved solids amounting sometimes to seventy grains per gallon, and consisting of sodium chloride, sodium carbonate, sodium sulphate, with calcium and magnesium salts, and a good deal of organic matter. The water from the sandy plains of southern France is said to contain enough organic matter to produce ague in those who drink it.

Chalky Waters.—The typical "hard" water, from chalk formations, is very sparkling and clear, highly charged with carbonic acid, and contains from seven to twenty grains of calcium carbonate, a little magnesium carbonate and sodium chloride, with small and immaterial quantities of iron, silica, potassa, nitric, sulphuric and phosphuric acids in combination; organic matter is usually in small amount, and is therefore a good, comparatively wholesome and pleasant water, which, though hard, softens greatly by boiling.

Limestone Waters.—The waters from limestone and magnesian limestone regions are also clear, sparkling liquids, of agreeable taste, but they differ from the chalk waters in that they contain usually more calcium sulphate, the sulphate of lime or gypsum, sometimes to the amount of twelve grains per gallon, and in dolomitic districts much magnesium sulphate and carbonate. They are not so wholesome as the chalk waters, are hard and soften less on boiling.

Clay Waters.—The water of clayey districts is chiefly surface, and soon runs into converging streams. They often contain much suspended matter in the form of mud, but few dissolved constituents. Waters from the mixture of sand and clay brought down by the rivers, perhaps of former ages, and called Alluvium, are generally impure.

Alluvial Waters.—The alluvial waters contain calcium carbonate and sulphate, magnesium sulphate, sodium chloride and carbonate, iron, silica, and often much organic matter, the total amount of solids reaching 120 grains or more. Occasionally the organic matter oxidizes rapidly into nitrites, and, if the quantity of chloride of sodium is large, it might be incorrectly supposed, from analysis, that it was contaminated with sewage.

Surface Waters.—Surface and subsoil waters are often highly impure, and, although very variable in composition, are always to be regarded with suspicion until proved to be safe.

Soil Waters.—Some soils contain potassium, sodium and magnesium nitrates, and give up these salts in abundance to water which soaks through them. In towns, and among human habitations, the surface and shallow-well water is often very unsafe, as already explained. It may contain large quantities of calcium and sodium nitrates, nitrites, sulphates, phosphates and chlorides. Organic matter exists often in large amount and slowly oxidizes, forming nitric acid and ammonia.

Marsh Waters.—Marsh-water always contains a large quantity of vegetable organic matter, it being not unusual to find from twelve to forty grains per gallon, and sometimes even more. Suspended organic matter is also common, but the amount of saline impurity is very variable.

Poisoned Waters from Graveyards.—In water from graveyards, ammonium and calcium nitrites, and sometimes fatty acids, with much organic matter of animal origin, are met with. The water of a well at St. Didier, France, more than 300 feet from a cemetery, was found to be largely contaminated with ammoniacal salts and organic matter, which was left on evaporation. The water was clear at first, but had a vapid taste ad speedily became putrid.

Artesian-Well Waters.—Artesian-well water varies greatly in composition, being so highly charged with saline matter sometimes that it is quite undrinkable. The artesian well at Grenelle, France, contains enough sodium and potassium carbonates to render it alkaline to the taste, although it is used for the water-supply of the town. In some cases artesian-well water contains an appreciable amount of iron; in other instances, when drawn from the lower part of the chalk formation, or the green sand below it, it is tolerably pure. The temperature of the water is usually high in proportion to the depth of the well. Thus, for example, a well at Louisville, Kentucky, bored to the depth of over 2000 feet, discharges an immense volume of water, the temperature of which is 75 degrees Fahrenheit. The amount of air in the water of deep artesian wells is often small, and this circumstance, with the frequently elevated temperature and high degree of saline impregnation, is apt to make such wells very unsatisfactory as sources of water-supply.

Seashore-Well Waters.—Lastly, water from wells near the seashore is apt to be brackish and objectionable on that account, even though it does not contain much organic matter. Dr. Parkes mentions one instance where a bored well, 150 feet deep, near the sea, yielded water impregnated with 500 grains of solids, including 380 grains of chlorides, per gallon.

THE DETECTION OF CONTAMINATED WATER.

Vigilance Over Drinking Water.—As a general rule, the examination of drinking water, in order to determine its purity, and consequent safety as a beverage, involves a chemical and microscopical analysis, which should always be made when circumstances permit. Moreover, it must not be forgotten that water which is usually pure and wholesome, may be at any time polluted by the fouling of its source during heavy rains, the occurrence of floods, the alteration in the customary course and flow of sewage, manufacturing refuse, and so forth, above or below ground. Constant vigilance over the condition of the water-supply is, therefore, exceedingly necessary to health; but as complete investigation requires the skill of a professed analytical chemist, those methods of examination need only be described in detail which are especially used as giving us warning of danger, with a few of the simpler tests.

Character of Water Tests.—For hygienic purposes, then, we examine water in order to discover whether it contains any suspended or dissolved ingredients which are likely to be hurtful. Some saline materials often found in water, as already mentioned, are not injurious when present in small quantities only, whilst others, consisting of or resulting from putrefying animal matter, are at once recognized as very dangerous to health. In any instance, reliance must not be placed upon the results of single tests, but all the circumstances of the case must be searched out and carefully considered.

Green Waters.—Green waters generally owe their color to vegetable matters, chiefly microscopic plants, and are usually harmless, although certain bluish-green plants of this kind give rise to the disagreeable smell popularly denominated the pig-pen odor, and probably render the fluid unwholesome as well as disgusting.

Yellow Waters.—Yellow or brown waters are the most to be feared, as their color is often due to animal organic matter, such as sewage. It is sometimes the case, however, that a yellow or brown tint is due to decomposed vegetable material, such as peat, or decayed wood, and the fluid is then merely unpleasant and not hurtful. Water is also occasionally colored in this way by some salt of iron, although in most instances the metal is precipitated as oxide of iron in the sediment.

Microscopic Tests.—The lustre or brilliancy of a water, which is recommended as a good test as to the amount of air which a specimen contains, can readily be judged by the eye; but the only satisfactory examination of the sediment must be made with the microscope, which ought to have a power of about two hundred and fifty diameters, although even an instrument of half that capacity will often reveal much of interest and importance in the deposit of a suspected drinking water.

Taste Not a Good Water Test.—The taste of a water is a very uncertain indication in regard to wholesomeness. Of course, any badly-tasting water ought at once to be rejected, but some very agreeable waters, as far as their tastes are concerned, have proved to be dangerously contaminated with sewage of the vilest character. And yet many people are to be found all over the country who think that if a water is bright and clear it must be good; nay, if it is the drinking fluid of their own wells which is called in question, they will often indignantly resent the faintest suggestion that it can possibly be in the least degree injurious to health. As remarked by Dr. Fox, however, such cases as that of the servant who, coming from an obscure village near the Dartmoor, in the southwest part of England, objected to the pure water of a distant town where she was in service, because it was devoid of both taste and smell, are becoming rare.

Where Taste Test Fails.—As regards dissolved mineral matters, taste is of little use, and differs in different persons. On an average, common salt is not recognized until it reaches the quantity of seventy-five grains per gallon, whilst carbonate of lime is perceptible when dissolved in a water to the amount of ten grains per gallon; iron, however, can be recognized by its astringent flavor in very small quantities, occasionally as minute an impregnation as two-tenths of a grain per gallon may be thus detected. A permanently-hard water has sometimes a peculiarly insipid or slightly saline taste, if the total salts amount to thirty-five or forty grains per gallon and the sulphate of lime or gypsum to six or eight grains.

What Taste of Water is Due to.—The taste of good drinking water is due entirely to the gases dissolved; water nearly free from the hardness of carbonate of lime, held in solution by carbonic acid, such as distilled water, is not so pleasant as the brisk, highly-carbonated waters; it may be called flat, but it is difficult to define the kind of taste or the absence of it.

Rules for Pure Water.—Although the general characters of a water, when examined as directed above, give only an imperfect idea of its value, they are yet important when no other investigation can be made. If the water be colorless, clear, free from suspended materials, of a good lustre, yet not too brilliant, devoid of smell and taste, except such as are recognized as characteristic of a safe and usable water, we shall in a majority of cases be justified in pronouncing it a wholesome drinking fluid; whilst, according to the degree in which it deviates from these characteristics, will we proportionately be sustained in regarding it with grave suspicion.

Chemical Tests the Best.—Visible suspended matter is probably often the most dangerous, although there is little doubt that the microscopic germs of various diseases may exist in small aggregations without being recognizable at all by the naked eye of even the most practised observer;

and, of course, the metallic impurities, such as lead and copper, for detecting which rules have already been given, must often escape discovery by any examination which does not include the application of chemical tests.

Nessler Test of Water.—The one of these chemical reagents which it would be well to apply in every instance where it is possible to do so, is the "Nessler's test," an ounce of which may be procured from almost any good chemist for twenty or twenty-five cents. It constitutes a test for the products of decomposing animal matters, especially sewage materials, including human and animal excrement, and is, therefore, capable of giving timely warning against the most dangerous of the common pollutions of drinking waters.

The Ammonia Test.—In the whole round of chemical analysis there is no determination which surpasses that of ammonia from putrefying animal matter by this method in point of delicacy. It is questionable whether any other approaches it. The Nessler reagent is said to be capable of indicating one part of ammonia in twenty million parts of water, and even this assertion, surprising as it may seem, is given as an understatement of the delicacy of the test. Such being the characteristic of this way of calculating the ammonia, the great advantage of causing determinations of organic matter to depend on measurements of ammonia will be manifest to every one.

Form of the Nessler Test.—In order to make use of this reagent, fill an ordinary wine-glass or small goblet which will hold from two to four ounces, nearly full of the water it is wished to examine, and add three or four drops of the Nessler's solution. If a yellow or brown color, or a brownish precipitate, be produced, the water contains ammoniacal salts. As a rule, this should be regarded as a very suspicious circumstance, and should the coloration be well marked, it is almost sufficient of itself to condemn the water for drinking purposes. If a milky or curdy precipitate is also formed, it shows that the fluid is a hard water, and more or less unfit for washing. Should this whitish precipitate be excessive, it hides to a certain extent the yellowish color indicative of ammonia, so that it is necessary to take a fresh sample of the water, add to it a few drops of strong solution of caustic potash or soda, and after the precipitate of lime which is thus caused to fall has subsided, test for ammoniacal compounds with the Nessler's reagent.

The Soap-Test of Impure Water.—Clark's soap-test for determining the hardness of water is prepared by dissolving a small quantity of soap, say one ounce in half a pint of a mixture of equal parts of alcohol and water. It is used by dropping it into a measured quantity, such, for example, as an ounce of the water to be tested, until the fluid when shaken begins to form a beady lather—the relative number of drops required to produce this effect nearly indicating the comparative degrees of hardness of the waters undergoing examination.

Water Test Should Always be Made.—This soap-test may be used to decided advantage in all "hard-water" districts, and every one should test his water-supply at the earliest opportunity, with it, with the Nessler's reagent for organic ammonia indicating pollution by sewage, and with the sulphide of ammonium for contamination with lead. And the application of these two latter tests is important, even although the drinking water in question has been in use for a long time by various members of a family without apparent injury, for many instances are on record in medical books where chronic derangements of health have been due to impurity of the water taken into the stomach, and yet this source of injury has been entirely unsuspected until a chemical examination of the water-supply has revealed the insidious origin of the trouble.

Water Precautions for Travelers.—A wise precaution when traveling, especially in unhealthy districts or during an epidemic of any kind, is to drink none but boiled rain-water, which you can make sure has not been exposed to contamination by lead pipes, roofs or cisterns. To be effectual, the boiling ought to be continued briskly for half an hour or longer. Rain-water is preferable in limestone regions, because the hard water containing lime is partially or not at all improved in this respect by boiling, and gives rise to serious diarrhœa in many of those unaccustomed to its employment. Such hard water is also probably one great cause of the very painful calculous disorders.

HYGIENIC USE OF BATHS.

Temperature of Baths.—Coming now to the detailed consideration of water as applied to the human skin in the form of a bath, in order to accomplish the important hygienic purposes described, it is obvious, in the first place, that temperature has a powerful influence in this respect.

Cold Baths.—The range of the cold bath varies more than that of any other kind, extending, as it does, from 84 degrees Fahrenheit down to 33 degrees of the same scale. The lower temperatures included between these limits would, of course, test the endurance of even the strongest to encounter safely the severe shock which is generally produced by the sudden application, and still more the prolonged immersion of the body in a water so near its freezing-point; but from 84 degrees to 74 degrees the reaction required is so slight that few persons who are not actually invalids are too feeble to manifest it.

First Effect of the Cold Bath.—A shock is experienced throughout the whole nervous system, more or less severe, according to the lower or higher temperature of the fluid, and the contracting effect of the cold aids the spasmodic contraction occurring in the small blood-vessels to drive the blood to the inner portions of the body, and allow the surface to become quickly chilled.

Second Effect of the Cold Bath.—But if the cold is not too severe, or the individual is not exhausted by fatigue, or enfeebled by disease, a change in these conditions promptly manifests itself soon after leaving the bath, especially if the skin is rapidly dried by friction with some absorbent substance. The heart and pulse return to their normal rate of movement, the nervous system recovers from the shock which it has undergone, the blood flows back to the surface of the skin, and a glow of renewed warmth is felt throughout the entire body.

A Guide to Cold Bathing.—This agreeable change in the condition of the circulation and the sensations is called the *reaction,* and constitutes our very best guide to the employment of cool or cold bathing. If the water of a bath has been colder than is adapted to the strength of an individual's constitution, reaction comes on but slowly, and several hours may elapse before the natural balance of the circulation is fully restored. In such a case, the hands, feet and nose remain chilly, and also cold to the touch of another person. The fingers, lips and indeed the whole face, has a bluish tint, and a more or less shrunken appearance. The pulse continues weak and slow, and languor and feebleness characterize all the movements. Of course, the method of deriving the greatest amount of benefit from these indications is for each person to cautiously test the power of his system to establish reaction, commencing with a bath of 70 degrees or 65 degrees, and gradually descending the scale of the thermometer, as he finds he is able to fully react from the depression produced by venturing among its lower depths.

Time for Cold Bathing.—It is recommended by some authors to resort to cold bathing either about an hour before breakfast in the early morning, or else late in the evening just before retiring for the night. The early morning bath of this kind may do very well for some few people of unusually vigorous constitutions, but as a general rule the evening is a better time for such a test of strength; and for many persons the middle of the morning, that is to say, about three hours after breakfast, when the first meal of the day has been nearly all digested, and the system is fortified thereby to bear the shock and establish the necessary reaction after it, is decidedly preferable to any other period of the twenty-four hours.

When to Avoid Cold Baths.—Under no circumstances should a cold bath be indulged in either immediately before or immediately after a meal, on account of the tendency which its inevitable shock will have to produce more or less disturbance in the process of digestion by congesting the stomach and intestines. Nor are cold baths suitable for individuals in either extreme of life, because both in infancy and in old age the power of developing animal heat is least efficient in its operations, and the reaction is accomplished slowly or not at all.

No Cold Bath After Fatigue.—Protracted labor or exercise, whether mental or physical, if so long continued as to leave the body suffering from feelings of great weariness or exhaustion, absolutely forbid the use of the cold bath. It was under these circumstances that Alexander the Great, of Macedon, nearly perished, from plunging after a long and fatiguing march into the icy current of the river Cydnus; an imprudence which, it is said, did actually prove fatal to the German emperor, the aged Frederick Barbarossa, at the head of his crusading army, seventeen hundred years later. In adverting to this latter event an ancient author quaintly observes: "No wonder if the cold water quickly quenched those few sparks of heat left in him at seventy years of age."

Duration of the Cold Bath.—The duration of a cool or cold bath must vary very much with the temperature of the water. When very cold the period of immersion should not exceed one or two minutes, whilst with water between 60 and 70 degrees, the duration of the bath may extend to a quarter or even half an hour; in every instance, however, we must be guided by the completeness of the reaction on coming out of the water.

Friction After Cold Bath.—Energetic friction of the whole surface of the body after bathing is highly beneficial as tending to produce the necessary degree of reaction. Active physical exercise, as well as warm and stimulating drinks, likewise aid in accomplishing the same desirable result. Even when a person is accustomed to the daily use of the cold bath, any sudden reduction of strength, such as may result from intemperance in eating, an evening debauch, or excess of any kind, particularly of the sexual powers, or even over-exertion in walking or in field-sports, will forbid recourse to it the following morning.

River-Bathing.—Bathing in rivers is even more to be recommended than that in ordinary bath-rooms during the summer season, as the gentle exercise of walking to and from the river-side, and if swimming whilst immersed in the water, promote the reaction which is so conducive to health. Evil consequences are, however, apt to result from river-bathing, if the baths are too prolonged, if too violent exertion is indulged in, or if the rays of the sun overheat the head of the bather. Dr. Bell states that he has seen continued fever, of some days' duration, and violent headache, with slight delirium, arise in boys who had thus imprudently exposed themselves.

VARIETIES OF COLD BATHS.

Cold Sponge-Bath.—There are various ways of employing water in cold bathing, according to the force of the current of fluid, the amount of surface to which it is applied, and so forth. Affusion and sponging are the mildest ways of using cold water as a bath, and there are few persons, not actually invalids, who cannot thus employ water, of moderately low temperature, with benefit. After the slight depression of the bodily warmth, produced by sponging with fluid of 60 or 65 degrees, of course but a mild reaction follows, but this is suitably proportioned to the feeble energies of debilitated persons. By a repetition of the process a greater endurance is developed, and colder water may ultimately be resorted to, with correspondingly increased advantage. The cool or cold sponge-bath is sometimes of great service in treating typhoid fever, and others of the eruptive diseases, as will be explained in the second part of this work.

The Shower-Bath.—In a shower-bath the water falls in divided streams, and thus, being generally distributed over the whole body, gives a severe shock to the system; such a one, should the fluid be of a low temperature, as only the most vigorous persons can endure.

The Cold Douche.—The cold douche differs from the shower-bath in that the water of a douche is poured upon the surface of the body in a solid column, instead of a number of small streams. It is sometimes highly efficacious in reducing the violent excitement of delirious or insane patients, but, being a very powerful agent, should be used only with caution and close watching, never in the indiscriminate way customary in some so-called hydropathic establishments, from which it is said that more than one sudden death has been the lamentable result.

The Bath for Old Age.—The advance into old age of those who, in the vigor of youth and maturity, have accustomed themselves to the regular use of the cold bath, does not necessarily interpose an obstacle to the continuance of the practice of bathing, provided the general health remains good. But if there be evidence of feebleness of the functions, or disorder in any one of the great systems of the body, such as the digestive apparatus, or the muscular system, so as to prevent the customary allowance of nutritious food or of exercise being taken, the cold plunge or shower-bath should be given up, and simple washing with cold water, followed by active friction, substituted in its place. Should even this prove rather too great a shock for the enfeebled powers of life, as may be evinced by want of prompt reaction subsequently, recourse to anything but the tepid or warm bath must be strictly prohibited.

The Water-Cure.—The evidence in favor of great benefit being derived in suitable cases from the so-called water-cure, in the numerous hydropathic establishments of Europe and this country, is very convincing; and, in fact, it is probable that persons generally of great mobility of temperament, who are readily excited and readily depressed, and whose nervous system is soon exhausted by either bodily or mental efforts, will often find relief in the systematic use of a moderately cool or cold bath.

Objection to Hydropathy.—The difficulty is with establishments of this kind that, being carried on as business enterprises, their proprietors are not withheld, by any philanthropic considerations, from looking at every case which applies to them with an eye to business, and recommending their particular cure to all possible patients, except where they are very sure that positive injury will result from the treatment. It is therefore advisable, in every instance, to consult some reputable physician, who is not devoted to any exclusive system or dogma of medical practice, before submitting oneself to the powerful agencies of water as applied by hydropathic practitioners.

Cold Bathing Removes Heat.—Dr. Bell judiciously remarks that there is a class of people, who suffer from a sedentary life, devotion to the desk in business, or to study, and complain of troublesome heat and dryness of the hands, and sometimes of the feet, with accelerated pulse and thirst; their appetite is not good, nor their sleep sound or refreshing. Though their systems be actually weaker than usual, yet is there morbid activity of the skin, owing, in part, to the vessels of the integument not relieving themselves by free and regular perspiration. Cold bathing, by moderating cutaneous excitement, and relieving the perspiratory organs, removes the unpleasant feeling of heat and dryness; and, by sympathy, produces nearly correspondent effects on the stomach.

The Flesh-Brush and Exercise.—The use of the flesh-brush and exercise in the open air are, it may be supposed, powerful auxiliaries to the measures just recommended.

Cold Bathing for Rheumatism.—There are many persons who, though enjoying what is often called full health, are liable to colds, rheumatic pains and stitches from any slight exposure to cold or moist air. Their vascular and nervous systems are both tolerably excitable, and they are readily thrown into perspiration from even moderate exercise or warm apartments. In them it is desirable so far to regulate the functions of the skin as to moderate its stimulation, and prevent the consequent debility which follows this state. Cold bathing accomplishes this purpose, and keeps the skin in a less constant condition of excitement, renders it less liable to sweat so freely from exposure to external warmth or by active exercise, and, of course, prevents the subsequent languor and susceptibility to morbid and enfeebling agencies. It would be a great mistake, in such a case, to talk of the tonic action of cold bathing. Its beneficial operation is evinced here at a time when no stimulus or tonic is admissible, and in habits sanguine and plethoric, on which nearly similar effects with those from cold bathing would be produced by a moderate bleeding, reduction of the usual quantity of food and diluent drinks.

HYGIENIC APPLICATION OF WARM BATHS.

Temperature of Warm Bath.—When the water used for bathing has a temperature of from 92 degrees to 98 degrees Fahrenheit, it produces upon the skins of most people the sensation of warmth, and although water of this degree of heat is usually employed chiefly for cleansing purposes, yet it has hygienic properties of a sufficiently marked character to render it worthy of especial notice. Since water is a much better conductor of heat than air, and especially than confined air, as much caloric is extracted from the human body when immersed in water which is only a few degrees lower than the average human temperature, as by air of much greater relative coldness.

Effect of Warm Bath.—The warm bath diminishes the frequency of the pulse, especially when it has been greater than natural, and this effect is almost exactly in proportion to the duration of immersion. It also renders the respiration slower, and diminishes the temperature of the body, relaxes the muscular fibre, increases the bulk of the fluids by absorption, or perhaps only by restricting evaporation from the skin, removes impurities from the surface, promotes desquamation and renewal of the cuticle, lessening the hardness of the nails and indurations of the epidermis.

Separation of Outer Skin.—The separation of the outer layers of the scarf-skin or epidermis, which may often be seen floating in small, whitish fragments upon the bath water, is due to two causes. In the first place, it is softened by the water, and so rendered more easily removable by slight friction; and secondly, it is in part pushed off by the increased fullness of the blood-vessels underneath. A humorous writer has compared the epidermis which covers the whole surface of the body to a tight shirt, and a dirty cuticle, therefore, to a dirty shirt which is gotten rid of by the aid of a bath.

Take Short Warm Baths.—A prolonged daily use of the warm bath is apt to cause eruptions on the skin similar to those which managers of water-cure establishments pronounce critical, and of the greatest advantage in certain diseases of the nervous system.

Warm Baths Soothe the Nerves.—An immediate and very agreeable effect of the warm bath is to soothe a nervously excited condition and promote sleep, which to many people is peculiarly refreshing when procured by this means.

Time to Take Warm Baths.—The best period for taking a warm bath is about an hour previous to the mid-day meal, because then the disturbance of the circulation will have time to pass off before food is introduced into the stomach, and the secretion of the gastric juice and other fluids necessary for digestion will not be thereby interfered with.

Duration of Warm Baths.—The duration of a warm bath ought not to exceed in ordinary cases half an hour, although in the warm water-cure of Leuk, in Switzerland, patients sometimes remain in the tepid fluid five hours in the morning and three hours in the afternoon, with alleged benefit. In the Leuk bath, persons breakfast from little floating tables, which afterwards serve to support books and newspapers for their amusement, and it is said that the Emperor Charlemange used to hold prolonged levees whilst immersed in his warm bath at Aix-la-Chapelle, which was supplied by one of the numerous thermal springs of that famous city.

Warm Baths in Acute Diseases.—The relaxing and soothing influence of the warm bath is an invaluable aid to the treatment of many acute diseases, and being, as a general rule, devoid of danger in its application, is a remedy peculiarly adapted to domestic practice, particularly among children, before the skilled physician, who should always be sent for immediately when a person it attacked with any acute disease, has time to arrive. Its prompt remedial effects may often be observed in bilious colic, in painter's colic induced by the poisonous influence of lead, in spasmodic croup, in infantile convulsions, in mental excitement bordering on delirium or even violent maniacal frenzy, and in many other diseases, as will be more fully explained in the second part of this book.

HOT BATHS.

Temperature of the Hot Bath.—The hot bath is so designated if the water employed is above the natural blood-heat of about 98 degrees Fahrenheit, and may range as high as 110 degrees, above which it is seldom safe to use water over the whole surface of the body. Of course, habit will often enable a person to endure the local application of water having a much higher temperature than this without injury.

Effect of Hot Baths.—Hot baths are decidedly stimulating, and rapidly produce redness of the skin with quickening of the pulse and respiration. Perspiration is poured out upon the face in great abundance, the mind becomes dull and inattentive, and, if the immersion is unduly prolonged, vertigo and apoplexy may supervene. One experimenter lost, during the short space of eight minutes, in a bath of the temperature of 113 degrees, about a pound and a half of his weight. Even a hot foot-bath of 110 degrees is stated in one case to have quickened the pulse from seventy-seven to ninety-two, and to have caused some headache in about half an hour. In another instance a foot-bath of 113 degrees raised the pulse from sixty to one hundred and five beats per minute in five minutes, and flushed the face, but without bringing on headache.

Where Danger Lies.—The hot bath ought therefore to be employed cautiously or not at all by persons of sanguine temperament, and those of robust or plethoric habit of body, especially if there is any hereditary tendency to apoplexy in their families.

Where Good is Derived.—This powerful remedy is, however, capable of doing good service in conditions of torpid, sluggish circulation, dry and cold skin, feebleness of muscular movement, and a low grade of sensibility; but great care must be used not to mistake this state of the system in an individual naturally weak and phlegmatic, or enfeebled by old age or chronic disease, for the languor of the vital processes which is produced by acute inflammation, or pressure of the blood upon the brain or upon the lungs.

When to Avoid Hot Baths.—In suspended animation from sunstroke, apoplexy, insensibility from inhaling noxious gases, or from swallowing narcotic poisons, disastrous results might be, and probably would be, produced by the application of a hot bath.

When to Use Hot Baths.—In exhaustion and torpor from exposure to intense cold, the hot bath, contrary to popular opinion on the subject, is a most valuable remedy. Some recent experiments performed in Russia, in order to determine what is the best way to resuscitate animals which have been subjected to such severe cold as to be almost fatal in its effects, gave the following results: Of twenty dogs treated by the customary gradual method of bringing them into a cold room which was slowly warmed, fourteen died; of twenty similar animals introduced at once into a warm room, only eight died; whilst of twenty in an analogous condition, which were placed at once in a hot bath, *all recovered.*

Local Hot Baths.—Hot baths applied locally to small portions of the body only, have often proved beneficial in gout and in acute as well as chronic rheumatism, and are highly recommended by some authorities for the relief of piles, in certain affections of the kidneys, and in some female disorders. Sundry modifications of the hot bath, such as the Turkish bath, the vapor bath, and so forth, have, under certain circumstances, considerable value.

THE HYGIENE OF SEA-BATHING.

When to Refrain from Sea-Bathing.—The long line of seacoast belonging to the United States, and the large proportion of our population which resides within a day's journey of the ocean, by placing a salt bath within the reach of many readers, render the subject of sufficient importance to be separately discussed. On paying a visit to the seaside, it is well to refrain from bathing, and indeed from exposure to the rays of the sun on dry land also, for a day or two if possible after arrival, or until the system becomes a little accustomed to the effect of the salt air and the surroundings. The rules already given in regard to the time of bathing, and especially as to not entering the water for an hour or so before or after a meal, ought to be strictly adhered to.

Duration of Sea-Baths.—The time spent in the water cannot be prescribed with the same exactitude, since the proper length of a dip in the ocean varies very greatly with the temperature of the water and air, the vigor of the individual's constitution, his temporary condition of health, and so forth. But in the state of the circulation we fortunately have a general guide, which every one can readily consult for himself, and quickly determine when nature decides that the bath should promptly terminate. After the first shuddering inspiration, which is generally produced by the application of cold water to the bare surface of the body, with the quickened pulse and breathing which for a few moments accompany it, the pulse, the action of the heart, and the respiration all become slower for a short time, and then are again accelerated.

Signs to Stop a Sea-Bath.—But if immersion in the cold sea-water is too long continued, the pulse and the breathing are again reduced in frequency, a sense of chilliness comes on, and with this a slight blueness of the lips, and of the fingers underneath the nails, makes its appearance. The moment this is perceived it should be accepted as an imperative order to quit the water at once and restore the lost activity of the circulation, which it indicates, by energetic friction of the surface with warm, dry towels as speedily as possible. As a general rule, from five to fifteen minutes is amply sufficient time to spend in the surf, and it is far better to err on the prudent side by coming out needlessly soon, than to prolong the bath until the teeth begin to chatter and the fingers have the shrivelled, bluish-white appearance of a washerwoman's hand, thereby risking some serious internal congestion afterwards. When the water is unusually cold, and especially when the air is also chilly, a bath in the ocean, if taken at all, should be correspondingly brief.

What Sea-Bathers Should Do.—In order to obtain the best results, a bather should enter the water whilst he is comfortably warm, and yet not in a free state of perspiration. It is a good plan to wet the head and breast first, or after wading only a short distance from the edge, for the purpose of avoiding the temporary fullness of the brain, which leaves some persons with a dull headache for several hours; also, if the sun is shining brightly, a bathing hat, or other protection for the head and nape of the neck, ought always to be worn.

Adjuncts of Sea-Bathing.—Floating, diving and swimming are excellent ways of adding to the pleasure of the sea-bath, but the latter should not be indulged in when the surf is very heavy, when the tide is running out, or when there is a strong current nearly in a line with the margin of the beach, as the latter may diverge a little from the coast, and carry the bather too far out to sea before he is aware of his danger.

INDEX TO PART III OF BOOK III

Preventive Medicine

Pure Air Necessary for Health

Part III of Book III deals with effects of air upon health and shows the necessity of taking every possible precaution to secure pure air in the home.

SUBJECTS OF THE TEXT

LIST OF ILLUSTRATIONS

PREVENTIVE MEDICINE

PART III.

PURE AIR NECESSARY FOR HEALTH

THE VITAL NECESSITY OF AIR.

Value of Pure Air.—There are some things in nature of which we take but little cognizance, probably from the fact of their apparent simplicity. Pure air, pure water, pure food are essential and fundamental to good health and health to happiness, so we see that our very lives depend upon the exercise of principles which we neglect to study and understand, possibly on account of other and manifold duties. But nature's laws are invariable, and the time comes when dire results follow a disregard of first principles. Any one will admit that pure, unadulterated food is necessary to health. Food is converted into blood, which having circulated through the body is unfit for further use until purified.

Air a Blood Purifier.—It is through the medium of the air, with its life-giving oxygen, that the blood is purified. It therefore follows, logically, that air and pure air is necessary to health and, other things being equal, the health will be imperfect in proportion to the impurity of the air we breathe. It should be our aim to learn much of so important a condition of health in order that we might, so far as is possible, avoid disease.

Necessity of Pure Air.—Not only is pure air of value to preserve a state of health, it is an absolute necessity. It is true that some persons with strong wills and capacious lungs can perform the feat of holding the breath, but if they endeavor to prolong the experiment from a minute and a half to two minutes the need of breathing becomes so intense that control over the muscles of the chest is lost and a deep inspiration must be drawn in spite of resolutions to the contrary. If the access of fresh air to the lungs is absolutely prevented by external force death speedily takes place, the fatal result occurring in from five to fifteen minutes. This latter condition is present in hanging and drowning and in some forms of croup in children. Four minutes is the limit of time a person can be deprived of oxygen and live.

Fatal Results from Impure Air.—No better illustration of the fatal effects of impure air upon the human system can be brought forward than the lamentable history of the Black Hole of Calcutta, a prison in India, the horrors of which have rendered it memorable even in that land of ferocious cruelty. According to the account of a survivor, 146 persons were shut up on a sultry night in June in a prison eighteen feet square, furnished with only two small windows, both strongly barred with iron. The thirst and oppression of breathing felt by the unhappy prisoners soon became intense, and the scanty supply of water brought in compliance with their entreaties only made the confusion more terrible, and caused several to be trampled to death. This scene of misery proved entertaining to the brutal guards outside, who supplied them with water that they might have the satisfaction of seeing them fight for it, as they phrased it, and held up lights to the bars in order that they might lose no part of the inhuman diversion.

Frantic Pleas for Air.—Before eleven o'clock most of the gentlemen, who formed about one-third of the whole, were dead, and "air! air!" became the general cry. Renewed insults were devised for the purpose of provoking the guards to shoot them, and every man had eager hopes of meeting the first bullet. About two o'clock in the morning the survivors crowded so much to the windows that many of them died standing, unable to fall on account of the throng. About six in the morning an order came for their release; but at that time, out of the 146 who went into the dungeon ten hours before, only 23 remained alive, and all these miserable survivors were in a highly feverish condition, several dying from putrid or typhus fever soon afterward.

We Breathe Out Poison.—Such, then, are the frightful consequences of overcrowding together a large number of human beings, and thus depriving them of fresh air in such a way that they are exposed to the poisons of their own contamination, comprising carbonic acid and the secretions from the lungs and skin. Wholesale poisonings by very impure air of this kind are fortunately seldom met with, but the gradual injury to health and destruction of life-force, produced by breathing an atmosphere slightly contaminated with noxious ingredients, are exceedingly common, and probably give rise to or aggravate a large part of the diseases to which our flesh is heir.

QUALITIES OF PURE AIR.

Composition.—In speaking of pure air we refer to a standard condition of air. The air is a mechanical mixture of elements. As ordinarily met with at the surface of our earth, pure air, when analyzed, is found to be composed of seventy-nine parts of nitrogen and twenty-one parts of oxygen to every one hundred parts of air. It contains also a considerable quantity of watery vapor, a trace of ammonia, and from three to six parts in ten thousand of that deleterious gas carbonic acid. Oxygen is the active element. If a candle be held in oxygen it would burn more brightly than in ordinary air, and so our own lives, if lived in an atmosphere of oxygen, would be more quickly spent. Our tissues would be quickly used up. Nitrogen, which forms so large a proportion, acts simply as a diluent; of itself it cannot support life, and a lighted candle held in nitrogen gas is quickly extinguished. Carbonic acid gas, or, as it is called, carbon dioxide, is normal to the extent of .04 per cent., and though it is useless to animals, it is quite as necessary to plant life as is oxygen to us.

Localities of Pure Air.—As air is rendered impure by respiration, the purest air is found in those localities farthest removed from human habitation, *i. e.,* on the mountain tops and upon the ocean. When there is a tendency to disease or during recovery from a disease residence in the mountains or at the seashore is of distinct benefit.

In order to understand how it is that the breathing in and out of the air of a room in time vitiates it, it will be necessary to explain some points of the anatomy and physiology of the respiratory tract—and the act of respiration.

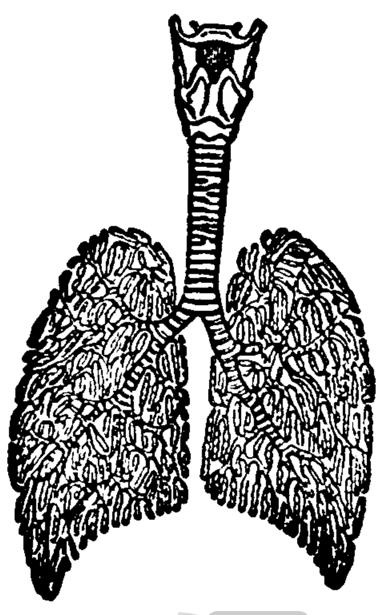
RESPIRATORY TRACT.

Anatomy.—The respiratory tract is made up of the lungs and the air passages leading to them. The air passages comprise the larynx or voice box, the trachea or windpipe and the bronchial tubes—two in number—which are branches of the trachea.

The Larynx.—The larynx is situated at the upper part of the trachea and presents in front the prominence known as Adam's Apple.

The Trachea.—The trachea or windpipe is four and a half inches long, and extends from the larynx to about the middle of the breast-bone or sternum, where it divides into the two bronchial tubes.

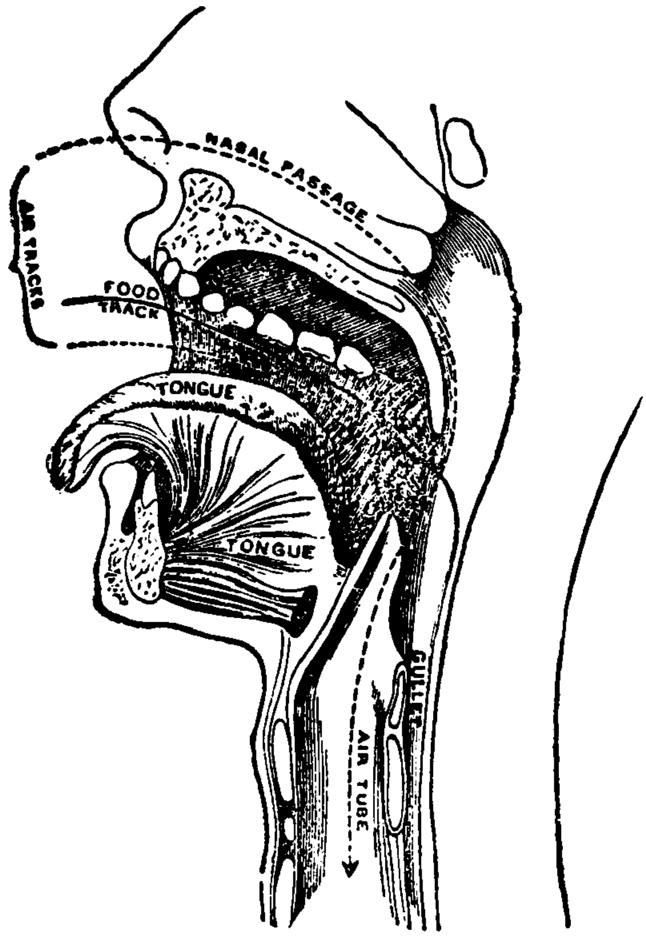
The Lungs.—The lungs, two in number, are situated in the cavity of the thorax or chest, one on either side of the heart. The lungs are made up of lobes, and the lobes are made up of still smaller divisions called lobules or little lobes. These latter are quite small, one one-hundred and twentieth of an inch in diameter, and they



The Lungs.

represent the ultimate divisions of the bronchial tubes, which have ramified and subdivided like the branches of a tree. Surrounding each lung and lining the cavity of the chest is the pleura, an inflammation of which constitutes the disease known as pleurisy.

Physiology.—The larynx, trachea and bronchial tubes admit the air to the lungs. The larynx, in addition to this function, is the organ of voice, being supplied with the vocal cords. Voice is produced by the outgoing air setting these cords into vibration. The air cells, of which the lungs are composed are the meeting places of the air and the blood for the purpose of the exchange of oxygen and carbonic acid.



The Air Passages of the Lungs.

Heart Functions.—The heart, which is a thick, strong muscular bag, pumps the blood through the lungs as it goes round and round through the circulation, at the rate of about sixteen hundred pints of the vital fluid every hour. These sixteen hundred pints of blood, by being spread out in the fine network of delicate tubes in the walls of the air-cells, get rid of nearly sixty pints of carbonic acid, and absorb rather more than sixty pints of oxygen in that length of time. Upon this gaining of fresh oxygen and getting rid of stale carbonic acid unceasingly, our very lives depend, for, as demonstrated in hanging and drowning, if this interchange of the gases in the blood is interrupted for even the space of a few minutes death is the effect.

Unceasing Heart Pumping.—Whilst life continues, night and day, our hearts must go on pumping dark, purple, venous blood into the lungs, to be there purified and changed into red arterial blood by losing its carbonic acid and gaining fresh oxygen, which is carried to every part of our bodies, as has been just explained, conveying everywhere its own new and vigorous life. Night and day, too, quite as unceasingly, must the lungs do their part, by pumping in fresh air to furnish this requisite supply of revivifying oxygen; and, what is almost equally important, they must pump out the air which has been partly deprived of its oxygen, and has received in its place the worn-out and now deleterious substances got rid of by venous blood. This constitutes the pulmonary circulation in distinction to the circulation of the blood through various parts of the body for purposes of its nutrition which constitutes the systematic circulation.

Respiration.—The lungs, which contain the air, are not active in the act of respiration. The chest cavity enlarges by the contraction of the diaphragm and the elevation of the ribs and sternum, so that the chest is enlarged in its vertical, its transverse and its antero-posterior dimensions. With this enlargement the pressure from without is greater than the pressure from within, and the air rushes in, thereby distending the air vesicles. In expiration the chest-cavity diminishes in the diameters in which it has been increased, and, as a result, the air in the lungs is subjected to pressure, and consequently rushes out. The air that passes in and out with each respiration is called tidal air, and is equal to twenty cubic inches of air. But, after an ordinary inhalation, it is possible, by the exercise of a little effort, to breathe in still more air, to the extent of one hundred cubic inches. This is called the complemental air. After an ordinary expiration it is still possible to breathe out air to the extent of one hundred cubic inches. This is called the supplemental or reserve air.

Residual Air.—After all effort to expel air from the lungs there still remains about one hundred cubic inches, called the residual air, from the fact that it resides in the lungs. But we must not get the idea that this residual air is unchanged, for it is ever being purified.

Frequency of Breathing.—The respirations vary from fourteen to eighteen per minute. They are greater during infancy and childhood. It is then during respiration that the fresh air, laden with oxygen, is carried to the blood to give to the blood its oxygen, and to receive in its place carbonic acid. But the air does not meet the blood directly. On the outer side of the air cells we have the air, while distributed on its inner side we have the small blood-vessels or capillaries which have carried the blood to the lungs. So that separating the air from the blood we have, first, the walls of the air cells, and second, the walls of the capillaries. But these two are so thin and delicate that the exchange can readily take place through them.

IMPURE AIR.

The Impurities of the Air.—The light of modern research has enabled us to know much of atmospheric conditions conducive to disease and health, the latter particularly engaging our attention at this time. The impurities of the air are, first, suspended substances and, second, gaseous substances. The suspended substances are particles of almost every known substance, the most important being sand, dust, soot, pollen, micro-organisms of all kinds, particles of food and clothing. The gaseous impurities are carbonic acid, whenever it exceeds .05 per cent.; carbon monoxide; sulphur dioxide; sulphuric, hydrochloric and nitric acids; hydrogen sulphide, ammonia and its compounds, and organic vapors from decomposing animal and vegetable matters.

Action of Impurities of the Air.—The solid impurities act by clogging up the air vesicles, thereby interfering with their function. They may of themselves be causes of disease, as in the case of micro-organisms. The gaseous impurities act, first, by virtue of their own toxic or poisonous properties and, second, by the fact that they take the place of the necessary element, oxygen. Carbonic acid is normal to the extent of .04 per cent. As before mentioned, air that we inhale contains twenty-one parts of oxygen and seventy-nine parts of nitrogen to every one hundred parts of air. On the other hand, expired air contains sixteen parts of oxygen, five parts of carbonic acid and seventy-nine parts of nitrogen. If, now, we should be placed in a room where the air is unchanged, the air inhaled contains a greater percentage than .04 per cent., and is consequently impure.

Carbonic Acid.—Carbonic acid is the most common impurity of air, and, with its associated organic matters from human or animal breathing, pollutes the atmosphere of closed or badly-ventilated apartments in the manner already described. Acute poisoning from contaminated air, such as took place in the Black Hole of Calcutta, is very uncommon, because people who are long shut up in over-crowded rooms always feel such an overpowering need of fresh air that they can be prevented only by main force from hurrying away from the danger to which they are exposed. Nature warns them so emphatically and imperatively to seek a purer atmosphere that they become ready to sacrifice everything to obey her commands.

Symptoms of Air Poisoning.—The early symptoms of oppression from breathing impure air are too well known to require any lengthened description, although the direct connection of many uncomfortable sensations experienced in crowded rooms, with the aerial contamination, is not so generally understood and appreciated. Among the primary indications of physical injury to the blood from inhaling vitiated or "second-hand" air, are a disposition to draw long, full breaths, as a result of the stifled or almost suffocated feeling which early makes itself apparent. This is accompanied, or soon followed, by flushing of the face, throbbing of the temples, headache and sickness at the stomach, which may even proceed so far as faintness or an actual fainting-fit, as we often see in delicate ladies accidentally wedged in crowded lecture-rooms, concert-halls or theatres.

Chronic Effects of Air Poisoning.—The chronic effects of long-continued breathing an air which is but moderately polluted are seen in a general deterioration of the strength, appetite and digestion, a pallid dyspeptic appearance, from want of renewal of the blood.

Bacteria in the Air.—Bacteriology has explained the cause of many diseases. The air is everywhere laden with them. They enter our bodies through the respiratory and digestive tracts. If our vitality or resistance is sufficient to withstand their invasion we remain in a state of health; but, when the vitality is lowered for any reason, the bacteria invade the system and disease results. The bacteria present in the atmosphere are not, as a rule, actively disease producing. Those that do produce disease are found particularly where the discharges of diseased animals have been allowed to collect and dry. These excretions become pulverized and are subsequently carried about in the air we breathe. The dried expectoration of cases of tubereulosis, of influenza, and occasionally of pneumonia, produce these diseases in this manner. The boards of health in various parts of the country are fast coming to the conclusion that expectoration upon the sidewalks, in the street cars, in public halls, and so forth, is a menace to the public well-being. In hospitals patients suffering with tuberculous disease are obliged to expectorate in special cups or pasteboard boxes, which are kept covered and subsequently destroyed. Similar measures might be adopted in private practice.

EVIL EFFECTS OF EXPOSURE TO DRAUGHTS.

Cold Air.—Cold air, and especially cold, moist air, is so often a factor in the production of disease that the consideration of this constantly impending danger to health and its hygienic treatment by the means of suitable clothing is very important.

Clothing.—Contrary to the popular notion, clothing gives no heat in itself, but only saves the heat of our bodies from escaping into the surrounding air, and it does this just in proportion as it is a bad conductor of heat. The rate at which our raiment carries off the bodily heat varies from that of a thin linen coat, for example, which conveys it away rapidly, to that of a thick fur coat, through which the loss of heat into the surrounding air is very gradual. Upon this difference in conducting power for heat the relative value of different articles of dress depends.

Why Clothing Comforts.—Much of the comfort that clothes afford is due to the fact that they give what is called an "artificial surface" to our bodies, on which the cold air can act without our feeling it so much. It is the absence of this artificial surface on the bare hands and face which makes the fingers, forehead and ears ache so with the cold, sometimes in wintry weather, and the reason that people's toes, after a while, often ache in the same way, is that the foot-coverings frequently become chilled through, so that they no longer do their duty as protectors against loss of heat.

Hardening Process.—The process of "hardening oneself" consists in rendering the skin so used to changes from a warm to a cold air, that its blood-vessels and nerves are comparatively little affected by the contracting influence of the cold. "Making oneself tender," on the contrary, is establishing the habit of staying in warm air, and venturing out only when well wrapped up, to such an extent that any accidental exposure to even moderately cold blasts has a powerful, or even dangerous, effect. Hardening the skin against the weather is just like hardening the eyes to a bright light, or the ears to loud noises. All three may occasionally prove valuable accomplishments after they are acquired, but a certain per cent. of the people who try to be thus accomplished will lose their lives, or their eyes, or their ears, in the process. No doubt thousands of young girls have died of consumption caught in the attempt to harden themselves to going with bare arms and bare necks, in the costume absurdly called "full dress" by fashionable society.

Dangers to be Avoided.—In every effort to harden oneself against the influence of changes of the air, and likewise in the practice of that accomplishment after it is acquired, any saving of clothes is often more than compensated for by a waste of extra food used up in maintaining the animal heat, through the process of burning up the fatty and starchy articles of our diet. Besides this, a great and frequently an unnecessary strain is imposed upon the digestive organs, in preparing this extra supply of nutriment, and the nervous system is also severely taxed in regard to both the digestive and the heat-regulating operations, so that study or other mental efforts may be seriously interfered with. Hence the hardening process should only be applied to our bodies in the most carefully considered way, by people who are, at the time the experiment is tried, in good health, and those especially who are free from any tendency, inherited or otherwise, to disease.

When to Venture Out of Doors.—As a substitute for hardening oneself by exposure to all sorts of atmospheric changes, without carefully regulated protection, attention to the weather indications, or "probabilities," as published every day in the newspapers, has of late years become of great importance from a hygienic point of view. In fact, the study of sanitary meteorology, as this branch of the science might be called, for the purpose of determining what hygienic precautions in regard to clothing, ought to be instituted against hot, moist, or cold air, what days or what hours convalescent patients, and especially children, may venture out of doors, when is the best time for invalids to bear removal, and at what periods neuralgic and rheumatic patients must exercise particular care against exposure, has a highly practical, and sometimes an almost incalculable value.

Providing Against Weather.—Any one, by consulting the daily "indications" in the public prints, can provide against the weather correctly about eight times out of ten, but in order to avoid most of the remaining 20 per cent. of blunders, it is only necessary to combine the knowledge obtained from the signal office predictions with that derived from observations upon an aneroid or mercurial barometer, as described in the following pages.

WEATHER OBSERVATIONS.

Signal Service Bureau.—From the time the great Dr. Johnson uttered his famous sarcasm upon observers of the weather, to wit, "A certain set of men pass their lives in watching the changes of the weather, and die at a good old age with the conviction that the weather is changeable," little has been accomplished in rendering us more truly weather-wise, until the splendid results attained by our own Signal Service bureau gave a new impetus to the study of meteorology.

Value of Weather Observations.—Few can dispute that not only the hygienists of America, but also those of the Old World, are under great obligations to our National Government, which, taking timely advantage of opportunities never before presented in the history of mankind, has utilized them with marvelous success.

Weather Reports.—These opportunities consist, of course, in the cir cumstances, first, that in our American Union there is a larger compact portion of the earth's surface inhabited by civilized man, now under the same jurisdiction, and controlled by one central authority, than in any antecedent epoch; and second, that by the most extended system of telegraphic communication ever organized, it has been possible, during the last decade, for the first time in the history of the world, to obtain instantaneous and simultaneous weather reports from an area of the earth's surface occupying the whole breadth of our continent, stretching from the thirtieth almost to the fiftieth parallel of latitude, and comprising more than three millions of square miles.

Methods of Observing Weather.—Over this vast section of country signal stations have been established, under the direction of the Weather Bureau, at least wherever practicable, and to such extent as the yearly appropriation would permit. At these stations three observations are taken daily, at the same moment, the hours selected being 7 o'clock A. M., 3 P. M. and 11 P. M., Washington time.

Weather Maps.—By this plan the changes from hour to hour and day to day, as well as the effects which are produced by these alterations, are noted, and after these records are forwarded to the central office, they are reproduced in a permanent form upon the daily weather map, which is transmitted as far as practicable over the country. Here these daily maps may justly be entitled "the geography of our atmosphere." Without examining them, we can no more secure an accurate conception of the general state of the weather than we could gain a correct idea of the real arrangement of seas, continents and islands, as represented upon geographical maps, by walking a few miles along the coast, or climbing over a range of mountains.

Storms.—By means of the extensive series of observations, carried on through several years by the United States Signal Office, it has been discovered that storms occur in areas of low barometer, rounded or oval in form, and two or three hundred miles in diameter, which travel across our country, from west to east, exactly opposite to the apparent movement of the sun in the heavens. The storm therefore is an immense ring or oval of wind, cloud and rain, which speeds across the country about as rapidly as a fast express train; that is, from about 300 to 600 miles in twenty-four hours.

Direction of Storms.—Such storms usually come to us from the Pacific coast, and by having telegraphic messages sent to Washington from several of the western stations on the Pacific Railroad, announcing at what time the storm reached each one respectively, the observers of the signal office can, of course, tell just how fast that particular tempest is advancing, and calculate when it is due in Washington, exactly as the railroad officials can tell, if they are informed by telegraph, precisely what time their train will arrive from the west. Evidently, after being thus notified, it is an easy matter for the Washington authorities to send word to the people in the neighborhood to get ready to meet the rain in one instance, or their friends at the depot in the other.

Storm Paths.—The path of an area of low barometer across the continent has been aptly compared to the track of an immense water-cart, the centre of which is, as a general rule, the line of most violent storm. The average rate of motion for such a storm-centre is 350 miles a day, although it may vary from 100 to 1200 miles in twenty-four hours. The winds commonly blow from all quarters towards the area of low barometer, the many apparent exceptions being caused by mountain-ranges, valleys, and so forth, turning aside the currents of air.

Barometric Effects.—From this it follows that, when the area of low barometer is running on a line of high latitude, the winds felt in places on its southern margin will be from the south, and *vice versa.* That is to say, if at any time an area of low barometer is passing through New York and New England, the winds in Philadelphia will, in a general way, be towards it and from the south; while, on the contrary, at any time when a similar area is traveling through Virginia and Maryland, the winds in Philadelphia will be from the north, and usually cooler. The exceptions to the rule of north winds being cooler and south winds warmer, are obviously due to large volumes of cold air or of warm air, respectively, having previously been blown to the north or south of a particular position.

Direction of Barometric Areas.—Although the general direction of the areas of low barometer seems to be round the earth towards the rising sun, their course is sometimes very irregular, as is demonstrated by the daily weather maps, which occasionally exhibit them traveling almost due north for three or four days, during which excursion they may pass over a distance of a thousand or fifteen hundred miles, before they resume their usual easterly tendency. The storm, as before remarked, is where the area of low barometer is, and as this almost always approaches us from the west or southwest, most of our storms really come from that direction. Hence there is seldom or never a true northeast storm, much as we hear people talk about "northeasters;" and a northeast wind, with rain, results from an area of low barometer situated southwest of us, and, as a rule, traveling eastward on a parallel of latitude one or two hundred miles south of our position.

Uses of the Barometer.—The use of the barometer is especially seen in determining, by its steady and gradual rise, that the edge of an oval of low barometric pressure has passed over a particular place. It also indicates, by its gradual fall, the oncoming of an area of low barometer, although when, as frequently happens, a storm lags behind this area a little, rain and wind may be most severe with a rising barometer. The indications afforded by barometric observations must therefore be specially studied for each particular place, and judicially combined with the daily report of probabilities from the Weather Bureau, in order to gain the greatest advantage in sanitary meteorology.

INFLUENCE OF WINDS ON HEALTH.

Variety of Influences.—Wind or air in movement exercises upon human health an influence which depends partly upon its rapidity, partly upon the properties which it may have acquired from the land and water over which it has passed, and lastly upon its variations. Its influence from these various causes may be either accidental or temporary, or durable and more profound. Thus, the effect of a cold or damp wind upon an individual who is in a free perspiration, as a consequence of active exercise just engaged in, may be to produce a cold, a sore throat, a bronchitis, or an attack of rheumatism, according to the predisposition or weak point of the person. Hence, as already insisted upon, every man ought to study out carefully his own special aptitudes, under the agency of certain exciting causes, to the development of particular diseases. This is indisputably the part of wisdom, because it is far easier to avoid these exciting causes, which may so readily bring into action the dangerous maladies to which we are predisposed, if we are well informed concerning the exact defect in our armor against their power.

Deleterious Influences.—A wind, if charged with injurious substances, such as the pestilential effluvia of marshes, for example, may carry with it the causes of serious alterations in the health. Some such winds produce, in countries where they blow, diseases terrible both on account of their severity and their persistence, and which cease only with the wind which has brought them. Difference in the rapidity of the movement of the air gives rise to great variations in its effects. A moderate agitation of the air, such, for instance, as a wind moving ten miles per hour, is decidedly favorable to the proper performance of the functions of the skin, to the energetic exercise of the muscular system, and to the maintenance of an agreeable temperature. Nothing, for example, can be pleasanter, nor in their way more healthful, during the exhausting heats of summer, than the sea breezes of maritime coasts.

Sea Breezes.—When cool air is in rapid motion, however, and just in proportion to that activity, a great and speedy abstraction of heat from the surface of our bodies is perceptible. Air which in repose gave merely the sensation of agreeable freshness, becomes cold when in movement, and cold air under a similar change of circumstances becomes frigid.

Hygienic Effects of Air in Motion.—Physiologists have calculated that, with dry air in rapid motion, the loss of moisture from the surface of the skin is ten times as great as when the air is still and moist. This fact explains the necessity of avoiding, as far as possible, exposure of the body particularly when perspiring to air in rapid motion, because the dangers of chill are thereby greatly increased. On the other hand, a very dry wind rapidly parches the skin, checks its secretions, which are so important to the maintenance of health, and produces a general feeling of discomfort. The exaggerated condition of this prejudicial influence is seen in persons exposed to the celebrated sirocco of the Great Desert of Sahara. The influence of winds depends not only upon their humidity and their rapidity, but also upon the nature of the countries which they traverse. The wind which crosses the icy peaks of snow-clad mountain-ranges carries with it for a long distance the cold with which it is charged. The town of Nice, such a favorite resort for consumptives in the south of Europe, would have an almost perfect climate were it not for the fierce and frigid wind called the *mistral,* which occasionally visits it, blowing from the summits of the Alps down the valley of the Rhone.

Effects of Cold Air.—Cold encountered without forewarning may be the cause of disease. Too often it is a predisposing cause of disease. Cold air may of itself cause disease, as is seen in frost bite, or it may produce its results by simply making the system more vulnerable. To illustrate—it was formerly thought that cold was the cause of pneumonia. We now know that pneumonia, like many other diseases, is due to a germ. Many healthy persons have the germ of pneumonia in the secretions of the mouth. If the vitality or power of resistance is good no evil effects follow. Should the same individual be "run down" for any reason and the added influence of cold be present the germs are no longer resisted and pneumonia results.

Benefits of Winds.—But no cloud is without its silver lining, and if we but look for it, it may be found. If we examine the subject more closely we see that winds are responsible for conditions of health, that upon winds or air in motion depends the whole subject of ventilation to be discussed later. It is by the motion of the air that respiration is possible. Impure air is diluted by pure air, and then rendered purer.

OZONE.

Among the invisible ingredients of air sometimes found in considerable quantity, but not always present in any appreciable amount, is ozone.

Origin of Ozone.—Ozone is made up of three atoms of oxygen, whereas free oxygen is made of but two atoms. It is therefore concentrated oxygen, and by loss of one of its atoms it is converted into free oxygen of two atoms.

Importance of Ozone.—As yet, the researches of medical chemists only enable us to state that the test of Shoenbein indicates that ozone is more abundant in pure than in impure air; in greater quantity at the seashore than in the interior, and in mountain air than in that of plains; absent in the centre of large towns, yet present in their suburbs; deficient in the air of a hospital ward, yet plentiful in the atmosphere outside.

Ozone in Pine Woods.—Dr. Nicholson, of Michigan, found in a long series of observations that ozone was more abundant in a pine forest than in the open country during the summer, but less abundant during the winter; less abundant in coal-pits and over swamps than in the open country, and less abundant in the night than in the day.

Property of Turpentine.—The results of these investigations in regard to the air of pine woods are in accord with the statements of Dr. Schreiber, of Vienna, who declares that the turpentine exhaled from pine forests possesses to a very high degree the property of converting the oxygen of the air into ozone, and this fact perhaps explains why a continued residence among the balsamic odors of the pines has long been credited with a favorable influence in cases of consumption. The test for the presence of ozone in the air, consisting of paper which has been soaked in starch and iodide of potassium, or iodide of calcium, is not reliable.

VENTILATION.

Importance of Ventilation.—Having reviewed the serious derangements to health that impure air might occasion, it behooves us to consider some preventive measures to ward off disease. The great remedy against impure air is, of course, proper ventilation.

System of Ventilation.—In arranging any system of ventilation, we may assume that the greatest amount of carbonic acid (and its associated organic material from the breath) which may be allowed in an inhabited room, without injurious results, is six-tenths of a gallon in every 1000 gallons of air, as already mentioned. The first question then is, how much fresh air must be supplied every hour for each person in a room, in order that this proportion of impurity may not be exceeded?

Quantity of Air for a Room.—By experiment and calculation it is found that, in order to keep up this admitted standard of purity, it is requisite that 3000 cubic feet of perfectly pure air should flow into a room hourly for every grown person occupying it. Of course, an equal bulk of more or less vitiated air must escape to give place to the pure air, and this bulk, which must be poured in and likewise emptied out hourly for each individual, would be equal to the contents of an apartment thirty feet long, ten feet wide, and ten feet high.

When Increase of Air is Needed.—Such a quantity, large as it seems, must sometimes be considerably increased, in order to maintain the requisite standard of purity. For example, when lights are used, and no provision is made for carrying away the products of combustion, much additional pure air is needed. An ordinary gas-burner consumes the oxygen of about twenty-five cubic feet of air hourly, and produces nearly as much carbonic acid as ten men would do in the same space of time. Sick people, especially those with diseases of the lungs, and those affected with low or putrid fevers, should have a larger quantity of pure air; and it has been found that, unless 3500 or 4000 cubic feet are supplied hourly for each patient, hospital wards, for instance, are more or less haunted by offensive odors.

Size of Apartments.—The size of apartments for human habitation should be directly dependent, within certain limits, upon the perfection of the ventilating and warming apparatus, because, if the room is small, it is only by securing a proper delivery of warm air that the occupants can receive their allotted 3000 cubic feet per head per hour, without suffering from dangerous or unpleasant draughts. For instance, in a room containing but 100 cubic feet, the air must be changed thirty times hourly, or every two minutes, in order to maintain the atmosphere at its standard purity. This would involve the necessity of such rapid currents of air flowing through the narrow space that it would be almost uninhabitable.

Objection to Small Rooms.—Besides, when the room is small, it is not possible to diffuse equally the air which enters it, because, between the inlet and the outlet, a direct current is apt to be established, so that a good deal of the fresh air passes right through, without being of any use in reducing the amount of impurity.

The Sleeping-Room.—The best authorities assert that, with ordinary means of ventilation, the space for every grown person should be not less than 1000 cubic feet, and that in this space the entire air should be changed three times each hour. According to this rule, a sleeping-room of ten feet wide, ten feet high, and twenty feet long, might be allotted to two people; and four persons, *but no more,* should sit, eat or sleep in a room twenty feet square and ten feet high, provided it was well ventilated in the ordinary way.

Frequency of Air Changes.—If the best ventilating apparatus is employed, and the air is warmed to the temperature of about 65 degrees Fahrenheit, the air in a room may be changed six times hourly without causing annoyance, so that, under such exceptional conditions, an apartment of less than half the size above mentioned, or twelve feet wide, fourteen feet long and ten feet high, would answer for four people.

Death Rate in Small Lodgings.—The dimensions given above are, unfortunately, very much larger than are generally provided in our dwelling-houses, and in the crowded lodgings of the poorer classes the allowance of space for each person often falls as low as 250 or even 200 cubic feet. Under the latter circumstances, the increased sick-rate and death-rate, and the general aspect of what a celebrated French physician graphically describes as "physiological destitution," bear witness to the disastrous effects of breathing impure air in confined apartments.

Natural Ventilation.—A certain amount of natural ventilation, as distinguished from artificial ventilation, effected by contrivances especially arranged for that purpose, goes on all the time through the many crevices, holes and pores of our dwellings, although this supply of air is, as a rule, but a small part of what is necessary for our health. It contributes, however, to the change which does progress, whilst we sit quietly within our four walls without feeling the least draught.

Relative Weight of Airs.—Since air, like other gases, expands or contracts according as it is heated or cooled, warm air is, of course, lighter than cold air, and tends to escape at the upper part of a room, whilst its place is supplied by cold air, which flows in through every aperture in the lower portion. The familiar experiment of opening a door leading to a cold entry an inch or two, and then holding a lighted candle first near the bottom and then at the top of the crack, shows very clearly, by the way the flame is blown inward in the first instance, and outward in the second, how strong are the currents of air in these two positions.

Effects of Second-Hand Air.—Many persons, especially ladies, are so sensitive to the effects of second-hand air in a room, that they can tell in a very few minutes, by the sensations in the head and lungs, whether an agreeable amount of ventilation has been provided, by leaving the door a little way open, or whether it has been shut tight.

Effects of Differing Temperatures.—The rapidity with which the necessary interchange of air goes on through the crevices of our doors and windows depends very much upon the difference between the inside and outside temperature. This important fact is well illustrated by the following observations of Pettenkofer. He found that, in a room ten feet high, ten feet wide and twenty-six feet long, containing 2600 cubic feet, when the difference in temperature within and without was 34 degrees, the contents of the apartment changed once in an hour, through the ordinary crevices of the doors and windows. In the same room, with the same difference in temperature, but with a roaring hot fire in the stove, the change in the air increased about one-fourth. When, however, in the same room the thermometer stood at 71 degrees, whilst outside it registered 64 degrees, leaving a difference of only 7 degrees, ventilation went on only at the rate of 780 feet per hour, and even opening a window, the aperture of which equalled eight square feet, only increased the ventilation about one-half, or to 1060 cubic feet. This experiment was very instructive, showing, as it does, that a difference in temperature of 34 degrees, with carefully shut doors, windows and crevices, has as great an influence in securing a pure atmosphere as much larger and quite unobstructed communications with the outer air, when this latter is of nearly the same temperature as that inside.

Getting Rid of Foul Air.—The quickest way of getting rid of foul air in a room is by cross ventilation, or "perflation," as it is sometimes called. This is obtained by opening windows on opposite sides of the apartment when a moderate breeze is blowing; but it is a method which cannot be relied upon, because, if the outside air is stagnant, no ventilation is secured; whilst, on the other hand, if there is a strong wind, the violent current of air produced might be unendurable.

SLEEPING APARTMENTS.

Ventilating.—In all rooms which are occupied most of the day, and in all sleeping rooms, proper ventilation should be secured by artificial apparatus specially designed for the purpose, as will be described in the section of this book upon Sanitary Architecture. In old houses, until proper alterations can be made, the exit of foul air ought to be provided for by lowering the windows at the top, and the entrance of fresh air permitted by raising them at the bottom.

Preventing Unwholesome Draughts.—Unwholesome draughts may be prevented in the latter instance by the simple device of fastening a board across the window-frame on the inside, in such a way as to direct the incoming current air upward toward the ceiling of the room. Dr. Keen's arrangement, which is still simpler and equally efficient, is to fasten with tacks or pins a piece of cloth, or even strong paper, across the lower ten or twelve inches of the window-frame, and then raise the lower sash more or less, according to the weather. The convenience of this contrivance is increased if the cloth, instead of being permanently fastened to the window-frame, is held in its place by loops of tape, which allow of its easy removal as occasion requires.

Dangers of Neglected Ventilation.—If we but stop a moment to consider we cannot fail to see the necessity of properly ventilating the sleeping apartments. We are oftentimes surprised at the neglect of these all-important matters by intelligent people. If the air of any room becomes impure during the day we are at liberty to remove to another, and our sense of smell or perhaps a headache indicates when such a change is desirable. But during the night the senses are at rest and the individual must breathe again and again the foul air of an unventilated room.

Consumption and Air.—Speaking on the subject of patients suffering with tuberculosis or consumption under treatment, Tyson states the more nearly the temperature of the sleeping-room approaches that of the outdoors the more likely is the patient to improve. The same truth holds in cases of health.

Remove Plants at Night.—Plants should not be kept in a sleeping apartment. During the night they do not give off oxygen, hence their presence is not needed. It is only under the influence of sunlight that the carbonic acid of the air is changed to carbon, which becomes a part of the plant, and oxygen which supports animal life.

CONTAMINATION OF AIR BY SEWER-GASES.

Dangers from Cess-Pool Germs.—A second great danger of impure air arises from its pollution by emanations from sewers and cess-pools, which frequently contain the germs of typhoid fever, diphtheria and perhaps other complaints, as will be more fully explained under the head of Contagion as a Cause of Disease. Dr. Letheby found that sewage-water excluded from the air and containing 128 grains of organic matter to the gallon, gave off over a cubic inch of foul-smelling gases per hour for a period of nine weeks.

Poisons in Sewer-Gas.—Of course, the danger to persons who inhale sewer-air, or "sewer-gas," as it is often called, depends very much upon whether it is loaded with disease-poisons as well as with foul odors, and the instances adduced by well-meaning but ignorant persons, for the purpose of showing that the emanations from sewers have proved harmless, are chiefly cases in which ill-smelling gases happened to be *unmixed* with the poisons of disease.

Proof of Sewer-Gas Poisons.—It would be just as well to argue that because hundreds of ships cross the Atlantic in safety every year, therefore no shipwrecks ever occur, as to contend that, because many people breathe sewer-gas with impunity, therefore it is never injurious to human health. That some sewer-gas is highly deleterious in its nature is proved by the following stubborn facts; and since we have as yet no tests for determining accurately the degree to which any particular sewer is infected with the germs of disease, our safest plan is to cut off all connection between the air of our houses and that of those dangerous channels for filth and disease-poisons.

Diphtheria from Sewer-Gas.—Dr. William N. Thursfield, of Birmingham, England, reports that he traced an isolated case of diphtheria to temporary exposure to sewer-gas in a house on a short line of sewer which he *knew* to be specifically contaminated by diphtheria. This sewer, when opened and examined by a surveyor, produced in him a severe diphtheric attack.

Typhoid from Sewer-Gas.—Dr. William V. Keating, of Philadelphia, has detailed at length four cases of typhoid fever attributed to sewer-gas from untrapped drain-pipes, and refers to cases of measles, scarlet fever and diphtheria in two other families apparently from the same cause.

Dr. C. W. Chamberlain, of Hartford, relates a remarkable case of fatal erysipelas which was seemingly due to sewer-gas from a waste-pipe carelessly left open beneath the bed of the patient.

Vomiting from Sewer-Gas.—Dr. George Wilson quotes the account of twenty out of twenty-two boys of Clapham, England, who were attacked, and two of them died, with violent vomiting, purging and fever within three hours after standing over a choked-up drain, watching the workmen cleaning it out.

Other Examples of Gas Poisons.—Nor are these isolated instances, for the medical journals of America and Europe record numerous similar examples of dangerous or fatal effects from disease-poisons in sewer-air when inhaled by human beings.

Avoiding Sewer Poisons.—In view of this great body of evidence, showing the direct conveyance of disease by air from sewers, it behooves us all to avoid the access of such noxious effluvia into our houses, or into any inhabited place whence they can penetrate into the lungs, which are the usual avenue of entrance into human systems.

DUST IN THE AIR AS A CAUSE OF DISEASE.

Solid Particles.—Dust of various kinds floating in the air, and often occurring in such minute particles that it can only be recognized in a bright sunshine, or by the aid of a beam of electric light, as Professor Tyndall has shown, is far more potent a cause of disease than is generally supposed.

Danger of Saliva-Loaded Dust.—Although affections of the stomach and bowels are often induced by the introduction of particles of injurious dust swallowed with the saliva, diseases of the lungs are chiefly to be dreaded when air loaded with substances which are mechanically or chemically noxious find their way to the delicate mucous membrane which lines the recesses of our pulmonary organs. Bronchitis, catarrh and acute or chronic pneumonia, the latter often running on into one form of consumption, are especially to be guarded against in persons who are liable to be forced to inhale dust of various kinds.

Unhealthy Trades.—The effects of dust are chiefly dependent for their severity on the large amount of the offending material, and the angular, rough and hard character of its particles. A large number of the unhealthy trades are insalubrious especially from this cause. Thus, for example, it is stated by Mr. Simon that, excepting in one locality, 300,000 miners break down in England prematurely from bronchitis and pneumonia caused by the atmosphere in which they live. The one exception is most important, because it occurs among the colliers of Durham and Northumberland, where the mines are well ventilated.

Coal Dust and Consumption.—The sharply-angular fragments of coal which may be seen under a microscope to constitute coal dust, mechanically irritate the lungs of those who inhale them, and often give rise to the kind of consumption which is so peculiar that it is called miners' consumption or miners' phthisis. This malady alone cuts short the days of an immense number of laborers among coal dust, and after death their pulmonary organs are found filled with sharp particles of coal, which being inhaled with the breath, become imbedded in the substance of the lung, and then acting like a vast quantity of tiny splinters in the flesh, give rise to innumerable minute boils or abscesses, by which the breathing apparatus is actually riddled with holes, and so much of it destroyed that the poor sufferers die for want of lung-substance enough to supply properly their blood with air.

Saw Grinders' Consumption.—The fine particles of steel and of sand thrown off in grinding saws and other tools, give rise to saw-grinders' consumption, particularly when dry-grinding is resorted to, and unless the dust is carried away from the workmen.

Particles of Deadly Dust.—In manufacturing these various steel and iron implements, the rough articles are firmly pressed against grindstones, which are revolving sometimes at the rate of three thousand times in a minute. Practically it is found that the degree of danger to the workmen thus employed depends partly upon the amount of dust inhaled, partly upon the character of the particles composing this dust, and partly upon the constrained attitude which the workmen are frequently compelled to assume.

What Dust Most Dangerous.—The grinding of needles and forks is the most dangerous, because it must be done upon dry grindstones, in order to reduce the chance of the fabricated utensil becoming rusty. Scissors, razors and table-knives can be ground partly upon wet grindstones, so that the men employed in such work run less risk of injury from it, whilst the coarser implements generally are now, as a rule, finished upon wet stones entirely, so that still less danger is incurred.

Grinders' Asthma.—The grinders' consumption, called also the grinders' asthma from the difficulty of breathing, which is one of the prominent symptoms, comes on very gradually, and often lasts four or five years before it proves fatal. At first there is only a little dry cough, with scanty expectoration; later on the mucus, which is coughed up, begins to be reddish from a minute quantity of blood mingled with it; and, although there is no fever, and the strength and appetite remain good, an examination of the chest with the stethoscope reveals serious trouble in one or both lungs.

How Recovery is Possible.—Still, recovery is not only possible, but probable, at this stage of the complaint, if the workman can be persuaded to abandon his occupation; but if he persists in exposing himself to the perils incurred by breathing these dangerous dusts into the lungs, the pulmonary structure soon begins to ulcerate away, and painful, lingering death by consumption follows.

Average Life of Grinders.—Until recent improvements in regard to grinding, the fatality of these particles of dust, when inhaled into the lungs, was very great. According to Dr. Holland, the average age at death of twelve workmen at the trade of needle-grinding was only thirty years and eight months, and other authorities give the duration of life as from thirty-one to thirty-five years.

Use of the Magnetic Plate.—In factories where steel-grinding goes on to a very great extent, the use of a large magnetic plate, for drawing to itself the metallic particles, is very useful; but, of course, it has no power to purify the air from any injurious dust, except that made up of iron or steel, and perhaps on this account it has never been popular among the workmen.

Use of the Mechanical Fan.—Another very efficient method is to draw away the dust in the strong current of air created by a powerful mechanical fan. A single fan may be made to extract the dust from several grinding stones, care being taken to have the opening in the boxes which surround the stones and in which the draught is set up underneath, so as to extract both the heavier and lighter particles. This plan adds materially to the expense of manufacture, and is therefore not very popular among the mill owners, but it so greatly diminishes the dangers to the workmen, when properly adapted, that its employment should be enforced by law, in order to protect the health of the operatives.

Danger from Wet-Grinding.—Although the introduction of wet-grinding for the coarser tools vastly decreases the chance of mechanical injury to the lungs from floating particles in the air, the artisans are often kept covered with the muddy water which is constantly being whirled off from the stones. Being thus exposed to the combined evil influence of cold and wet, they are especially subject to acute bronchitis, pneumonia and rheumatism, which may, however, be in part prevented if the men wear water-proof clothing whilst they are at work.

Pottery Dust.—In the pottery trade there is often a large amount of dust made up of mineral particles, which are very irritating to the lungs of the operatives employed. The same may be said of the artisans who work at the trade of glass-making, the most dangerous department being that of grinding and polishing the cut-glass. Of these men more than one-third are said to die of consumption, and their average age at death is variously estimated at from thirty to forty-two years.

Match-Makers' Diseases.—The makers of matches, who are exposed to the fumes of phosphorus, suffer from a form of ulceration of the jaw-bone, if there happens to be any uncovered portion upon which the poisonous vapor can act, as for instance, around the root of a diseased tooth. The manufacture of many chemical products is exceedingly dangerous to health, and requires special precautions to reduce its evil influence as far as possible.

Danger of Metal Fumes.—In some trades and under certain circumstances the fumes of metals or particles of metallic compounds pass into the air, and render it very injurious to health for those who happen to breathe it. Brass-founders are affected with bronchitis and asthma, as in other trades where dust is inhaled by the workmen, but in addition they suffer from a disease called brass-ague or brass-founders' ague. It appears to be the result of inhaling the metallic fumes, perhaps of the oxide of zinc.

Symptoms of Fume Poison.—The symptoms are tightness and oppression of the chest, with uncomfortable nervous sensations, followed by shivering; unlike those of genuine ague, are not periodical. Coppersmiths are apt to be affected in a similar way by the fumes arising from the partly vaporized metal or from the solder. Tin-plate workers likewise suffer occasionally from the fumes of the soldering.

White-Lead Poison.—Workmen in white-lead manufactories often suffer in the same way from inhalation of fine powder of white lead, chiefly from the beds in which oxidation goes on and in the process of packing the product. And the same may be said of house painters to some extent, although lead poisoning is more apt to occur in them from swallowing the lead compound in consequence of want of cleanliness while taking food.

Tobacco Dust.—Operatives in tobacco factories sometimes suffer from irritation of the throat, nose and eyes by the tobacco dust, and there are some people who cannot become accustomed to an atmosphere of the weed. The greatest irritant effect seems to be produced in the manufacture of snuff, but with the large majority of operatives, if proper care and ventilation is secured, no serious effects result after the first few weeks or months.

Wall-Paper Poisons.—Perhaps the most common kind of poisoning from a metallic dust inhaled with the air is that developed in persons who spend much time in rooms decorated with arsenical wall papers. In some instances, these brilliant yet treacherous decorations, which may be either green, purple or brown in color, have been found to contain as many as thirty-seven grains of the arsenical compound to the square foot, and numerous well-authenticated cases of serious injury to health from inhalation of the atmosphere of rooms in which this arsenical dust was constantly floating are on record. Whenever a person who occupies a room papered with green or purple hangings begins without any obvious cause to suffer from headache, nausea, inflammation of the eyelids, dry cough, muscular tremors and impaired nervous power, the cause should at once be sought for upon the walls of the apartment, and if the usual chemical tests show the presence of arsenic in a little of the paper which has been scraped off, both the patient and the paper should be promptly removed.

Modern Improvements.—In recent years many improvements have been made in machinery. Factories made sanitary, workmen protected from dangers of all kinds, laws enacted compelling owners of factories to protect workmen; so that at the present time the operator and mechanic does not have the many dangers to contend with he formerly had. In many places illustrated lectures are given, educating him to avoid certain dangers and conditions in connection with his work.

INDEX TO PART IV OF BOOK III

Preventive Medicine

Foods and Drinks

Part IV of Book III relates to foods and drinks and tells of their hygienic effects upon the different organs of the human body.

SUBJECTS OF THE TEXT

LIST OF ILLUSTRATIONS

PREVENTIVE MEDICINE

PART IV.

FOODS AND DRINKS

GENERAL CONSIDERATION.

Object of Food.—The object of food is primarily to furnish the means for growth, repair, heat and energy. The mere gratification of appetite, which to the detriment of health too often is regarded with undue prominence, is a secondary consideration and merely incidental to nature's demand for nutrition.

Food, Half of Life's Battle.—It has been said that "food properly chosen, properly cooked and properly eaten is half the battle of life," and the practical value of the subject will readily be understood when it is considered that it plays an important part, not only in maintaining health, but in modifying and curing diseases.

The Problem of Diet.—If all members of the human family were alike it is obvious that a bill of fare could soon be arranged which would give every person the most perfect nourishment; but as we each differ, in some smaller or greater degree, from all others of our fellowmen, it is necessary to study the problem of diet, as modified and limited by our own individual peculiarities and surroundings. Age, sex, occupation, climate, nationality, and so forth, all influence the quantity and the character of food required, and, on the other hand, the amount and nature of food taken govern to no little extent the temperament and characteristics of people.

How Food Affects Races.—It has been pointed out, and doubtless with some truth, that racial distinctions are in a measure the result of the character of the food taken, and that the Irish and the Hindu would not have submitted so supinely to the rule of England had their diet, which consists chiefly of vegetables, been more highly nutritious like that of the British.

How Food is Appropriated.—In considering the subject of food, it is important to understand the method by which it is appropriated by the system and converted into blood, flesh, bone and other tissues, and how it is utilized in the generation of heat and force.

Change of Fluids and Tissues.—During our whole lives the fluids and the solid tissues of our systems are constantly undergoing change. New materials in the form of infinitely minute particles of muscle, nerve, and so forth, are being produced, while the old and worn-out atoms of these structures are removed with ceaseless activity. While this incessant movement of these constituents of our bodies is not perceptible to the eye, even when aided by the most powerful microscopes, it nevertheless goes on, and must go on as long as life continues. In fact, the researches of physiologists tend to show, with a large amount of certainty, that the health, strength and vigor of the whole and of every part of the body is in proportion to its youth and newness. Thus it is that exercise, under due regulation and management, is a hygienic means of such great value in strengthening and developing the whole frame, especially the muscular system.

Relation of Natural Forces.—In endeavoring to reach the "bottom facts" of our knowledge in regard to the forces we derive from the food taken into our stomachs, we must bear in mind that, in our own bodies, as in the whole universe around us, we have, from a scientific point of view, to deal only with material entities of various kinds and properties which we call matter, such as the chemical elements oxygen, carbon or sulphur, and their compounds; and principles of actions, which we demoninate forces, among which may be instanced heat, electricity, and the attraction of gravitation, as types.

Natural Forces.—The doctrine of the correlation of forces, abstruse as it sounds at first, is simply, as regards two of them, namely, heat and mechanical motion, an extension of the commonly observed fact that motion, by causing friction, produces heat, as we see in using an ordinary Lucifer or friction match. Every time we strike a match we demonstrate that motion may produce heat; and to expand this idea into the doctrine of correlation (or relationship) of forces, it is only necessary to prove by careful and ingenious experiments, as was first done by Mr. Grove and Mr. Joule, that any certain amount of motion applied in any conceivable way to the production of heat, causes always exactly the same amount of heat, and contrariwise, a particular quantity of heat applied to the production of motion, originates always the same quantity of movement no matter by what kind of machinery it is applied.

Heat and Motion.—In this way we can, by mechanical experiment, establish the existence of a correlation—or, to use the more familiar word introduced above, a relationship—between heat and mechanical motion, and this relationship has been found to be that the force of a weight of 772 pounds falling one foot would, if converted into heat, raise the temperature of one pound of water one degree of Fahrenheit's thermometer.

Muscular Effort.—After clearly comprehending this idea, it is only necessary to grasp the further suggestion that, if a man is hired to lift up again the weight of 772 pounds, which in falling one foot gave us our unit of heat (namely, the heating of one pound of water, one degree), we further establish, by the additional experiment, a relationship or "correlation" between the number of muscular efforts he is required to make and that same heat unit.

Food Required.—Lastly, if we weigh the extra beefsteak or half-peck of potatoes he needs to eat, to enable him to perform so much extra labor, we find out the equivalent ounces of food for the requisite amount of muscular exertion employed, which is again the equivalent of our (arbitrarily assumed) unit of heat, the quantity of heat which will raise one pound of water one degree.

The Four Natural Forces.—Thus, even those readers who make no pretensions to scientific culture can, it is hoped, understand the nature of that mutual relationship or correlation which exists between these four natural forces, to wit, heat, mechanical motion (of falling or lifted weights), muscular exertion and food.

What Food Is.—Food, then, is any substance which, when taken into the animal body, may enter into such new chemical combinations that it gives out its dormant force in the form of heat, muscular movement, nerve power, and so forth.

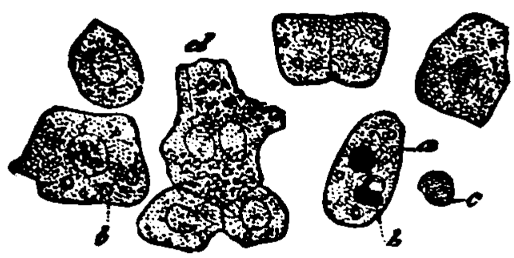
How Food Nourishes.—If an article of food is completely combined with oxygen in the human system, it yields up all the force which it is capable of affording; but if it is not so adapted to the wants of the body as to be fully oxidized or burnt up, part of its force passes off with other refuse matters, and is wasted, as far as that man's nutrition is concerned. It is by learning how to avoid this waste, as well as to escape the injury excess of undigested food is apt to cause to the digestive organs, that a careful study of the articles of diet suitable for each individual, in accordance with the facts and conclusions detailed below, may be made so profit able and beneficial to every one.

STRUCTURE OF ORGANIZED BODIES.

Cell Organization.—All animals and vegetables are built up of minute, separate, organized bodies, called cells, which are put together like stones in a pavement, so as to form the skin, the muscles, the nerves, and so forth. The cell-elements or cell are made up of a nucleus or central living mass, which may be aptly compared to the yolk of an egg.

Protoplasm.—Around this nucleus is gathered a little lump of formed material or protoplasm, corresponding to the white of an egg, and the whole is enclosed in a delicate membrane resembling that which lines the egg-shell. These cells are extremely small, varying from one four-thousandth of an inch to one five-hundredth of an inch in diameter. In the epithelial scales or cells, which are packed together to form the skin, as already mentioned, the average diameter is about one fifteen-hundredth of an inch.

Building of Human Organs.—The different organs of human bodies and those of the inferior animals are built up of cells very similar to those found in the vegetable kingdom, as is illustrated by the adjoining figure. This cut shows the liver-cells of man, with the nucleus, *a,* and oil-drops, *b,* in their protoplasm. At *c* is depicted a free nucleus, that is, one from which the cell-wall and the protoplasm have been accidentally torn away; and at *d* is shown a large cell with two nuclei, illustrating the tendency to occasional twin-formation, which seems to run throughout all animated nature.



Cells of Human Organism.

First Step Toward Human Development.—The first step toward the development of a new being in that wonderful yet hourly miracle of reproduction, as, for instance, of a young chicken inside an egg, is the division of the yolk into a great number of little rounded parts, which soon present the appearance of a heap or mass of cells, which for a time cannot be distinguished from the white cells in the blood of the parent hen. Gradually, however, as the operation of hatching progresses, certain groups of these cells vary under the influence of the vital force from other groups, until, by a continuing process of development, the liver, the heart, the skin, and so forth, are completely formed.

Cell Nourishment.—In chickens, and birds generally, the young creature is nourished until large enough to pick up its own food by the contents of the egg, but in animals which bring forth their young alive, a curious natural provision is made for supplying the requisite nourishment from the blood of the mother. After birth, however, the necessity for food immediately becomes apparent, and in order that mere existence shall continue, external nourishment of some sort must be regularly supplied. Furthermore, if growth and complete development are to go on, this nourishment must be accurately proportioned in kind, quantity and composition to the exact needs of the infant animal or man.

MIXED DIET REQUIRED BY MAN.

Analysis of cows' milk shows it to contain—

Albumen and casein	54.05
Butter	43.05
Milk Sugar	40.37
Salts	5.48
Water	857.05
Total	1,000.00

While this forms a suitable diet for young children, who, though rapidly growing, expend in labor comparatively little muscular force, it fails to meet the requirements of active adult life.

Kinds of Diet.—Nor, notwithstanding much argument to the contrary, does an exclusively vegetable diet seem best adapted to man's needs. The evidences derivable from the form and arrangement of the teeth, the structure and functions of the alimentary canal, and the results of direct experiment, all indicate that, in the present age of the world at any rate, mankind thrives best, as a general rule, upon a mixed animal and vegetable diet.

Amount of Food Required.—The requirements of a full-grown individual may be estimated by accurately determining, as has been done by scientific men, the quantities of the chemical elements carbon, hydrogen, nitrogen and oxygen, which are cast off from the body by the bowels, the kidneys, the skin and the lungs, every twenty-four hours, and then calculating what quantities of various articles of food, containing these chemical elements, must be eaten daily to supply this waste.

What Foods Must Supply.—For instance, if we find, as some English investigators have done, that a gang of one hundred average prisoners cast off every twenty-four hours, from their lungs, kidneys and bowels, about seventy-one and a half pounds of the element carbon, and four and a quarter pounds of nitrogen, it is obvious that carbon and nitrogen must be supplied to this amount in the food the gang of prisoners eat in order to make up for what is excreted. If they were to be fed upon bread and water alone it would require 380 pounds of the staff of life daily to keep them in good health, because it requires that weight to yield the four and a quarter pounds of nitrogen which they daily cast off in the ways just mentioned. But in 380 pounds of bread there are 128 pounds of carbon, which is about fifty-seven pounds more than would be needed to replace what these men would excrete.

Meat Food.—On the other hand, should the authorities try the experiment of giving them animal food only, it would be necessary to allow them 350 pounds of lean meat, because no less than that amount would contain the seventy-one and a half pounds of carbon necessary to replace the quantity of this element excreted; but lean meat contains proportionately a very large amount of nitrogen, and in 354 pounds of it there would be found 109 pounds, or 105 pounds nearly in excess of what the prisoners really required, and which would therefore be wasted as food.

Mixed Food.—In the former case which we have supposed, each man would have to eat about four pounds of bread, and in the latter about three and a half pounds of meat every day, in order to avoid losing strength. In the first instance, there would be a good deal of starch in the bread, and in the second case, a considerable bulk of nitrogenous material, which would be quite unnecessary as food, and apt if taken into the stomach to overload it and derange its functions.

A True Mixed Diet.—The true way is to resort to a mixed diet, and if such were to be adopted in this instance, we would probably find that 200 pounds of bread, with sixty pounds of meat, would answer every purpose. Two hundred pounds of bread contain, besides water, sixty pounds of carbon and two of nitrogen, and sixty pounds of meat about twelve of carbon and two and a quarter of nitrogen; making, it will be observed, exactly the quantity of each of the primary elements cast off by the 100 men daily as waste matter from the processes of life.

Property of Milk Food.—It is manifest, according to this calculation, that milk is not accurately suited to supporting an adult population, because it contains too little carbon and too much nitrogen to supply the waste. This excess of nitrogen is well suited to the young animal which is actively engaged in adding to its muscular development, but is not adapted to the full-grown man, who is obliged to produce force, or its equivalent, heat, by the slow combustion of carbon in his body. It is to supply this excess of carbon, beyond what exists in milk, that all the world over, bread or starch, which is rich in carbon in some form, is gradually added in larger and larger proportions to the food of a growing child.

Proper Diet List.—Such calculations, in regard to the other constituents of our food, form a basis of the utmost value for the economical arrangement of diet lists, and the distribution of limited means, as, for example, in armies and navies, with the least possible waste of the ingredients at command.

THE TEETH.

Number and Arrangement.—In the adult human being the teeth, when perfect, are thirty-two in number, and are arranged in the following order: First, in the middle of each jaw, are the four incisors or cutting teeth; next, come one on each side of the group of incisors, the two canine or dog-teeth, so-called because they are very large and conspicuous in a dog's mouth; the next pair of teeth, situated just back of each canine tooth, are named the first and second bicuspids, on account of their having two points or cusps; behind these, again, we find the first, second and third molars or grinding-teeth.

The Molar Teeth.—The last, or third molars, four in number, counting two in each jaw, of course, have received the name of the wisdom-teeth, because they appear about the time that people grow up and are supposed to have arrived at years of discretion.

Children's Teeth.—The permanent teeth are preceded during childhood by a smaller set, only twenty in number, which are styled the deciduous teeth, for the reason that they fall out or are pushed out by the larger and stronger permanent set. These deciduous teeth begin to come through the gums of babies when they are from six to twelve months old, and unfortunately give rise to much of the pain endured in childhood. The adjoining figure shows how the second set of teeth comes in behind the first, or deciduous teeth, pushing these latter out of the jaws from the sixth to the tenth or twelfth year of life.

Structure of Teeth.—Each tooth has, as can be readily seen by cracking open one from a dead animal, a very hard outside shell, composed of what is called the enamel, a softer and thicker body-substance, denominated dentine or ivory, and a hollow place near the centre of this dentine, named the pulp-cavity, which during life is filled with a mass of nerves and blood-vessels. The pulp or nerve of a tooth is exceedingly sensitive, and acutely painful on the slightest touch, or even from mere exposure to the air, as, for example, by the breaking off or decaying away of some portion of the dentine or tooth-bone which naturally protects it, and which when removed gives rise to toothache.

Care of Teeth.—The prevention of such suffering lies in avoiding the decay as long as possible by keeping the teeth clean, refusing corrosive articles of food or medicine, and, when cavities begin to form, having them stopped up or filled by a skillful dentist before they have time to reach the nerve.

Effect of Hard Brushes.—While frequent cleansing of the teeth is important, it is not advisable to brush them too much with hard tooth-brushes, and especially with gritty tooth-powders, thus irritating the gums and wearing away the very enamel which it is our object to preserve.

What to Avoid.—The teeth should never be used to break hard objects; hot and cold liquids, especially in quick succession, ought not to be brought in contact with them, as in drinking; and strong vinegar, syrups and sweetmeats ought likewise to be kept away from the teeth. If candies are eaten at all, or at rare intervals, the sugar remaining between the teeth and around the gums should be promptly washed away by rinsing the mouth.

THE TONGUE.

Tongue Function.—Besides being the organ of taste and the chief agent in the production of speech, the tongue performs an important duty in bringing different portions of a mouthful of food under the molar teeth during the operation of mastication or chewing. This office of the tongue is shown to be one of great usefulness, by the fact that when paralyzed, either wholly or in part, great difficulty is experienced in chewing food, because it cannot be pushed between the grinding surfaces of the back teeth.

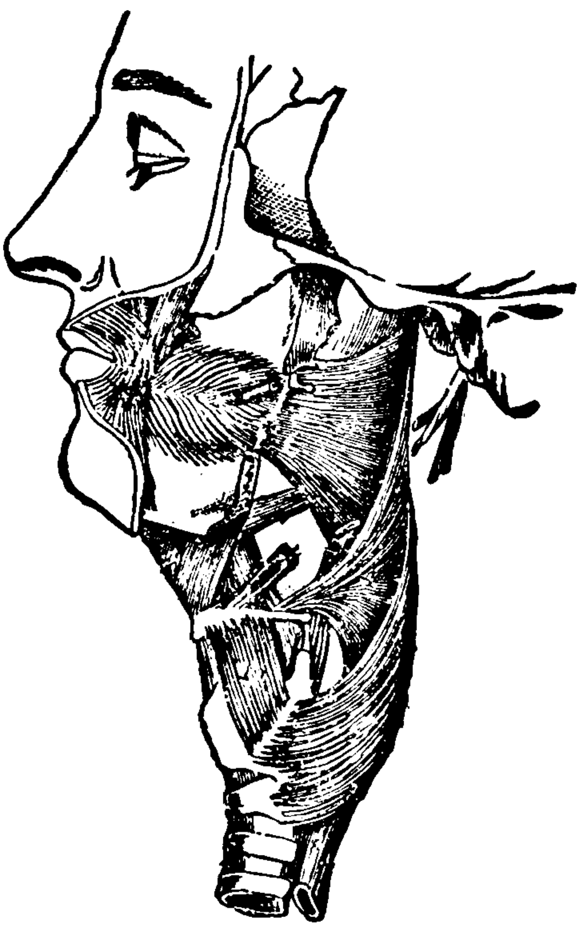
THE SALIVARY GLANDS.

Breaking up the food into a sort of coarse powder is only the first step in its proper preparation for digestion. It must next be mixed with the liquid of the mouth, called saliva, which has the remarkable power of turning the insoluble starch of bread and other starchy foods into soluble sugar.

Number and Location.—The salivary glands, whose business it is to manufacture the saliva, are six in number, four being situated under the tongue and the jaw. and the others seated deeply in the cheeks in front of the ears. These are called the parotid glands, and are remarkable for being the parts affected by the contagious disease named mumps.

Secretion of Saliva.—The saliva is poured out by different ducts, into various parts of the mouth, so as to become intimately mixed with the food. Its active principle, named ptyalin, plays a very important part in the digestion of the amylaceous substances, that is to say, articles of diet, such as bread, potatoes, corn, and the like, which are chiefly composed of starch.

Thorough Mastication.—It is, therefore, highly necessary that chewing should be performed slowly enough to give time for a sufficient quantity of saliva to be secreted, and to be completely mixed with the food, as want of care in eating too fast is apt to be followed by the disease called dyspepsia, as already mentioned. It is difficult to urge too strongly the importance of a thorough mastication of vegetable food.


The Swallowing Muscles.

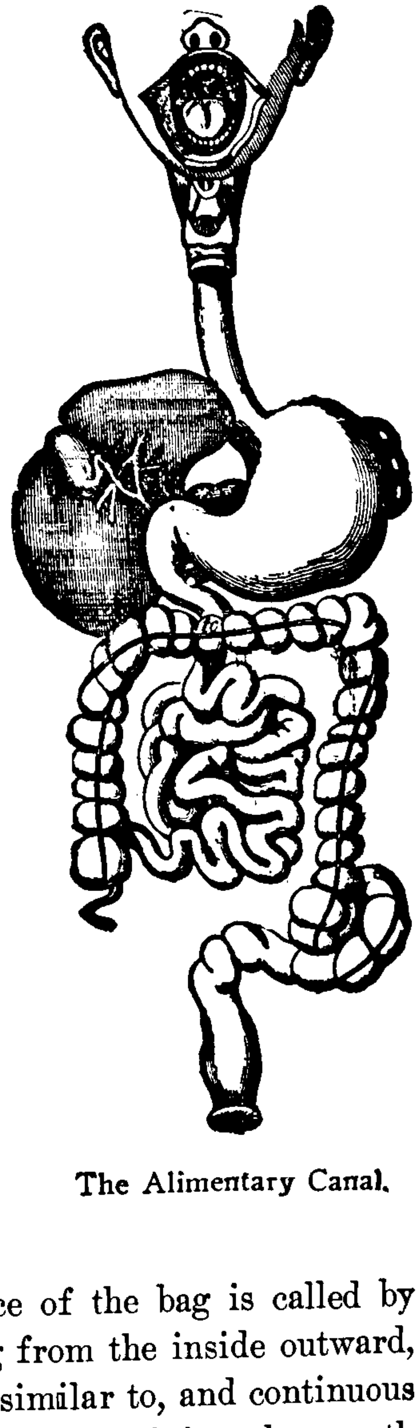
Quantity of Saliva.—In the human being, the saliva is produced in the quantity of nearly four pints daily during health; but the secretion of this very important agent in the digestive process is powerfully affected by mental emotions, such as fear, anger or pity, and it is also largely influenced by certain medicines, such as belladonna or deadly nightshade, even in comparatively small doses.

THE ACT OF SWALLOWING.

Operation of the Muscles.—The entire process of swallowing is a series of associated muscular acts, quite independent of the force of gravitation, as may be seen in animals drinking with their heads downwards. Although these complex movements follow each other without any check or pause, it is common to divide them into three stages, the first of which is the voluntary one of pushing the mass of chewed food back to the upper part of the throat or pharynx, so that it is grasped by the involuntary muscles, which send it on downward to the stomach. This operation the muscles which form the tube called the throat or gullet accomplish by relaxing in front of the morsel of food which is being swallowed and contracting behind it. The adjoining figure exhibits the deep muscles of the cheek and the pharynx with adjoining parts. The circular muscle of the mouth (1) and the buccinator or trumpeter's muscle (2) help the tongue to push the food back to the upper margin of the gullet, where it is seized upon by the three constrictor muscles (3, 4 and 5) of the pharynx, and pushed down the gullet or œsophagus, which is represented as being cut off at 6.

The Glottis.—In front of the pharynx is an opening into the windpipe named the glottis, through which we breathe, but which must, of course, be closed during the operation of swallowing, in order to prevent our food from dropping into it.

The Gullet.—The gullet or œsophagus is a muscular and membranous tube, about nine inches long, which if dissected out would look very much like a thin piece of rubber hose, such as is used for watering gardens. Its duty is to carry the food from the pharynx to the stomach, and in order that it may not get stopped up by food getting wedged in it, this pipe, in consequence of its muscular structure, has the power of contracting itself in successive portions from above downward, so as to push onward the articles of diet which are being swallowed.



The Alimentary Canal.

THE STOMACH.

Shape.—The human stomach is a somewhat egg-shaped bag, the walls, as the substance of the bag is called by anatomists, of which are made up first, counting from the inside outward, of a layer or coat of mucous membrane which is similar to, and continuous with, the moist red mucous membrane which we seen lining the mouth and throat. Outside of this is a coat of muscular fibres, some running around and others diagonally across the sack, and then outside of these again is a layer of membrane or skin.

Stomach Communication.—The stomach communicates, at its upper part on the left side of the body just below the heart, with the gullet, which opens directly into it, and it empties itself, on the right side, into the upper portion of the small intestine, through a sort of valve, which has received the name of the pyloric orifice, because the word pylorus means a janitor or gate-keeper.

The arrangement of the stomach and other portions of the digestive apparatus, or alimentary canal, or alimentary tract, is well shown in the foregoing figure.

Gastric Juice.—The whole of the mucous membrane, or inner lining of the stomach, is filled with glands, somewhat similar to the salivary glands, but so small that they can scarcely be seen with the naked eye. These glands all open into the cavity of the stomach, and their business is to manufacture, from the blood which flows around them, in a network of fine blood-vessels with very thin walls, that important fluid, the gastric juice, remarkable for having such a wonderful solvent power upon the meat, eggs and other foods which constitute what is called the nitrogenous portion of our diet.

Quantity of Gastric Juice.—The quantity of gastric juice very much exceeds that of the other digestive fluids, being about a gallon and a half every twenty-four hours.

THE LIVER.

This is the largest organ in the body, being situated below the right lung. Its office is the secretion of another digestive fluid known as bile.

Bile.—About one quart of bile is daily produced, it being intimately connected with the digestion of fats. Interference with its proper secretion is largely concerned with the production of constipation and the train of symptoms ordinarily known as biliousness.

THE PANCREAS.

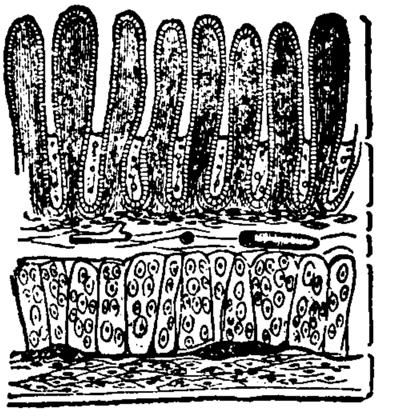
The pancreas is a long, thin gland, situated behind the stomach, and constituting, in the ox, part of what is sold under the name of sweetbread.

Pancreatic Fluid.—This is secreted daily to the extent of about a pint and a half. It supplements the action of the saliva and the bile by helping to dissolve the starchy materials and to finely subdivide the fatty substances.

THE INTESTINES.

The small intestine is a membranous pipe or tube about twenty feet long, but twisted and looped together in such a way as to occupy only the small space of a few inches in the cavity of the abdomen, which forms the lower half of a person's trunk, or body, as it is often called, in contradistinction to the limbs and head. This tube is continuous with the pyloric opening of the stomach at its upper end, and at its lower extremity empties into the side of a much wider membranous tube, about five feet in length, called the large intestine.

The Large Intestine.—Most of the large intestine has received the name of the colon, and it may be justly compared to the main sewer of a city, into which pass all the waste refuse and foul materials which are of no further use, and must be gotten rid of as soon as possible.

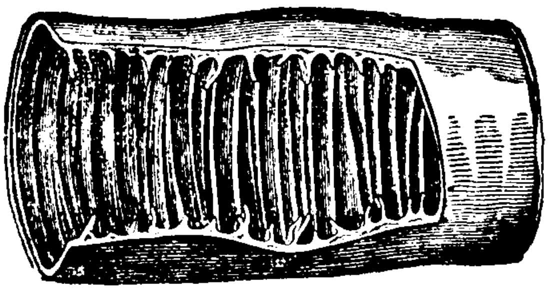


Villi of the Small Intestine.

STRUCTURE OF INTESTINAL CANAL.

Mucous Membrane.—The whole intestinal tube is lined with a mucous membrane, and in the small intestine this has its inner surface covered with hundreds of thousands of little tongue-like projections called villi. These villi are represented as they appear when highly magnified in the marginal illustration, which is a diagram of a thin slice cut lengthwise from the wall of the tube.

Folds of Membrane.—Although the intestinal canal is so prolonged as to measure, when stretched out, over twenty-five feet, its internal surface is not sufficient to perform all the work of absorbing the digested materials of diet. Hence, the lining mucous membrane is thrown into folds, as shown in the appended wood-cut, simply in order, it appears, to afford surface enough for absorbing all the nutriment from the articles of food, and so disposing of the substances we swallow to the best and most economical advantage.



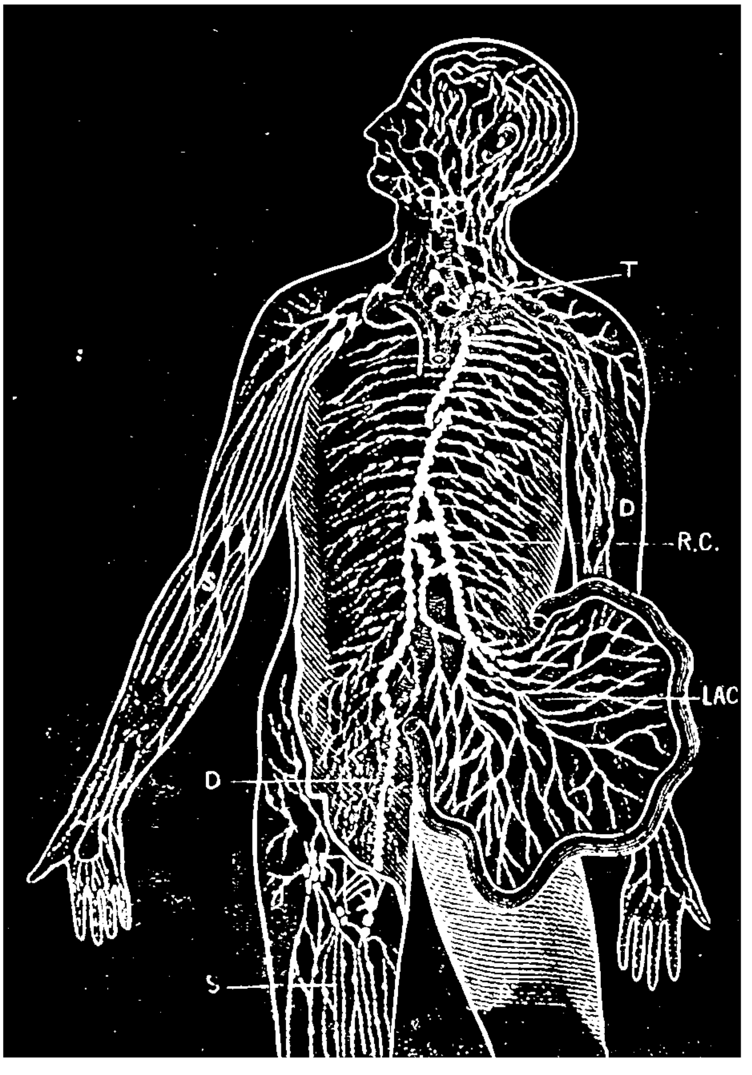
The Valvulæ Conniventes, or Folds of the Intestines.

ABSORPTION AND ASSIMILATION.

In order that the food-stuffs, when altered by the digestive process, may be of any real use to the animal economy, the nutritive materials must be distributed through the different tissues and organs of the body.

Digestion Not Sufficient.—The mere digestion of food is by no means sufficient, and no matter how much we eat, it would accomplish nothing toward keeping our muscles, hearts and brains in active operation, unless food-elements were absorbed after digestion into the blood, and assimilated from it into the very structure of all the different portions and organs of the animal frame.

The Lymphatics.—As shown in the adjoining illustration, the lacteals, LAC., which take their origin in the villi of the small intestine, converge and unite together, meeting the combined lymphatics of the lower extremities in a kind of bag, called the receptacle of the chyle, which is situated deeply in the abdomen and in front of the spine, near its middle. From this the mingled chyle and lymph are carried along the thoracic duct, up to the root of the neck on its left side, where they are poured into the large veins, and so mix with the blood and become a part of that vital fluid.



The Lacteals and Lymphatics.

Distribution of Nutriment.—The nutritious principles of the food having been absorbed by the lacteals and carried onward by the lymphatics to the general circulation are now distributed to the various organs by the blood.

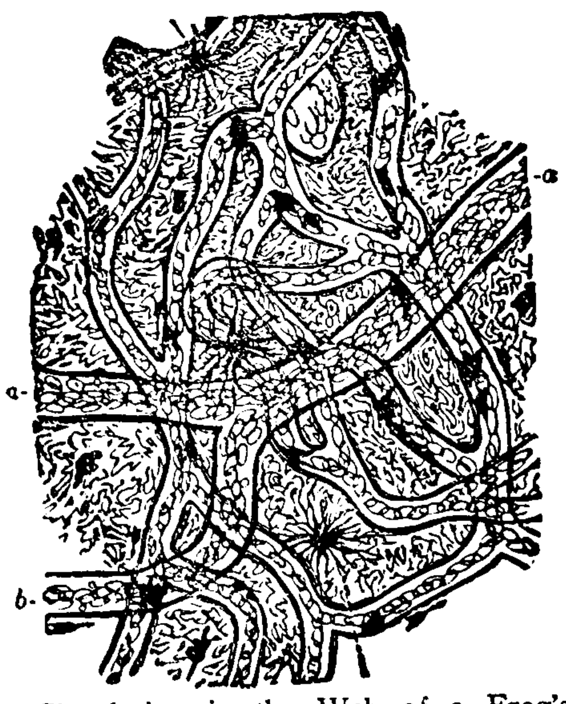
THE CIRCULATION.

Through these channels the blood is kept in constant motion by the action of a muscular pump, the heart, first passing into strong-walled branching arteries, the walls of which gradually become thinner as the branches grow smaller. These end in a network of delicate capillaries, or hair-like tubes, through which the crimson tide flows slowly into the wider, soft-walled veins, appointed to carry it back to the heart, and thus complete the round of the circulation.

Blood Function.—In its course, it receives the nutritive materials from the stomach and intestines after digestion, the special products of the liver, spleen and the lymphatic glands, and the oxygen absorbed from the air in the lungs. It therefore contains and carries to their destination all the materials required for the chemical and vital changes of the various tissues necessary to life.

Waste Material.—While passing through the capillary networks of the different organs and structures, it takes up the waste materials resulting from the wearing out and decay of these portions, and carries them to the proper point of escape from the body, as, for example, the kidneys or the bowels; at the same time the nutriment needed to rebuild the worn-out organs is allowed to ooze through the delicate vessel-walls of the capillaries, and be diffused into the surrounding tissues.

Capillaries.—In the human being it is difficult to demonstrate the circulation of the blood in the capillaries, but the fineness of their network and the pressure of the blood which is kept up in them to force along the vital fluid may be readily shown by pricking the finger with a needle, the point of which, no matter how small it is, can scarcely fail to penetrate some minute blood-vessel, and let out a tiny drop of crimson blood. This wonderful arrangement can be most conveniently demonstrated in the thin membrane of a frog's foot, stretched out under a microscope magnifying two hundred times.



Circulation in the Web of a Frog's Foot.

Arteries and Veins.—Of the two sets of blood-vessels, the arteries, which convey the blood from the heart to the tips of the fingers and the ends of the toes, carry bright scarlet blood, and are generally deeply seated in the interior of the body and limbs, so as to be, as far as possible, out of harm's way. The veins, which lie more generally near the surface of the body, as, for example, just beneath the skin on the back of the hand and arm, are filled with dark purple blood, which is much less pure than the arterial fluid, because it contains large amounts of the broken-down materials, the ruins, as it were, of the various bodily organs, which are now on their road to be thrown away out of the system through the lungs, the kidneys and the bowels.

The Heart.—The heart has small chambers at the upper part to receive the blood, and larger, thicker chambers at the lower end, called ventricles, to pump it out. The human heart is also double, having a right side made up of a moderately strong auricle and ventricle, to send the blood to the lungs, and a powerful left side or left heart, with a thicker auricle and a very thick, strong ventricle, to drive blood to all other parts of the body.

The Illustration.—This arrangement of the two independent sides of the heart will be better understood by the aid of the diagram in the margin, which represents the two sides of the heart as separated, as they are in reality in the human breast, although there fastened together and apparently forming but a single organ. The arrows indicate the direction of the blood-current in the entire round of its circulation.

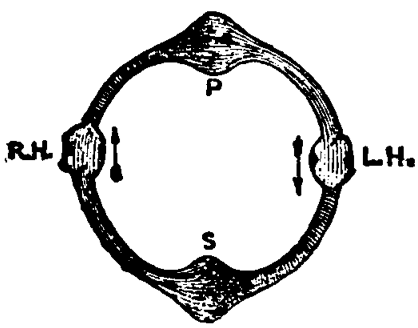


Diagram of the Circulation.

Shape of the Heart.—The human heart is a pear-shaped muscle, about the size of the fist, hollow, like a bag, but with very thick walls. It is divided inside by fleshy and membranous partitions into four parts, very much as a four-roomed house is divided into rooms by its ceiling and partitions, with communicating doors through each of the latter.

The Valves.—The valves consist of a skin or membrane hung across each side of the opening between the chambers of the heart, like curtains, in such a manner that the blood, in running one way, presses them flat against the sides of the hole, and then, as the heart's contraction attempts to drive the vital fluid back again, some of the blood is forced in behind the curtains, and swelling them out so that they meet in the middle, makes them entirely shut off the return-current of the blood.

Pulsations.—The throbbing of the heart may be felt on the left side of the body, near the lower edge of the ribs, and the beating of the pulse, which in health corresponds to the pulsations of the heart, at the wrist and over the course of large arteries elsewhere, when situated sufficiently near the surface.

Number of Beats.—In adult men these beats usually number about seventy, in women about seventy-five, and in children still more frequent; in infancy being about one hundred and twenty in a minute, and decreasing in frequency with increasing years. Within the limits of health the heart's action may vary considerably, some habitually having a rapid and others a sluggish pulse, when in the same individual such conditions as exercise, emotion, depression or even the process of digestion, may decidedly modify its frequency.

Course of Circulation.—The left side of the heart, marked L. H. in the figure, pumps the blood into the systemic arteries, and thus keeps these vessels over-filled; the larger systemic arteries, A., by their elasticity, exert continuous pressure on the blood with which they are distended; the smallest systemic arteries, A′, by their vital contractility, check and regulate the amount of blood flowing out of the larger arteries into the capillary network, and thus keep up the constant pressure or tension in the larger arteries; the systemic capillaries, marked S. C., are the portions of the vascular system where the great operations of the blood are carried on, that where the worn-out particles from all the tissues of the body are removed and the new atoms for rebuilding these same tissues are supplied; the wide systemic veins, V., are the passive channels conveying the impure blood back to the right side of the heart; the right or pulmonary side of the heart, R. H., pumps the blood into the arteries of the lungs and distends them, though less fully than is the case with the systemic arteries; by the pulmonary arteries, P. A., the blood is carried through the pulmonary arterioles or smallest arteries, P*a,* to the pulmonary capillaries, P. C., where it is exposed to the inbreathed air and exchanges its poisonous carbonic acid for the active life-giving oxygen; the letters L*h* indicate the lymphatics, ending in the thoracic duct, as already described, and receiving in their course the lacteals, L*c,* which absorb the nutriment of the food from the stomach and intestines, designated by I. in the diagram.

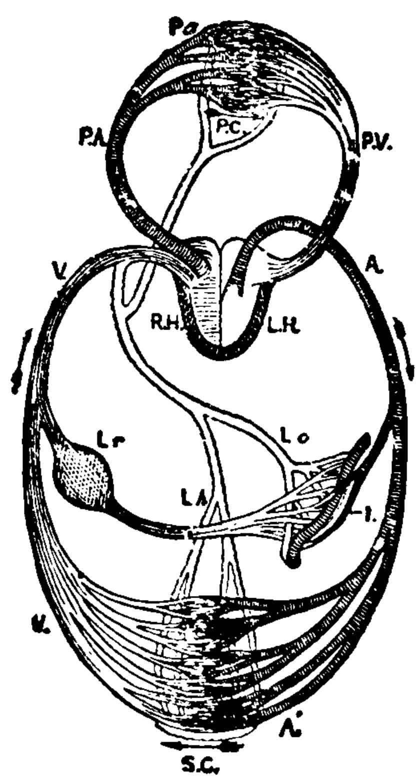
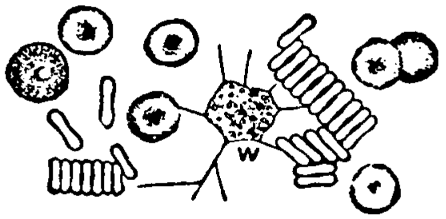


Diagram of Both Circulations.

Description of Blood.—Human blood, when exposed to the air, from which it rapidly absorbs oxygen, is of a bright scarlet color; but when deprived of oxygen it is dark purplish-red. This difference is the great characteristic distinguishing arterial from venous blood, and should always be borne in mind when attempting to staunch the bleeding from a wound, since entirely different treatment is needed in the two cases.

Red Corpuscles.—The blood is not a red fluid, as it appears to be when first shed; it is composed of a watery portion, called the plasma, which has a light yellow color, and an immense number of minute corpuscles, which give to the blood its crimson hue. These little bodies, which are called the red blood corpuscles, are exhibited in different positions in the accompanying cut, as they appear when highly magnified; the illustration also shows two white or colorless corpuscles, one on the extreme left in a rounded condition, and the other at W, misshapen and entangled in some fibrin threads.



Red and White Blood Corpuscles.

CLASSIFICATION OF FOODS.

The foods may be divided into the following classes:

1. Nitrogenous substances, or proteids, which go to form the tissues of the body, and are represented by meat. eggs, the casein of milk, and other substances consisting chiefly of albumen.

2. The fatty or heat-producing aliments, which are derived from both the animal and vegetable kingdoms, although chiefly from the former; they include the animal fats, such as lard or suet, butter and the vegetable oils, among which that from the olive is the one most consumed by civilized man.

3. The carbo-hydrates, of substances containing carbon and hydrogen without nitrogen; these are the saccharine or sugary, and the amylaceous or starchy ingredients of human diet, comprising therefore sugar, molasses, bread, potatoes, beans, etc.

4 The saline or salty articles, consisting largely of common kitchen salt, with potash, lime, magnesia, and a little iron in various combinations. These ingredients of the human body, small as some of them are in amount, possess a very great importance.

Animal Food.—When men are called upon to perform any extra amount of severe labor, involving great muscular exertion, there is no doubt that an additional supply of meat is of great service.

Fatty Foods.—In regard to the functions of the fatty constituents of food, we may at once conclude that, since the diet resorted to by inhabitants of cold countries invariably contains a large proportion of fatty ingredients, these elements play an important part in the maintenance of animal heat. Indeed, it has been demonstrated by experiment that the respiratory or heat-producing powers of fat are two and a half times greater than are those of the vegetable hydro-carbons, such as starch or sugar.

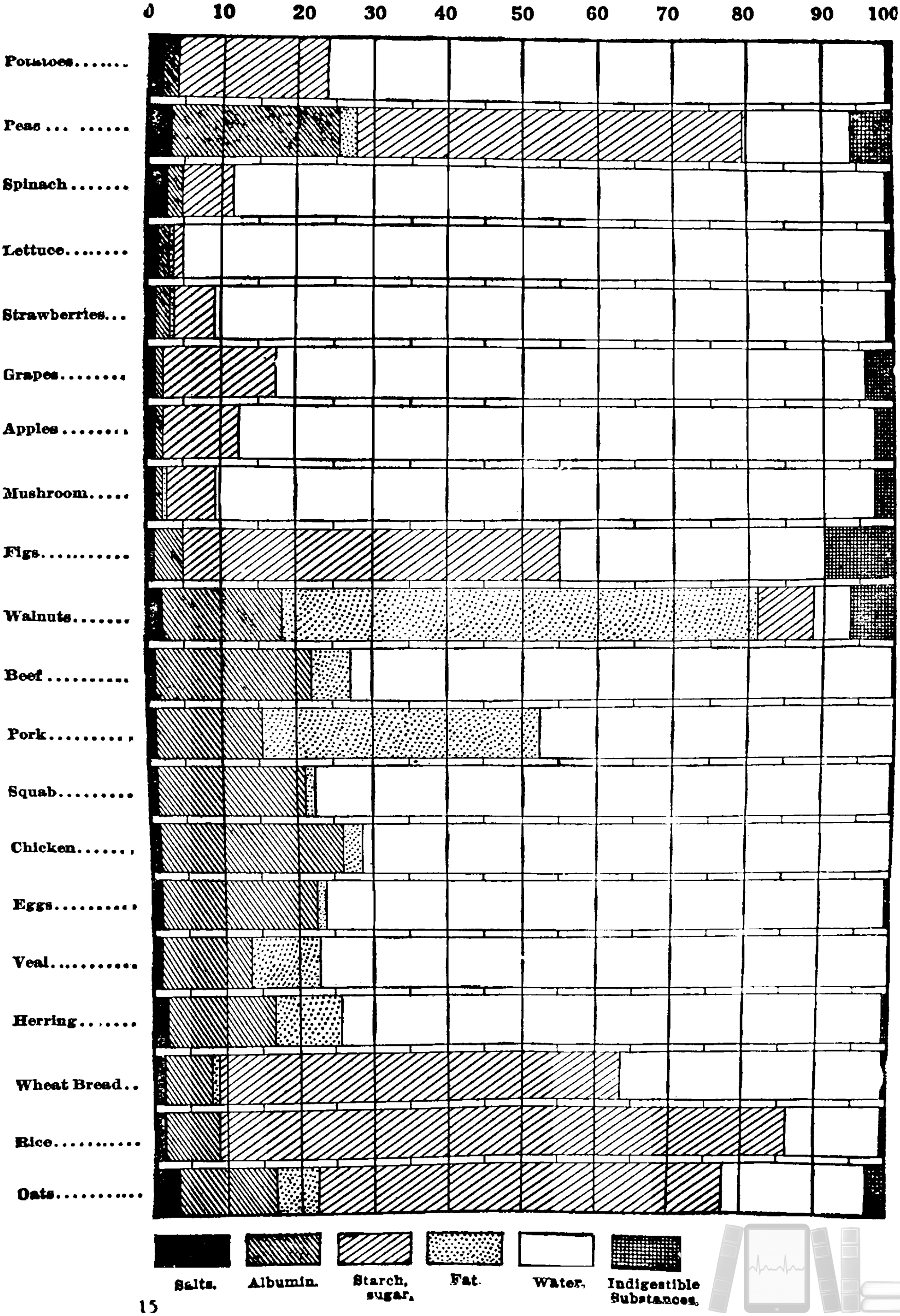
Saccharine and Starchy Foods.—The saccharine and starchy constituents aid the fatty matters in developing animal heat, although they are much less efficacious in this respect. Starch is, however, capable of being rapidly converted into fat by the wonderful operations of nature's laboratory, as we see in the process of fattening pigs upon corn for market, and in this way a large store of the best heat-producing materials may be laid up in the system as a provision for the winter's cold.

PREPARATION OF FOODS.

Soups and Broths.—Where economy of nutriment is an important object to be attained, it is probable that the production of broths and soups, from vegetables and meat in combination, affords many and great advantages. In making nutritious broths with a fair allowance of butcher's meat, it is advisable, when possible, to cook the vegetables separately, and the meat, if intended to be eaten with the soup, should be cut up into small pieces. In any case, the meat should be put into cold water, but should not be boiled, except when the vegetables are cooked in the same utensil, a temperature of about 150 degrees Fahrenheit being quite sufficient. If the meat is plunged into hot or boiling water at the outset, the external layer of albumen is coagulated, and the juices are prevented from exuding.

Boiled Meat.—In boiling meat, on the other hand, when the object is to retain as much as possible of the soluble juices in the meat, the piece ought to be of good size, and it should at once be plunged into boiling water, to coagulate the outside albumen. After being kept boiling for about five minutes, the saucepan should be placed aside, and the temperature allowed to lower gradually; or it may be lowered by the addition of three pints of cold water to each gallon of boiling water.

Boiled Fish.—In boiling fish, the addition of salt makes the flesh


0
10
20
30
40
50
60
70
80
90
100
Potatoes
Peas
Spinach
Lettuce
Strawberries
Grapes
Apples
Mushroom
Figs
Walnuts
Beef
Pork
Squab
Chicken
Eggs
Veal
Herring
Wheat Bread
Rice
Oats
Salts.
Albumin.
Starch, sugar.
Fat.
Water.
Indigestible Substances.

firmer and more retentive of the flavor. In cooking green vegetables, they should first be carefully washed in cold water, but not allowed to remain in it, then plunged into boiling water and cooked rapidly. Potatoes should be boiled in their skins, and after boiling for about five minutes most of the water should be poured off, and then the potatoes should be steamed.

Roasted Meat.—In roasting meat, the joint should be placed at first before a brisk, hot fire, with a view, as in boiling, to coagulate the outside albumen, and then the roasting may be conducted more slowly.

Stewed Meat.—Stewing has this advantage over dry-baking—that there is no risk of charring, and the meat is rendered juicy and tender. Tough and strong-flavored meats are, perhaps, best cooked in this way, because they can be rendered very palatable and digestible by the addition of vegetables and seasoning.

Fried Meat.—Frying is even worse than baking, unless very carefully done; but broiling on the gridiron is an excellent way of cooking chops, steaks, kidneys and small dishes of fish or fowl.

RELATIVE DIGESTIBILITY OF FOODS.

Not until 1825 was the question of the relative power of the stomach to digest different foods satisfactorily demonstrated.

Liquids.—Liquid, such as water, both pure and when containing a small amount of nutriment in solution, as is the case with beef-tea or broth, are often quickly absorbed by the lining membrane of the stomach, very much as water is sucked up by a sponge, and pass directly into the blood.

Milk.—Milk is usually coagulated or clotted as we see it when curdled by rennet, which is the dried stomach of the calf, by one of the ferments in the gastric juice, but it is commonly soon dissolved again and absorbed.

Bread.—Wheat-bread composed, as already mentioned, chiefly of starch, cannot be regarded as holding a place among the quickly digestible foods, since it has been found to require nearly three hours and a half for solution.

Eggs.—Eggs, if eaten raw, may be digested in two hours, but if boiled soft may take three hours, and if hard boiled or fried, require three and a half hours for digestion.

Meats.—Meats of various kinds differ a good deal in their digestibility; thus, for example, boiled turkey has been found to disappear from the stomach in about two hours and a quarter; boiled lamb in two and a half hours, and roast beef in three hours; while fried pork requires over four hours, and roast pork five hours and a quarter for complete digestion.

Fish.—Fish prove, as a rule, more easy to digest than meats; and the ordinary vegetables present less difficulty to the action of the stomach than bread, boiled rice being particularly manageable and requiring only about an hour for its entire solution.

Rules Regarding Meals.—In regard to the periods for eating, experience proves that habit is one of the most important agents in determining the times we ought to partake of nourishment. When a systematic regularity in respect to the period when we introduce food into the stomach is observed, the digestive processes are all better accomplished, and the food is more thoroughly and completely assimilated, than when meals are eaten irregularly.

Time for Meals.—The prevailing custom in this country is to breakfast, soon after rising in the morning, on food nourishing enough to repair the exhaustion consequent upon the long fast of the night, and yet not so heavy as to overload the stomach during the morning, when the most active exertion of the day is usually performed. Whether the most substantial meal be taken at mid-day or in the evening must depend largely upon individual preference, convenience, occupation, and so forth.

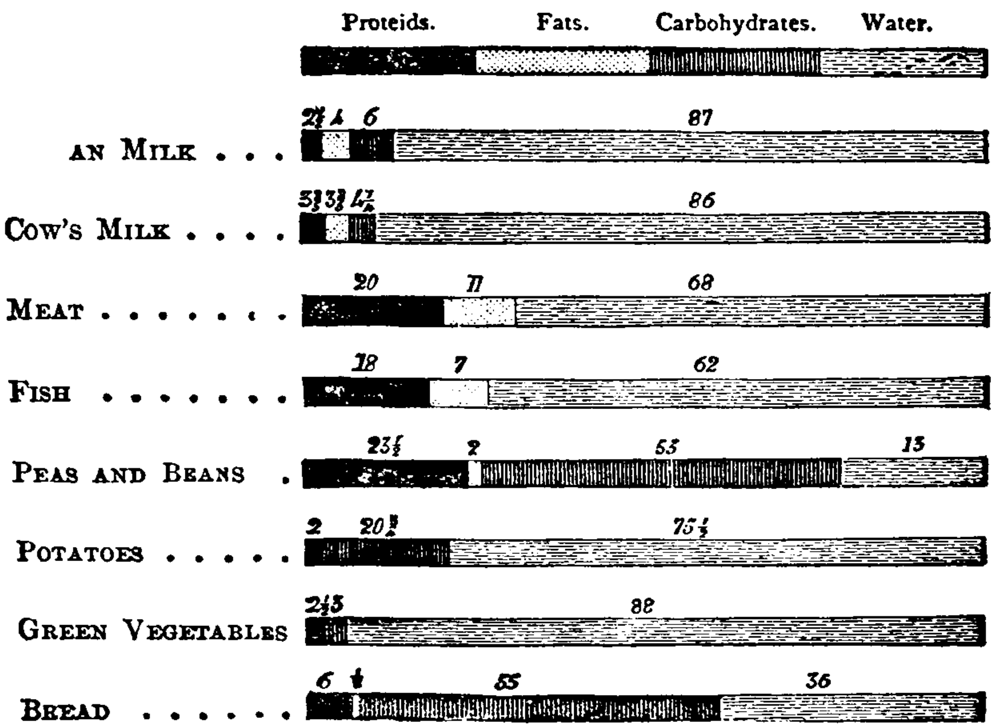
Exercise.—A very deliberate walk for half an hour or so in the open air, when the weather is not too cold, accompanied by the stimulus of cheerful, but not exciting nor absorbing, conversation, is a material aid to digestion.

Thorough Mastication.—As already indicated, the thorough mastication of articles of diet, especially by the third set of teeth, is essential to proper digestion, because, during this process of chewing, nature intends not only that the alimentary substances shall be broken up into a coarse powder, but also that this powder shall be completely mixed with the saliva, which has a powerful influence in preparing the starchy ingredients for solution. Hence persons should eat very slowly, chew thoroughly and move the mouthful of food freely about from one cheek to another, in order to amply impregnate it with the fluids of the mouth, and this precaution is particularly valuable when the food happens to be less digestible in quantity or quality than is customary.

The diagram on following page shows the percentage of the different nutritious elements of food in eight of the common articles of diet.

Effects of Overeating.—An English observer has calculated that for every death from starvation, seven occur from the effects of over-indulgence in food. When the stomach is overloaded with food beyond its power of digestion, nature often relieves the abused organ by the process of vomiting, which no doubt frequently saves people who violate the laws of hygiene in this respect from the penalty of death, or at least of prolonged illness. When, however, the digestive organs are not unloaded in this manner, the ordinary chemical changes, which occur in warm, moist animal and vegetable matter outside of the body, set in, and fermentation or putrefaction occur, large quantities of gas being sometimes produced.

Excess of Nitrogenous Food.—When a superabundance of proteid substances is eaten, and perhaps imperfectly digested, whilst at the same time, as often happens, a diminished quantity of exercise or labor is performed, there must almost necessarily be a disproportion between the oxygen inhaled by the lungs and the nitrogen absorbed from the food, when they



Constituents of Foods.

meet in the blood, and therefore a disturbance of the assimilative processes. It is probable that gouty and perhaps rheumatic affections arise partly in this way, although the direct influence of certain alcoholic drinks in producing gout is indisputable.

Excess of Starchy Food.—Superabundance of starchy articles of diet appears to be less directly hurtful to the system, because a larger proportion of the excess passes off from the bowels in an unchanged condition.

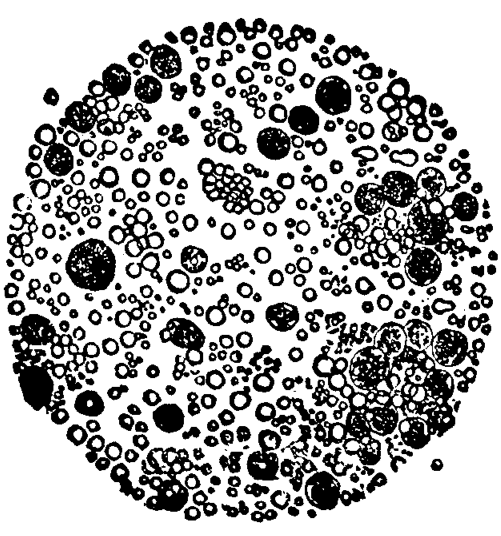
Troublesome corpulence may sometimes result, however, from eating too much starchy food, and it has been supposed that attacks of diabetes, a disease which is characterized by the presence of sugar in the urine, are occasionally due to the same error in diet.

Contaminated Food.—Food is often rendered unwholesome and unfit for use by inherent disease by contamination with poisonous substances and by putrefactive changes. Moreover the peculiar power of absorption possessed by some foods, as milk, pineapples and bananas, is capable of causing the transmission of certain diseases.

Decomposing Food.—Decomposing food may give rise to alarming and fatal poisoning through the absorption of septic materials into the system. It is probable that where chemical analysis fails to reveal a cause for death, many cases giving evidence of violent gastro-intestinal inflammation or of profound impression of the nerve centres, are in reality due to such causes.

Meat of Diseased Animals.—The meat of animals affected with such diseases as pleuro-pneumonia, murrain, anthrax, tuberculosis, Texas cattle fever and parasitic affections, as tape worm and trichiniasis are unfit for food, and precautions should be observed to guard against their employment.

Adulteration of Milk.—The results of the adulteration of milk are mainly those caused by withholding certain nutritious principles from the food supply. Their evil effects are seen particularly in infants fed upon cow's milk, who are thus deprived of much that is necessary to their subsistence and growth. The skimming of milk, or the addition of water, are alike productive of this result.



Human Milk Containing Colostrum Corpuscles.

Transmission of Disease by Milk.—The results of investigation into the causation of numerous epidemics and isolated cases of contagious diseases have shown conclusively that some of these are capable of being conveyed through the agency of milk. By carelessness in cleansing dairy utensils, by feeding cows with contaminated food and watering them from stagnant or infected pools and by exposing the milk to foul and poisonous emanations, milk may become a source of danger to those who take it. Among the diseases which have been often spread in this way are the following: Tuberculosis, typhoid fever, scarlet fever, diphtheria, and so forth.

INDEX TO PART V OF BOOK III

Preventive Medicine

Outward Enemies to Health

Part V of Book III deals briefly with many outward enemies to health, such as light, heat, climate, soil, etc.

SUBJECTS OF THE TEXT

PREVENTIVE MEDICINE

PART V.

OUTWARD ENEMIES OF HEALTH

Heat and Disease.—Heat becomes a predisposing cause of disease as soon as the temperature rises above 70 degrees or 80 degrees. When it begins to affect healthy life the pulse, the heart action and respiration are quickened. The skin and lungs are unable to equalize temperature, and the condition of the entire body becomes one of susceptibility to disease.

The Sun's Heat.—Exposure of the body for long periods to the heat of the sun is apt to result in more or less serious disturbances, such as congestions, brain hemorrhages, meningitis, etc. Hence the need of protection against the direct rays of the sun.

Sunstroke.—Sunstroke, or thermic fever, is the result of exposure to heat rays. Its early symptoms are faintness, thirst, great heat and dryness of skin, with prostration. As quickly as possible the body should be subjected to the ice or cold water treatment to neck and head.

Traveling in Hot Climates.—Do not travel during the heat of the day. Protect the person by some covering which will deflect the sun's rays. Rest during the mid-day hours. Content yourself with a scanty, unstimulating diet. Use gently stimulating baths. Wear thin, light, loosely-fitting clothes.

Cold as a Disease Producer.—Cold becomes a disturber of bodily function as soon as it falls to a temperature which ceases to be agreeable. The tissues shrink, the capillaries grow sluggish, perspiration is suppressed, sensibility is impaired.

Sudden Cold.—Sudden falls of temperature are marked by a long train of diseases, or by aggravated or fatal turns to existing diseases. This is particularly true of consumption, catarrh, influenza or grippe and bronchitis.

Cold and Elderly People.—From thirty years on the human body begins to draw on its surplus power. This power is constantly diminishing as we age. Hence cold affects the aged most seriously by calling largely on a diminishing power. It is difficult to sustain a "blood heat."

Cold and Perspiration.—Cold produces disease by checking perspiration, thus preventing the escape of injurious materials from the blood, and throwing more work on kidneys and lungs, which often become overtaxed.

Cold and the Blood.—Cold tends to drive the blood from the blood-vessels to the surface, thus filling one or more of the circulating organs too full of blood. If any of these vessels be weak the man is handicapped in his battle against disease.

Clothes.—The body loses heat by radiation, by evaporation, by rapid air movement. Hence the necessity for clothing, which cuts off radiation of heat, interferes with the evaporation from the body, and limits the conduction of heat by rapid air movements. Clothing, therefore, plays a most important part in warding off diseases and disease-producing conditions.

Regulation of Clothing.—Garments worn next the skin should be of wool or silk, as best absorbents of perspiration, and as non-conductors of heat. Weights may be light or heavy according to the seasons or different constitutions. White or gray clothes are preferable to black, when one is subjected to direct solar heat.

Poisoned Clothing.—Clothes made of dyed materials are sometimes injurious to health, as containing poisons. This is particularly so of bright colored stockings or underclothing.

Local Injuries.—Cold gives rise to painful local affections, such as frost-bite and chilblains, the former involving the nose, ears and fingers, the latter the feet. Heat applications in any of these cases must be avoided. The cold treatment is best.

Light.—Light has a powerful effect on the system, through both the blood and nerves. It is, therefore, an active agency in the generation of diseases and their cures. It is the essential of all growth, and particularly affects the outer tissues as well as the internal organization.

Light and the Eyes.—Light for the eyes should be carefully graduated, so as to prevent impairment of vision. It has the effect, if profuse, of rendering the eyes sensitive, so that they cannot bear the effects of even subdued daylight without pain.

Colored Light.—Many advantages are claimed for colored light. Blue and green lights are preferable to orange, yellow or red for the eyes.

Certain of the colored lights act beneficially on animal and vegetable growths, and have a great influence in hastening the cures of certain diseases.

Electricity.—Electrical conditions of the atmosphere have a direct effect on the human system. On the approach of a thunder storm, one may frequently notice a difficulty of breathing. Rheumatics are painfully affected, neuralgia is intensified. Many existing maladies are aggravated by electrical conditions.

Electricity in Medicine.—As a medical agent electricity has grown rapidly in favor. As a remedy for many nervous diseases and for pain the galvanic battery has come into quite general use. It is a clean, convenient and safe remedy. It is also economical, for the cost of an electrical machine is within the means of most every one, and it can be self-operated. For the X-ray consult index.

Climate, Soil and Health.—It is not alone in temperature that climates differ from one another, and are endowed with the power to check or engender diseases. Into its influences on the human body must enter all the manifestations of humidity, tempest, fog, dew and wind directions.

Diseases Affected by Climate.—Among the diseases favorably affected by a change of climate are consumption, bronchial affections, diseases of the throat, asthma, chronic gout and rheumatism, dyspepsia, kidney affections, especially Bright's disease, and neuralgia. The advantages of a climate where sea air abounds, or where the air is rarefied and dry, are fully recognized by medical men.

Soils.—These affect health in the most direct manner, and through their mineral, animal and vegetable matter, also their air and water. Diseases connected with moist soils are of almost every type, rheumatism, catarrh and typhoid being most general. Moist soils are favorite breeding places for germs affecting health, and drainage systems should be made as perfect as possible.

Contagion.—The subject of contagion is one of popular notoriety and apprehension. Certain receptive conditions, or a predisposition, the nature of which is as yet unknown, exist in individuals, which appear essential to the development of the specific poisons, and the establishment of the disease. An immunity against the repetition of a malady is generally conferred by one attack of a contagious disease. This safety has been proved real upon an enormous scale in regard to small-pox, and, in relation to the other contagious disorders, a belief in such immunity from second attacks is founded upon very extended observation; but the protection acquired by a first attack of any of these diseases is of no avail against the rest. Measles, for instance, renders the human body proof, as a rule, against measles, but leaves it as open to small-pox as before, and so on with all the rest.

Morbid Poisons.—With regard to the co-operative effect of fermentation, putrescence or decomposition there is some reason to believe that it may quicken the activity or facilitate the development of specific morbid poisons in the way of a predisposing cause to their reproduction. There is no small amount of circumstantial evidence tending to show that conditions of this kind may be thus favorable to the propagation of specific diseases, even to the extent of rendering them epidemics, in consequence of the predisposing agency of putrefying emanations.

INDEX TO PART VI OF BOOK III

Part VI of Book III deals with the Germ theory of disease, explains how germs propagate and grow and the necessity of sanitary measures to prevent infection from them.

ILLUSTRATIONS

PREVENTIVE MEDICINE.

PART VI.

THE GERM-THEORY OF DISEASE

Antiquity of the Theory.—In order to make the sanitary precautions thus rendered advisable clearly understood, it should be explained in the first place that the germ-theory of disease, traced by some to the celebrated Pliny, vastly extended by the renowned botanist, Linnæus, more than a century ago, since placed upon a scientific basis, particularly through the labors of the celebrated Pasteur, of Paris, and Professor Koch, of Berlin, to whom more than to all of their co-laborers in this important field belongs the honor of proving what had long been suspected, the relation of micro-organisms to disease, and removing this subject from one of theory to one of incontestable fact.

The Pasteur Controversy.—Without relating in detail the controversy that Pasteur's announcement made in 1857 that fermentation and putrefaction were brought about by specific ferments and that these were composed of living cells, it is sufficient to state that this assertion led the way for further investigation, discovery and proof, with the result that the micro-organisms causing the diseases of relapsing fever, discovered by Obermeier; that of typhoid fever, by Eberth; of diphtheria, by Loeffler; of cholera and tuberculosis, by Koch; of pneumonia, by Friedlander and Frankel, and the origin of many other diseases are now known as the result of the labors of other investigators, whose claims were subjected to the test of the laws formulated by Koch before their character was established as proven.

Germ Laws.—In substance these laws insist (*a*), "that in order to the acceptance that a specific micro-organism is productive of disease, it must be demonstrated. (*b*) That it is constantly present in the fluids or tissues of the individual subject to that disease. (*c*) Its absence from all other diseases. (*d*) Its isolation, growth and repeated cultivation on proper culture media. (*e*) Its power of reproducing the disease after inoculation in susceptible animals."

BACTERIA (See Adjoining Plate).

Bacteria (Greek, stick).—Bacteria are the diminutive organisms commonly called MICROBES (Greek, little). They are visible only under a microscope of high magnifying power.

Forms.—There are three recognized forms of bacteria.

Spiralus.—1. The spiral, or wriggling, form, the only form capable of progressive motion.

Bacillus.—2. The stick-like, or straight rod-like form, incapable of motion.

Coccus (berry).—3. Very like, when magnified, a period in print; incapable of motion.

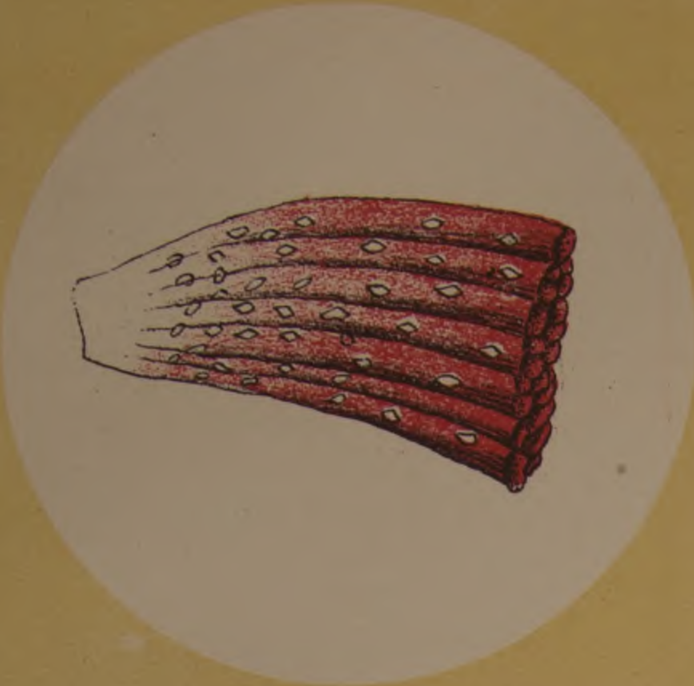
The Plate.—Upper left-hand object. The circle shows the size of the little drop of liquid subjected to the microscope. It is called the microscopic field. Within, in red, is a magnified section of human muscle. In its folds are seen, in white, the encysted spirala, called trichinæ (hairs). They are found in diseased pork, and enter man through the eating of raw or under-cooked pork. Thorough cooking kills them.

The Plate.—Upper right-hand object. This is the trichina magnified and more mature. It has taken on the spiral form, due to growth, and is consuming the muscle in which it is embedded.

The Plate.—Lower left-hand object. This shows (1) in white, four cells scraped off the intestines, in which cholera germs may lodge. The little dark objects are the spirala of cholera. They are found in the intestinal canal and feces of cholera patients.

Form.—They are short, comma-like elements, also in the form of U and S, and again long and spiral. They are capable of motion. They are cultivated in gelatin, agar-agar, blood serum, potato and bouillon.

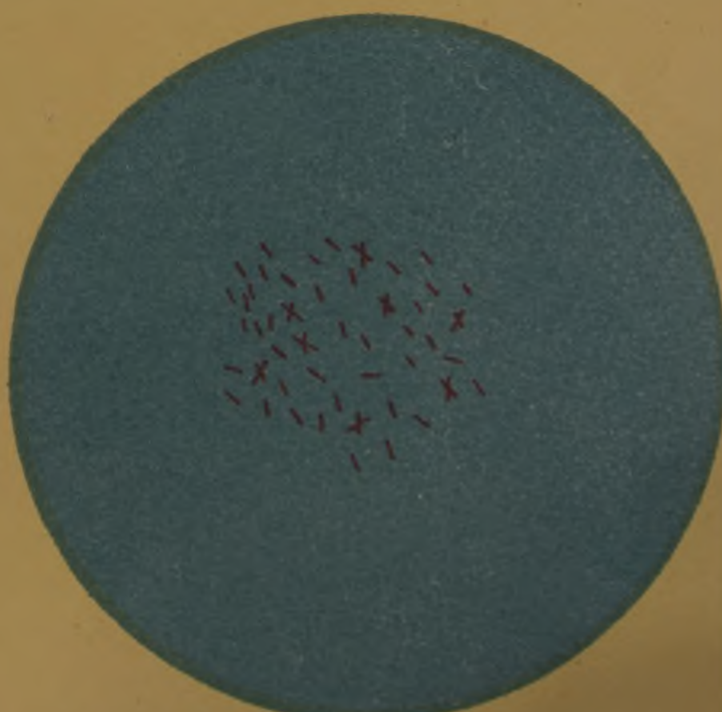
The Plate.—Lower right-hand object. This shows the bacillus of consumption (tuberculosis). It is rod-like in shape, slightly curved, and rounded at both ends. It is not mobile. It may be cultivated in blood serum, glycerine and agar-agar.



Encysted Trichina in Human Muscle
Double natural size.

Trichina in Human Muscle
Highly magnified.

The Cholera Germ and four Intestinal Cells
(Comma Bacillus)
Magnified to 400 Diameters.



The Fungoid Growth causing Consumption
(Bacillus Tuberculosis)
Magnified to 800 Diameters.

Results of Germs in the Body.—The results of the introduction of living organisms into the system are local or general; the local disturbances are of an inflammatory nature caused by mechanical irritations arising from the presence or activities of the organisms and are accompanied by proliferation of cells and the formation of new tissue.

General Disturbances.—The general disturbances may possibly result from (*a*) nutritive derangement; or (*b*) the organisms may cause innumerable foci of local inflammation, producing general disturbance, as for example in tuberculosis; or (*c*) by their activities of growth, reproduction, nutrition, etc., they may give rise to poisonous materials (ptomaines, toxalbumins, etc.), which act on the system as any general poison, malaria is probably an example of this class.

Period of Germ Ripening.—The period of incubation is the time between the introduction of the specific organism of a disease (exposure to small-pox for example), and the manifestation of its symptoms.

Increase of Symptoms.—The gradual increment of the symptoms is attributed to the progressive growth of the millions of minute fungoid plants, whose period of greatest luxuriance marks the acme of the attack, and the death and destruction of which correspond to the decline of the disease. The contagiousness of the communicable maladies is accounted for very beautifully by the existence of the immense number of bacteria forming the true seeds of disease, constantly produced, evolved from the affected individual, and carried through the air of a room or house either alone or attached to some of the innumerable epithelial cells, which are being rubbed off by millions from the surface of human bodies.

Absence of Second Attacks.—The general absence of second attacks is admirably explained by the hypothesis that the parasitic fungus on the first occasion has exhausted all, or nearly all, of some peculiar (unknown) organic ingredient in the body, which is absolutely requisite for its support, according to the very same law that will cause, as every farmer knows, his wheat to fail if he plants it repeatedly in the same ground and neglects to secure a due rotation of crops.

Transmission of Disease.—Hence, according to this doctrine, contagious diseases are conveyed from one person to another by the transplanting of miscroscopically visible organisms and spores or seeds which have a separate vitality of their own, each after its kind, and which are to be escaped just as one would escape hordes of animal or swarms of insect pests by shutting them out or killing them before they can succeed in fastening upon human bodies.

The Itch Germ.—It is curious how we have seen in regard to small-pox and diphtheria, etc., the same old battle fought which fifty years ago was so strenuously contested by Biett and Morgagni on the one hand, and the microscopists on the other, in relation to scabies or the itch, now universally admitted to be caused by a tiny insect which burrows beneath the human skin.

Size of Disease Germs.—As having an important bearing upon the hygienic precautions instituted, great benefit would probably result from its being understood by every man, woman and child that the contagion of small-pox, scarlet fever, typhoid fever, yellow fever, measles, diphtheria, cholera, and so on, is composed of exceedingly minute forms of life, so small that 25,000 of them, placed end to end, would measure less than one inch in length.

Multiplication of Germs.—Bacteria under favorable circumstances multiply with inconceivable rapidity, reproduction occurring most frequently by cell division; this is technically known as fission, constriction taking place in the centre of the cell, with ultimate separation at this point into two separate living beings; from one parent organism, maturity occurring in one hour, a progeny of fifteen millions is theoretically possible in twenty-four hours.

Nature's Law.—It is, however, probable that the same law of the prodigality of nature, exemplified in the spawn of the herring and salmon, holds good, and not more than one spore in a thousand, a million, or a hundred millions, perhaps, has an opportunity to reproduce its species.

Care Required.—As there is no doubt that the contagion of the diseases just enumerated may penetrate into your system by the air that is breathed, the food that is eaten, and especially the water that is drunk, it is obvious that only the most scrupulous care can save us from these extremely minute seeds, or insure their destruction after entrance into our bodies is accomplished. If these germs were singly disseminated, it would be almost impossible to avert constant infection; but as they generally are carried about by winds or currents in aggregations of thousands or tens of thousands, of course the chances of imprisoning them, or otherwise shielding ourselves from them, are largely increased.

Sanitary Regulations.—The obvious deductions from these facts tend to strengthen the urgent recommendations of sanitarians, that every effort should be made, first to prevent these morbific germs from being let loose upon the world; and second, when they have made their escape into the free air or water, to destroy all these forms of life that are likely to come in contact with unprotected persons—that is to say, human

PART VII OF BOOK III

Treats of the manner in which a house should be constructed to be thoroughly sanitary and shows the advantages derived from this method of construction.

PREVENTIVE MEDICINE.

PART VII.

HEALTHY DWELLING HOUSES

A healthy dwelling house is a very potent factor in the prevention of disease. If the house or its surroundings be unsanitary its inmates are subject to disease in many ways that would not otherwise occur, and therefore it is important that the sanitary or unsanitary condition of his abode should be considered by every householder.

SITE, CONSTRUCTION AND INTERNAL DECORATION.

Conditions of a Healthy Home.—The conditions necessary to insure a healthy habitation may be summarized as follows:

1. A site dry and not malarious, and an aspect which gives light and cheerfulness.
2. A ventilation that carries off all respiratory impurities.
3. A system of immediate and perfect sewage removal which shall render it impossible that the air shall be contaminated from excreta.
4. A pure supply and proper removal of water, by means of which perfect cleanliness of all parts of the house can be insured.
5. A construction of the house which shall insure perfect dryness of the foundations, walls and roof.

Choosing a Site.—The site for a dwelling is rarely selected from a consideration of the healthiness of the location, particularly in its relation to the conditions of the soil. Other considerations, often of an accidental character, more frequently determine the choice. And yet there is no more important subject to be taken into account in planning a house, none which demands a closer scrutiny, in view of its influence upon the health of the occupants, than the character of the soil in which its foundations are laid.

Effect of Soil on Health.—It is only within recent years that public attention has been generally directed to the important relationship existing between certain physical characteristics of the soil and health. The ground-air, ground-water and dampness have all been studied in connection with their agency in the production of certain diseases of common occurrence, and important facts have been arrived at, which are of great advantage in instituting measures for the preservation of health.

Diseases Due to Damp Soils.—Paroxysmal fevers, typhoid fever, bilious remittent fever, dysentery, diphtheria and cholera (during epidemics of that disease) have all been attributed to earth effluvia. It is a well-known fact that dampness of the soil will cause catarrhal affections. rheumatism and neuralgia.

Consumption and Damp Soils.—It has been clearly shown that dampness of the soil under houses is one of the chief factors in the production of consumption—that plague of our climate which destroys more lives than any other disease. Typhoid fever has also been supposed to be connected with changes in the water in the soil. A similar view is held with regard to dysentery, bilious remittent fevers and cholera. It is thus seen how potent are the influences of certain conditions of the soil in undermining health, and in causing disease, and therefore how important it is to use every means for protecting ourselves against these enemies of health.

The Air in the Soil.—All soils and most rock formations are more or less porous, and are capable of holding in their pores and spaces air or water, or both. When air as well as water is present, the soil is said to be moist. Only the hardest rocks are free from air. Gravel and loose sands are well known to be very porous, the latter containing often as much as half their bulk of air. The amount of air in some varieties of soft sandstones sometimes reaches 40 per cent.

Composition of Soil Air.—The composition of the air in the soil is variable, and differs widely from that of the free atmosphere. Carbonic acid in variable quantity is usually one of its constituents. The origin of this gas is supposed to be due to organic changes taking place in the soil itself. It cannot be derived from water precipitated from the atmosphere, as the amount of this gas in meteoric water is exceedingly small. Nor is it to be sought for in the ground-water as a source; but is most likely derived from the soil, and is imparted to the ground-water and ground-air simultaneously, but more freely to the latter on account of its greater absorbent capacity.

Sources of Polluted Ground-Air.—The ground-air contains more or less moisture, and is liable to be contaminated by effluvia and organic matter arising from the constituents of the soil. A frequent source of ground-air pollution in inhabited places is the impurities which soak into the soil from leaking cesspools and drains, from badly-constructed sewers, from leaky gas-mains, and from deposits of filth upon the surface of the ground.

Motion of Soil Air.—It is important to observe that the air in the soil is in continual movement. This movement is especially active in dry, porous soils. The motion of the air in the ground is caused by pressure of the atmosphere and wind against its surface; by changes in the temperature of the lower strata of the atmosphere and of the upper surface of the soil, by the rainfall, and by changes in the level of the ground-water; and to some extent by the operation of the law of diffusion of gases.

Closing of Ground-Pores.—At every rainfall, the pores of the superficial layers of the ground are closed by the inflowing water, so that the upward escape of the imprisoned air is hindered, while the rise in the ground-water exerts a pressure from the opposite direction; under the circumstances the ground-air seeks an outlet at the point of least resistance, and in many cases escapes into dwellings—the more freely, the more extended and copious the rainfall.

Currents in Ground-Air.—A current in the ground-air may be caused by local conditions; thus, a house artificially heated, being warmer inside than the external air, will cause a current of air to enter it from the ground on which it stands. Any impurities in the surrounding soil may find access to the house through this channel.

Coal-Gas in Dwellings.—Numerous instances have been recorded of the penetration of coal-gas into dwellings through the pores of the soil under the basement floors, the entrance of the gas being facilitated by the activity in the current of ground-air caused by the heated house. Ill-health, and even death, has been caused by gas escaping into houses in this manner. In the same way the air made noxious by the oozings from cesspools and broken drains, and by foul matters contained in the soil, may gain entrance through the foundation floors.

FEATURES OF A HEALTHY SITE.

A Clean, Natural Soil.—A clean, natural soil, such as is free as possible from those organic changes or processes which cause unhealthy emanations, should be the prime object in changing the location of a dwelling. No effort should be spared in improving the healthiness of a site. This may be accomplished by keeping the soil clean through efficient drainage, abolition of cesspools and other sources of filth-impregnation, and an abundant source of water for maintaining cleanliness in all parts of the house. And further, by making the ground floors and walls, as far as possible, impermeable to air.

Dangers of Made-Ground.—"Made-ground" is to be looked upon with the greatest suspicion. Such a soil, generally composed of the refuse of a town, is necessarily very impure, and a house built upon it is liable to be unhealthy. A process of purification by oxidization and the influence of rain naturally takes place in the course of time, but the uncertainty of the result should always be determined by an examination of the ground. It is, however, best to avoid such a location altogether.

Of Porous Soils.—Porous soils, such as those composed of gravel or rubble, are generally supposed to be healthy, but the assumption is not to be taken without qualification. The great facility which they afford for the circulation of air, and, through this medium, of conducting impurities for a long distance, aided by the suction power of the house, makes it essential that such soils, in order to be healthy, should be free from noxious effluvia and deposits of animal or vegetable matter.

Danger of Porous Soils.—Dry, porous soils, otherwise unobjectionable, may be the source of morbid exhalations. The ground in inhabited places, and even about isolated dwellings, often becomes impregnated with filth from sewers, broken drains, cesspools, and refuse heaps, which undergoes decomposition and gives rise to noxious gases which are dangerous to health in proportion to the degree of concentration.

Ferments in Soil.—Such a filth-sodden soil is, moreover, a convenient *nidus* for the production of those morbific ferments which seem to be connected with certain palpable organisms, which are looked upon as very important agents in the production of some of the common diseases that afflict humanity.

Diseases from Soil Emanations.—Among the diseases which have been attributed to emanations from the soil may be mentioned typhoid fever —

that scourge of the country as well as the city—cholera, fevers, dysentery and diphtheria.

To Prevent Soil Emanations.—As it is impossible to prevent the circulation of the air in the ground, structural devices must be employed to keep the soil-exhalations from rising up into the house. This is best accomplished by covering the entire site of the house with a layer of cement, concrete, asphalt or some other impervious material. A layer of concrete at least six inches deep, well rammed and well grouted with liquid cement, and made smooth upon the surface, makes a most satisfactory barrier to the ground-air and dampness.

PREVENTION OF SOIL EXHALATIONS.

Ground Air.—Every house should be protected from access of ground air. The selection of a proper site has much to do with this, but not all, for since it is impossible to prevent the circulation of ground air, certain devices must be employed to keep soil exhalations from rising into the house.

The Best Device.—The best device for this is to cover the entire site with a layer of cement, concrete, asphalt or some impervious material. A layer of concrete six inches deep, well rammed and grouted with liquid cement, is a most satisfactory barrier to ground air and dampness. Asphalt over concrete also affords an excellent barrier. Such a floor has the advantage of being free from cracks and holes which harbor vermin.

Dampness of Soil Injurious.—Dampness of soil is dangerous to health. A dry, porous soil with possibilities of natural drainage will be found to be salubrious. Elevation of site is an indication of the presence of this condition. A damp condition of soil may be kept up by injudicious planting of trees and shrubs too near the house or by neglect in diverting drainage to some distant outlet and thereby preventing its absorption by the soil.

House Aspect.—In choosing a house site preference should always be given to the aspect or exposure which gives most light and cheerfulness, insures free circulation of air without being subjected to violent gusts of weather and is defended as far as possible from North and East winds; a location free from mists and fogs, sudden shiftings of temperature and malarial and other injurious influences.

Removing Soil Dampness.—For a building to be healthy the subsoil water should never be allowed to rise to the level of the foundations. To prevent this ordinary land drainage pipes should be so laid as to carry off the subsoil waters into some sewer or other outlet.

Foundations.—Foundation walls should be composed of the best materials and to prevent moisture being absorbed by the materials, thereby injuring the walls and timbers and rendering the atmosphere within unhealthy, a damp-proof course of some impervious substance like cement should be built in the wall just above the surface of the ground.

External Walls.—The walls of a house are sometimes rendered damp by exposure to continued wet weather. Various means have been employed for protecting the outside walls in exposed positions. Smooth, hard bricks, glazed bricks, slate, cement, weatherboards and tin have all been satisfactorily used for this purpose and under a variety of circumstances. Some walls are improved by a coating of good paint, but its frequent renewal makes it expensive. Hollow walls are not infrequently constructed as a protection against dampness. Two parallel walls are constructed with a space between them three or four inches wide and joined together with bonding-ties of iron or stoneware. By this plan not only is dampness excluded but a more equable temperature is maintained in the house.

Construction of External Walls.—Whatever be the material chosen for the external walls it should be of the best quality and well put together. If stone or brick be chosen, and the latter is always preferable as being fire-proof, the laying should be done in well-tempered mortar or cement, and the wall should be of sufficient thickness to insure stability, keep out weather and protect the air of the house from the influence of sudden weather changes.

Chimneys.—To insure safety against fires the brick work of chimneys and fire-places should be at least nine inches thick, and no wooden plugs or bricks should ever be inserted in it lest they become charred and ignite and set the house on fire. Terra-cotta linings to chimneys are a source of safety and cleanliness. So far as possible chimneys should be straight and have a smooth interior so as to facilitate the draught.

The Roof.—A good roof is an important part of a sanitary house. If not properly constructed it is a constant source of annoyance. Slate, tiles, zinc, copper, lead, tin and shingles all make substantial roofs. Tarred felt and gravel compositions are not to be recommended except for temporary structures. Metal roofs require but little slope, but the slope of slate, shingle or tile roofs should be steep. Great care should be taken in the arrangement and making of gutters, spouting and pipes.

Floors.—These should be of well-seasoned lumber and laid so as to present a smooth, even surface, free from cracks. The plowed and grooved floor and the doweled floor have great advantages. Fire-proof floors are desirable but not adapted to ordinary dwellings. Basement floors should be of concrete.

Floor Coverings.—The inlaid floor composed of different woods and known as parquetry is ornamental and very effective when it is intended to dispense with carpets. Carpets were formerly much more used as floor coverings than at present. They are not a sanitary covering on account of their susceptibility to collect dust and dirt and they are difficult to remove and shake. The present fashion of abandoning the closely fitting carpets and substituting parquetry rugs and square carpets on stained or varnished floors is an imporfant step toward effecting improvement in the sanitary condition of dwellings.

Wall Coverings.—For cottages and inexpensive dwellings no wall covering is better or healthier than lime whitewash. It may be rendered artistic by coloring, and can be renewed readily and cheaply. Paint answers as an excellent wall covering. It produces a smooth, hard, non-absorbent surface which can be washed when necessary. Paper is most used at present as a wall covering, but it is doubtful if it is a good sanitary covering, as it is absorbent of moisture and is very apt to become saturated with impurities in the heated air of rooms. Moreover, many wall papers are dangerous from the fact that some of their colors, especially the green, are derived from poisonous substances.

Woodwork.—The woodwork about the house may be stained and varnished, or oiled and polished, or painted. Natural wood, oiled and polished, or varnished, the pores first having been "filled," makes a most desirable finish, and is rapidly coming into general use. Whatever may be the choice in this respect it is important that the materials used shall, as far as possible, be impervious, and so applied as to present a smooth, even surface that will repel dust and dirt and admit of being easily cleaned. This recommendation applies with equal force to all the interior finishing of the house.

Internal Decorations and Furnishings.—The internal decoration and fittings or furnishing of the house may exert no inconsiderable influence on health, and it is therefore important that they conform, as far as possible, to the principles of sanitation, so as to conduce to the health as well as the comfort of the occupants. It is clearly evident that all furniture, which, by its excessive decoration or peculiar construction, collects and conceals dust and dirt that cannot be easily detected and removed; all heavy drapery, so commonly hung in profusion about living and sleeping apartments, which cannot be cleaned with facility and which excludes light and air; all over-ornamentation of ceilings and cornices by elaborate mouldings which defy all attempts at cleansing; the so-called artistic furniture loaded down with ornaments of china and glass, and "what-not," which furnish so many hiding places for the ever-present dust; all these are, to a great extent, objectionable and unhealthy.

PART VIII OF BOOK III

Shows how necessary to health it is to remove all refuse matter, solid and liquid, from dwellings and their vicinity.

PREVENTIVE MEDICINE.

PART VIII.

SANITARY CLOSETS

The thorough removal of refuse matter, solid and liquid, from buildings and their vicinity, is indispensable to healthy life. Neglect of this is a cause of a vast number of preventable diseases.

Why Filth Produces Disease.—Accumulations of filth about houses taints air, water and soil. Septic particles, or ferments, given off in the putrefaction of organic matter, evolve the seeds of many diseases. Typhoid and enteric fevers are thus engendered. Privies and privy drainage and soakage have given rise to typhoid epidemics. Cholera, dysentery and allied diseases spring from the same source. Many other diseases owe their origin to filth poisons. Many suppose that consumption may be due to filth particles. Filth is the breeding place of the germs of diphtheria and other fatal diseases.

Safety in Cleanliness.—All refuse matter calculated to poison air, water or soil near a dwelling should be sedulously removed. This necessity exists everywhere, in city as well as in country.

Sources of Air and Water Pollution.—Nuisances traceable to air and water pollution are:

1. Defects of public sewerage.
2. Defects of house drainage.
3. Faults of cess-pool arrangement. No cess-pool should exist as a simple hole in the ground. It should be walled or bricked dry, and the bottom laid similarly. It should be frequently cleansed. No wells should be near it.

House Drainage.—Every house drain should insure the removal of all liquid refuse, waste-water and fecal matter, without leakage. The pipes should be of iron or earthen ware, for at least eight or ten feet distant from the house; but if a spring or well be near the piping should continue far beyond it. All pipes should be laid in a bed of clay, and the joints firmly cemented. Cement beds for pipes are the best.

Flushing of House-Drains.—All house-drains should be occasionally flushed by pouring large bodies of water into them. Field's flush tank is used for the purpose of flushing drains in the country.

Rain-Water Leaders.—A convenient plan of disposing of rain water is to pass it through the drain pipes. This affords an excellent flush, but care must be taken against freezing in winter; all conductors of rain water should be kept outside the house, lest the back gases should enter the house.

Dry System of Removing Excreta.—The dry system is adapted to towns and villages and to single cottages. It consists in the admixture of dried earth, coal ashes, or other dried refuse, with the excrement in sufficient quantity to absorb and reduce it to an inodorous form. The absorbent material must be perfectly dry, and must be applied immediately, and in sufficient quantity to cover the excretions and remove all fluidity. All slops and sink water and solid matter must be carefully excluded. In rural districts this plan can be made very satisfactory, but in towns it is seldom that the removal takes place sufficiently often to meet the requirements of the case. The receptacles should be made of impervious materials, and the closet should be located either out of doors, or in an isolated part of the building, or in an apartment projecting from the house. The apartment should be well ventilated.

The Earth-Closet System.—Moule's earth-closet system comes under the head of the dry-removal systems, and is the plan with which the public is most familiar. On account of the absorbing and deodorizing qualities of dried earth, this substance is selected for use in closets, especially within the house. The original apparatus, designed by Mr. Moule, consists of a wooden box divided into two main compartments. The lower one contains a receptacle or pail for the sewage, and the upper one the reservoir or hopper from which the dried earth is supplied in requisite quantity whenever the closet is used. The hopper in the upper part of the apparatus is capable of holding an ordinary coal-scuttle full of earth. A plug is attached to its outlet, and is operated by a lever connected with a handle. Beneath the seat is a guard, which directs the dried earth into the pail without allowing any of it to escape at the sides.

Construction of Sanitary Closet.—(1) A concrete bin, six feet long, three feet deep and two and one-half feet wide in measurements, divided into three compartments of equal size by concrete partitions, the first of which is built so as to leave a six-inch space at the bottom and the second a six-inch space at the top.

PART I OF BOOK IV

Treats of the eruptive diseases; their classification, prevention, symptoms and treatment.

ILLUSTRATIONS

Book IV

CURATIVE MEDICINE

PART I.

THE ERUPTIVE DISEASES

The Plan and Scope of the Subject.—In this part of the work, the author proposes to give an outline of the natural history of each disease, advice as to the modes of preventing its onset when threatened, recommendations as to its hygienic management, hints as to its probable course, fatality, and ultimate results upon the system, if recovery takes place, and finally suggestions in regard to its medical treatment.

Home Value of the Book.—As already advised, the most skillful physician who can be procured should be called in to treat disease; but in the emergency, until he arrives, much can be done in accordance with the directions here given to allay the sufferings of the patient, to place him in a more favorable position for speedy recovery, and, above all, to prevent the calamity which has befallen him from becoming aggravated before the doctor comes, through want of proper care.

Manner of Treatment.—Since a large proportion of the "ills which flesh is heir to" are rarely seen in this country, and have therefore but little importance to inhabitants of the United States, except as matters of curiosity, it is proposed to give very brief notices of these infrequent maladies, in order to economize space for a fuller account of those prevalent diseases which, sometimes in their lives, will, alas, personally interest a majority of the readers of this book.

THE CLASSIFICATION OF DISEASE.

Among the almost innumerable methods of classifying diseases which afflict the human family, one of the latest, and probably the best, is that devised by the Royal College of Physicians of England, and adopted by law as the basis for all those statistical reports relating to medical subjects of which the British nation is justly entitled to be proud. This, with some unimportant variations, is the system adhered to in the present section.

English Names for Diseases.—The plan of this nomenclature is to give an English name to the disease, employing the terms in popular use whenever they are not absolutely inaccurate, and to use only one word, or as few words as possible, in naming a disease. Definitions are attached to the English names in certain instances only, that is in cases where there might otherwise be some ambiguity in the signification of the title. The classification of diseases thus designated is based on their anatomical seat in the human body, the division being first into general diseases and local diseases.

General Diseases.—The general diseases are those which affect the whole frame, and are subdivided into two sections. The first comprehends those disorders which appear to involve a morbid state of the blood, and for the most part present the following characteristics. They run a definite course, are attended with fever, and frequently with eruptions on the skin; are more or less readily communicable from person to person, and possess the singular and important property of generally protecting those who suffer with them from a second attack; they are apt to occur as epidemics. Small-pox is a good example of this group, and in our ceaseless combat with disease it is with disorders of this section that hygiene and preventive medicine have won their grandest triumphs and accomplished their most beneficent work.

Constitutional Diseases.—The next of the general diseases comprises for the most part maladies which are apt to invade different parts of the same body, simultaneously or in succession. These disorders are sometimes spoken of as constitutional diseases, and they often manifest a tendency to transmission by inheritance. Gout and rheumatism furnish good illustrations of this type of disease.

Diseases of the Organs.—The second class, that of local diseases, comprehends all those which affect the structure of special organs, or particular parts of the human body, leading to marked disturbance of their functions. Diseases of the eye, such as cataract, and local inflammations, such as pneumonia or inflammation of the lungs, exemplify the characters of this group. Owing to the wonderfully close association and sympathy between all the different parts of the human frame, no one organ can suffer alone, and hence with the local diseases constitutional disturbances, such as fever, generally arise, and may totally mislead an inexperienced observer.

Recognition of Local Diseases.—The recognition of local disease in obscure cases is often, indeed, one of the most difficult problems a physician can be called upon to solve. Commonly complaint of pain in some particular part directs attention to that spot as the seat of primary disturbance, and leads to its thorough examination, which should be made with the aid of all the mechanical appliances, such as the stethoscope, the microscope, the thermometer, and so forth, which medical science has placed at our disposal. It is only when after all these means are exhausted, in a vain effort to detect local disease at the seat of pain or of pronounced discomfort, sufficient to account for that disturbance, that we are justified in considering local distress as a mere symptom of general disease.

Complicated Diseases.—Unfortunately, neither a general nor a local disease gives the sufferer any positive security against the onset of another malady at the same time, and we often see people burdened with a complication of disorders, each of which by its symptoms obscures the rest, and perhaps renders the proper treatment for them inadmissible. It is this tendency to the development of complications, either secondary to the chief disease or entirely independent of it, which in many affections is the indirect cause of death.

Damaged Organs.—Frequently, too, after a severe illness, some important organ is damaged in its structure, and the patient for the rest of his life suffers for want of its proper performance of function throughout his whole organism, which is really as much crippled in its work as a man would be if his leg or arm had been left upon a battlefield. This is especially the case with the heart after an attack of inflammatory rheumatism, which, by affecting the cardiac valves, prevents the circulation of the blood from being duly carried on, and, as it grows worse in later years, is apt to terminate existence abruptly by sudden death, or by the painful method of prolonged and lingering illness.

Care in Dosing.—The greatest care must be exercised in portioning out the doses of medicines suggested for the treatment of the diseases described, and it should always be recollected that a mistake which is a mere blunder in other vocations may at any moment become a crime in the occupations of prescribing, preparing, or administering medicines. Hence the doctor, the apothecary and the nurse, who have always the life of the patient in their keeping, should be persons who are willing and able to fully realize their responsibility; those who, whilst on duty, are unceasingly and vigilantly on guard against committing an error of any kind.

Doses Are Always for Adults.—The doses of medicines recommended in this section of the work are always for adults, unless otherwise expressly stated, and must be proportionately reduced for children according to age. Thus, for a young person of from fourteen to sixteen years, two-thirds of the ordinary dose should be given; from ten to thirteen, about one-half; from eight to ten, two-fifths; from six to eight, one-third; for a child of four or five years, one-fourth; for one of three years, one-fifth; for one of two years, one-seventh; for an infant of one year, one-thirteenth; and for a baby of from three to six months, one-twenty-fourth.

Doses for Children.—For example, the average dose of bromide of potassium for a grown person being twenty grains, that for a youth between fourteen and sixteen years would be sixteen grains; between ten and thirteen, ten grains; between eight and ten, eight grains; between six and eight, seven grains; between four and five, five grains; at three years, four grains; at two years, three grains; at one year, a grain and a half; and at six months, three-quarters of a grain.

How to Graduate Doses.—These fractional amounts are most conveniently arranged for young children by diluting a single dose for an adult with the requisite number of teaspoonfuls of pure water. That is to say, using the above illustration, if it is desired to administer bromide of potassium to a child one year old threatened with convulsions, twenty grains of the drug might be dissolved in thirteen teaspoonfuls of water, and a teaspoonful given every hour or two.

Why Doses Should Vary.—The doses of medicine vary, as already pointed out in the earlier part of this volume, in accordance with sex, idiosyncrasy and habit, and one of the most important advantages enjoyed by a skilled family physician is his power, gained by long practical experience, of so adapting each dose of medicine to every individual of a family, as to gain the greatest amount of benefit with the least amount of injury in any particular case.

Opiates and Emetics.—The general rule given above in regard to doses of medicines to children has some exceptions, the most important being in regard to opium, which is not well borne in childhood, and calomel or castor-oil, of which a larger proportionate quantity may be administered. In regard to the frequency of repetition of medicines, it should be understood that when not otherwise stated, this may be judged of by the effect produced. Thus, as a rule, an emetic may be repeated in fifteen minutes if the patient does not vomit; an opiate may be repeated in an hour if pain still continues without mitigation, and a cathartic in from six to eight hours if no purgative action is effected.

Change of Medicines.—In those unfortunate patients who cannot take laudanum, morphia, or paregoric for the relief of pain, which constitutes the great symptom. of disease, codeia, chloral, hyoscyamus, bromide of potassium, Indian hemp, and lactucarium may be used as substitutes, but without much expectation that they will fully serve the purpose of opium, that greatest boon to suffering humanity.

THE ERUPTIVE AND ACUTE INFECTIONS

SMALL-POX OR VARIOLA.

Definition.—An acute and highly contagious disease characterized (*a*) by an eruption, which by the third day is papular, by the sixth day is vesicular and by the ninth it becomes pustular (*b*) by a fever which appears with the onset, disappears with the eruption, but returns again when the eruption becomes pustular.

History.—Small-pox was first accurately described by Rhazes, an Arabian physician, in the ninth century, and distinguished by him from measles, but it is believed to be the same as the *pesta magna* described by Galen (A. D. 130-200). It is known to have prevailed during the sixth century and again about the time of the Crusades. The disease is believed to have been introduced into America by the Spaniards early in the sixteenth century.

Cause.—Small-pox is one of the most virulent of the contagious diseases, the poison of which is extremely tenacious of life; it may remain latent in clothes for a long time, and then be capable of exciting the disease. The contagion exists in the secretions and excretions, and in the exhalations from the lungs and skin. The dried scales constitute by far the most important element, becoming attached to clothing and furniture; and are conveyed by persons who have been in contact with the sick. The disease is probably contagious from a very early stage, though it has not yet been determined whether the contagion is active before the eruption develops. The degree of mildness or severity of a case does not influence that of another caused by it, the severest cases being at times followed by the mildest forms, and *vice versa.*

Age.—Unless protected by vaccination or a previous attack, nearly every one is susceptible, from the aged to the child in the womb. The disease is usually fatal in the very young.

Sex.—Male and female are equally affected.

Race.—The North American Indian and the negro are particularly susceptible to it.

Nature of the Disease.—The eruption consists in an infiltration of cells into the *rete mucosum* or into the true skin. Genuine pock marks are frequently found in the mouth, œsophagus and larynx and there are parenchymatous or soft cellular tissue degenerations in other organs.

Varieties.—Discrete, confluent, malignant and varioloid.

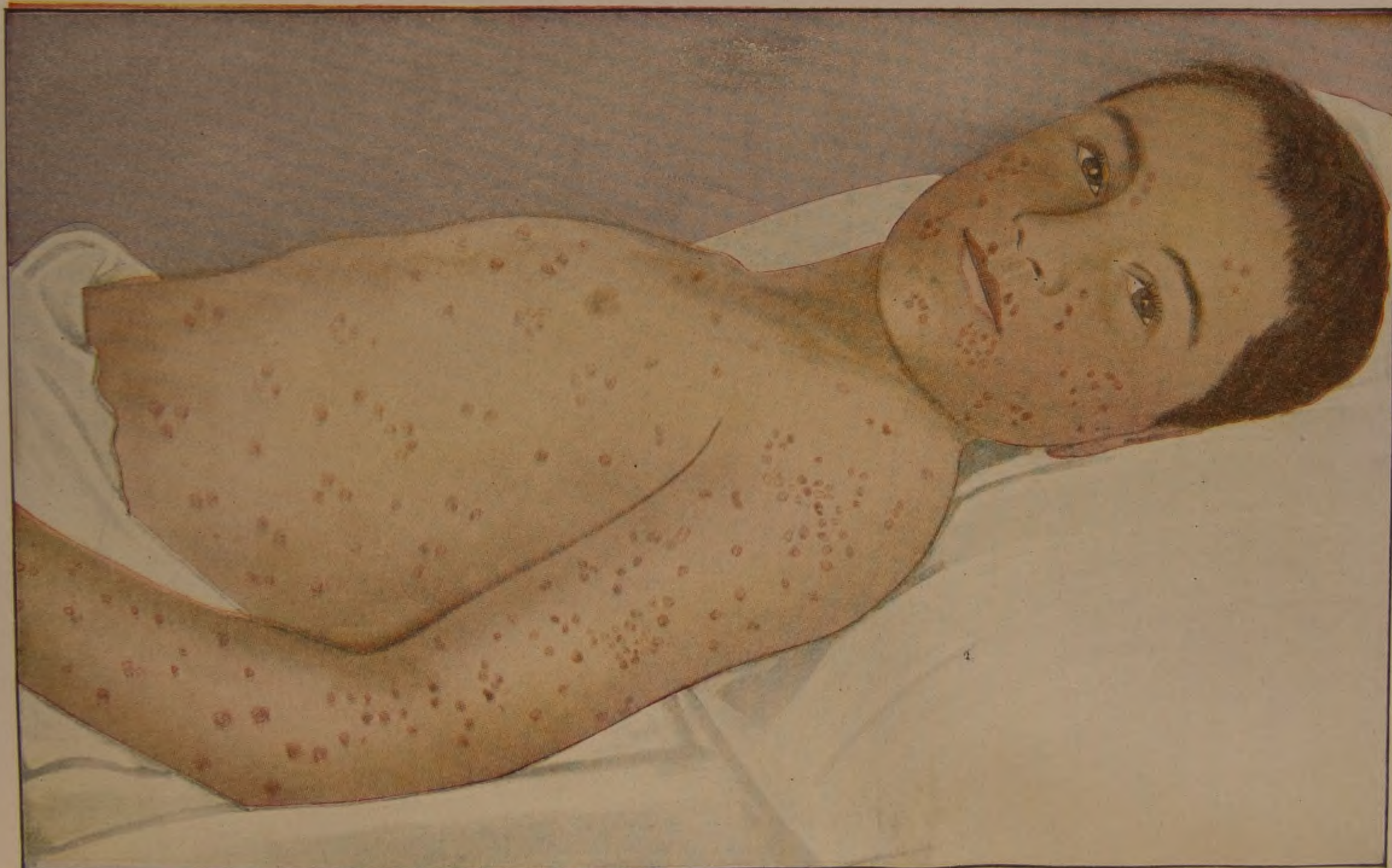
Symptoms.—1st. Discrete form: After a period of incubation of from nine to fifteen days (Osler), seven to twelve days (Tyson), the disease is ushered in with a chill in adults, and with a convulsion in children. There is an intense frontal headache and agonizing lumbar pains, and vomiting. The pains in the limbs and back are more severe in the initial stage of this than of any other eruptive fever, and connected with the frontal headache and vomiting are specially and decisively characteristic, or pathognomonic, of this disease.

Fever sets in rapidly and may go as high as 103 or 104 the first day; the pulse is rapid, hard and strong at this stage. Delirium may be present, and is at times violent. The face is flushed and the eyes are bright and clear.

The Eruption.—About the third or fourth day small red spots are noticed, first on the forehead and wrists, from which it rapidly spreads over the face and extremities. At this stage the eruption is not unlike measles, but in another twenty-four hours it is quite different, the papules having a "shot-like feeling," from which stage they pass into the other two stages mentioned in the definition. As the eruption comes out the fever falls, symptoms abate and the patient feels more comfortable. On the fifth or sixth days the papules become converted in the vesicles, which contains a clear fluid, the vesicle itself having a depressed or umbilicated centre. By the eighth or ninth day the vesicles are converted into pustules, the umbilication disappears and the fluid becomes a grayish-yellow, owing to the contained pus. At this stage the fever rises and the general symptoms return. In the discrete form the fever does not usually remain high for more than twenty-four or twenty-six hours, so that on the tenth or eleventh day the fever disappears and convalescence sets in. By the fourteenth day the pustules become dry, are converted into crusts and drop off, leaving, in mild cases, a simple discoloration which in time disappears, but in severe cases a more or less deep ulcer, or, if cicatrization be complete, a simple pit.

SMALL-POX.
Discrete or Separate Form.

SMALL-POX.
Confluent or Enmassed Form.



VARIOLOID.
Modified Small-Pox.

Symptoms of the Confluent Form.—2d. This form has the same initial symptoms as the discrete, but they are of greater severity. The eruption in this variety comes out earlier than in the above-mentioned form. Sydenham early called attention to the fact that the earlier the eruption appeared the more danger there was in its assuming the confluent variety. In this variety the fever does not abate on the appearance of the eruption as it does in the discrete form. The face, hands and feet present an almost continuous pustule, which often bursts in places, and, the pus partly drying, there results a picture which is horrible in the extreme. True pocks nearly always develop in the air passages, and give rise to a copious fetid discharge from the nose and throat. Should the patient recover it is only after a tedious convalescence, with great facial disfigurement and often with defective vision and hearing.

Malignant Form.—3d. In some cases this form of the disease is ushered in with a high fever, excruciating pains in the back and vomiting. The hemorrhagic rash appears early, while the hemorrhage takes place from the mucous membrane or surfaces, generally on the evening of the second or third day, and the patient may die in from two to six days, sometimes even before the eruption makes its appearance. The face is swollen and large conjunctival hemorrhages, with the deeply sunken corneæ, give a ghastly appearance to the features. The mind generally remains clear, but death is the usual result.

Varioloid.—4th. This is small-pox which is modified by a previous attack or by vaccination. The attack may come on with the symptoms as severe as in the discrete form, but usually the initial fever is less, the eruption is less general and may abort in its early development, the secondary fever is less marked and convalescence sets in earlier. Vesication, or blistering, takes place rapidly, as there is rarely any scarring.

Diagnosis.—The diagnosis or recognition of small-pox is of great importance, and many an anxious hour is often passed by the physician, the patient, and the friends of the latter before it is possible to decide with certainty as to the nature of the disease. While small-pox may be mistaken for a number of affections, the chief difficulty after the eruption begins to come out is in distinguishing it from measles and from chicken-pox. Of course, it is very important to make the diagnosis at the earliest possible moment, in order that timely precautions against the spreading of the disorder shall be instituted. After the pimples begin to contain fluid, the danger of mistaking the malady for measles is over, because the general eruption of measles is never vesicular, although a few little blisters are occasionally seen in bad cases.

To Distinguish from Measles.—In many instances a probable opinion can be given that a disease is measles and not small-pox, from the fact that the eruption of pimples is softer, less shot-like, and arranged in obscurely defined crescents upon the arms and neck. In others, however, it is impossible to decide before the second day of the eruption, when, as a rule, some few of the pimples will be found slightly vesicular if the disease is small-pox.

To Distinguish from Chicken-Pox.—When the vesicles appear, the great point of distinction between them and the vesicles of chicken-pox is that the small-pox vesicle is depressed in the middle, giving it what is called the umbilicated or navel-like aspect. This is an important characteristic, and should always be carefully looked for. Before the eruption comes out, only a probable guess can be made in many instances.

Unusual Symptoms.—Dr. Flint, perhaps the most acute diagnostician in America, says that decided fever following immediately after a chill, the fever continuing without much remission for two days, pain in the back being a prominent symptom, if it be known that the patient has been exposed to small-pox, or if this disease is prevalent, renders the diagnosis extremely probable. In comparatively rare cases, unusual symptoms in an attack of small-pox might for a day or two render the diagnosis difficult from scarlet fever, the simple mild fever called febricula, the skin disease called lichen, some of the pustular eruptions of the venereal disease, and in its very earliest stage from erysipelas and typhoid fever.

Treatment.—Since we have as yet discovered no antidote for the small-pox poison, the chief treatment is the relief of symptoms, as far as possible, as they arise, and careful nursing, in order to avoid needless aggravation of the disease or the development of complications. The mildest cases, as well as those which are more severe, should be kept in bed in a cool apartment, which is ventilated as freely as possible, without producing dangerous draughts.

The Back.—In bad cases the patient's back ought to be frequently examined, and suitable precautions taken against the formation of bed-sores, as recommended under the head of typhoid fever, the hair cut off close, in order to avoid the matting with the corruption from the pustules when that begins to discharge.

The Bowels.—The bowels should be well opened as soon as fever develops with a tablespoonful of castor-oil, or a saline purgative, such as

Two children in the Municipal Hospital, one unvaccinated and the other vaccinated on the day of admission—the crust is still seen upon the leg. This child remained in the hospital with its mother (who was suffering from small-pox) for three weeks, and was discharged perfectly well. The unvaccinated child admitted with small-pox died. (Welch and Schamberg.)

© E. J. S.

Three Members of a Family Brought to the Municipal Hospital with the Mother Who was Suffering from Small-pox. The child in the centre was unvaccinated; the other two had been vaccinated a year before because of the school vaccination requirements. These two children remained in the small-pox wards several weeks, and left the hospital perfectly well. (Welch and Schamberg.)

a Seidlitz powder or a bottle of citrate of magnesia, and then a cooling and diaphoretic mixture, composed of half a teaspoonful of sweet spirits of nitre, ten grains of bromide of potassium, or phenacetum, four grains, every three or four hours, for fever, and an ice cap to the head for the violent headache, administered every two or three hours if there is much pain or restlessness. After the primary fever subsides, with the coming out of the eruption, there are often a few days during which no medical treatment is necessary; but with the appearance of the secondary fever, the cooling mixture should be resumed. Quinine, tincture of iron and brandy should be given in full doses.

The Itching.—To relieve the itching, which is sometimes almost intolerable, the surface of the skin may be sponged over with a weak solution of sulphurous acid or of carbolic acid, six or eight drops to the ounce of water. If no relief is obtained from these, anointing the body with cosmoline or with cold cream may be tried; but it is sometimes needful to muffle the hands, especially of children, in order to prevent them from scratching open the pocks after they begin to heal, and so rendering the resulting scars much deeper and more permanent. Keep the patient in a dark room and cover the face with a mask of mercurial ointment, and to prevent pitting the pustles may be touched with tincture of iodine.

The Fever.—The fever, when high, must be kept within limits, either by cold sponging or by the cold bath, the water being at a temperature of 75 degrees when the patient is first put in and then gradually lower it to 68 degrees. During convalescence bathing should be frequent, as it helps to soften the crusts. In malignant small-pox, which generally proves fatal, where very soon the face becomes so swollen that the eyelids are tightly closed and glued together, they should be frequently bathed with a saturated solution of boric acid. The mouth and nose should be kept clean and soft by frequent injections. The patient should have plenty of cold water. Should the heart become weak hypodermics of strychnine, one-thirtieth of a grain, or dram doses of aromatic spirits of ammonia by the mouth.

Treatment of Malignant Small-Pox.—In malignant small-pox, and in the petechial or hemmorrhagic form, the black small-pox of common language, the only chance of successful treatment is to support the strength with quinine in four-grain doses thrice daily, or Peruvian bark and other tonics, and with stimulants such as wine or brandy or milk-punch, in the forlorn hope that unusual vigor of the constitution may thus be reinforced long enough for the violence of the disease to become expended. If the patient can thus be kept alive until after the twelfth or fifteenth day without any important organ becoming seriously damaged in its structure, the chance of recovery will subsequently increase every day. The disease being self-limited, it is obviously our chief duty, in the absence of any known specific, to direct our energies toward sustaining the patient's strength in his battle with the disorder, and the prospect of recovery, or prognosis, as it is termed, turns upon the relative power of endurance of the disease-poison and the patient's constitution.

Diet.—The diet in the early stage of small-pox, like that in most febrile conditions, should be light and unstimulating, consisting of rice, cornstarch, bread and milk, or arrow-root. Oranges or lemonade in moderation may be allowed, unless there is a tendency to diarrhœa. Ice water, lumps of ice, or iced carbonic acid water may be given *ad libitum*. Later on in the disorder, when the strength begins to fail and the pulse grows weaker, strong animal broths, beef essence, and other highly nutritious aliments are necessary; and if the pulse at the wrist should seem very feeble, and especially if it should become intermittent, milk-punch, egg-nogg, or other powerful stimulants ought to be resorted to.

Nursing in Small-Pox.—The general care of a small-pox patient ought to be afforded in accordance with directions contained in the chapter on Nursing, and most of the special precautions for avoiding the extension of the disease, and so forth, have been pointed out in the article on Contagious Influence. On account of the danger of pneumonia and pleurisy, particular watchfulness is needed against taking cold from draughts of air, and during the delirium of the fourth stage, in bad cases, the attendant must be constantly on guard to prevent the patient from injuring himself or others. The nurse should wear an overall and remove it on coming out of the room, and her head should be covered with a cap.

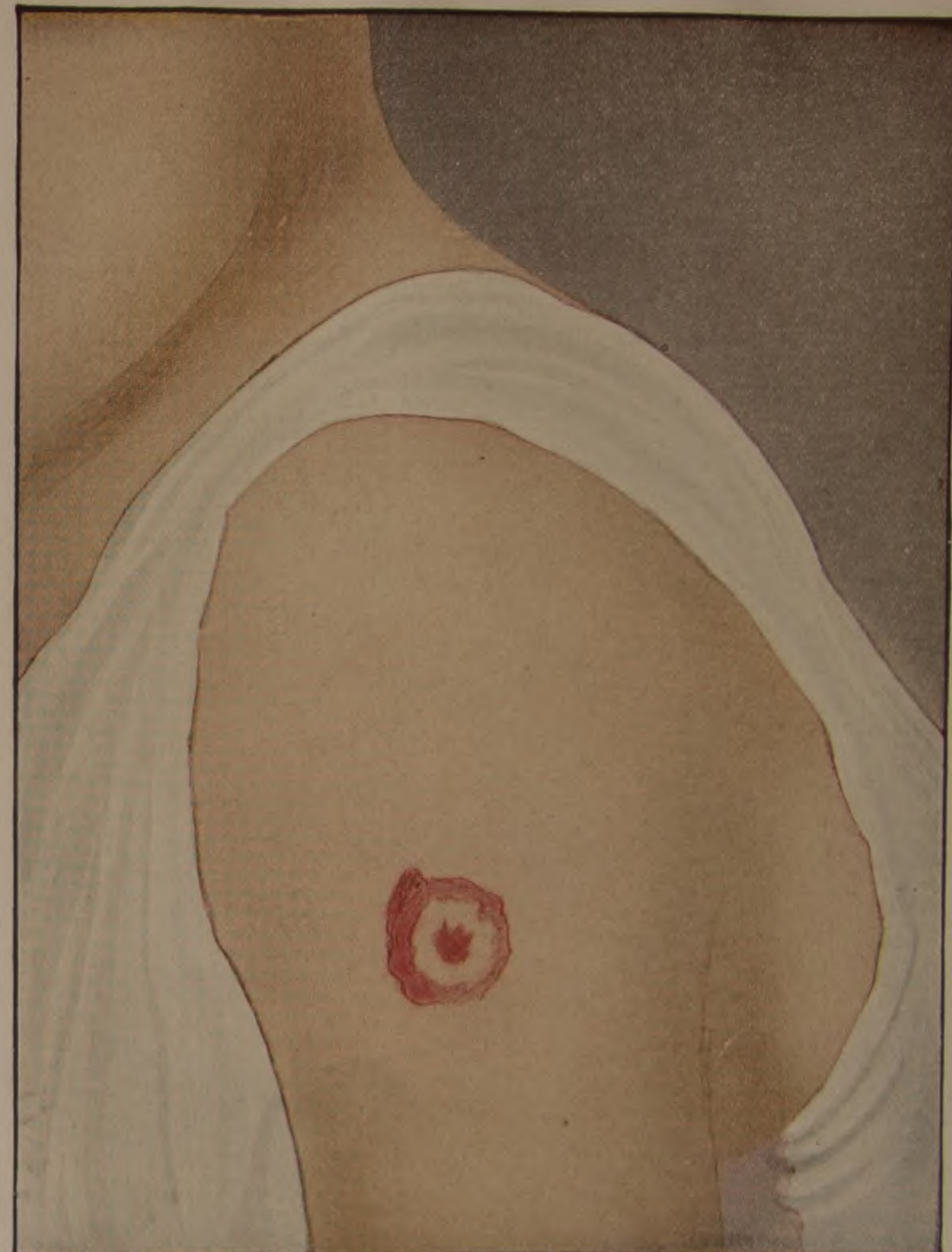
VACCINATION THE GREAT PREVENTIVE OF SMALL-POX.

Seeing, then, that small-pox is a most painful, loathsome, and fatal disease, for which we have no cure, it becomes infinitely important to avail ourselves of the protection against its ravages afforded by Dr. Jenner's beneficent discovery of vaccination, a discovery which ought to make his name honorable whilst the world stands.

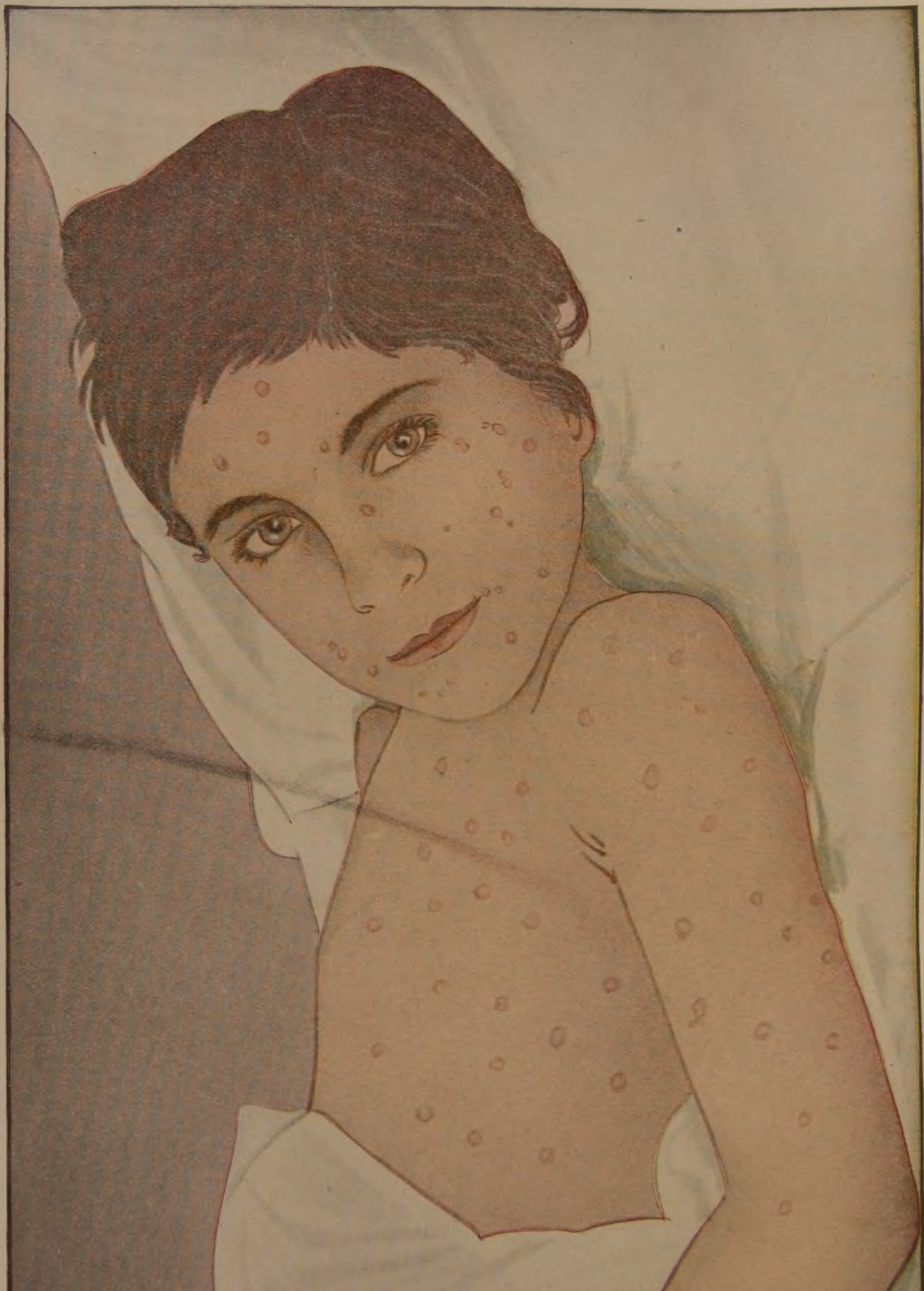
And yet, strange to say, there are people bearing the general aspect of reasoning beings who oppose vaccination; and in England, where vaccination has been made compulsory by law, a league has been formed to

© E. J. S.

VACCINATION.
Inflamed Condition.



VACCINATION.
Perfect Mark.



CHICKEN-POX.
Second and Third Day.

©E. J. S.

combat its enforcement. Recently the folly of these fanatics met, it is stated, with a most righteous punishment in the following circumstance: A leading anti-vaccinationist, Escott by name, who refused to have any of his children vaccinated, lately lost two of them and his wife by small-pox. Escott borrowed a suit of clothes from a friend to attend his wife's funeral, and returned them without disinfection, with the result that the lender caught small-pox and also died of it. Subsequently nearly every house in the neighborhood was infected, producing a local epidemic of small-pox, during which sixteen patients were removed to the pest-house. The only excuse for the obstinacy of such deluded people is, that more than half a century of deliverance from the horrors of small-pox has rendered most persons practically ignorant of its dangers. In the latter half of the eighteenth century, that is, from 1750 to 1800, small-pox attacked almost every inhabitant of England, and about one out of every five seized with it died, whilst nearly another fifth of its victims were disfigured or crippled for life. It is estimated that two-thirds of the blind people in England at that time lost their sight from small-pox. To give an idea of its relative mortality, Dr. Guy states that it caused eighteen per cent. of all the deaths, and was one hundred times as fatal as diarrhœa, with its allied intestinal disorders, and six times as fatal as apoplexy, palsy and sudden death taken together.

Objections to Vaccination.—These, aside from the mere sentimental ones are that in some instances erysipelas and venereal disease have been apparently caused by it, and that it has been accused of being the means of inoculating the human system with scrofula, consumption and certain cutaneous affections. Now, all of these objections can be removed by the use of what is called bovine virus, obtained direct from the cow, without ever having passed through any human body. Glycerinized lymph is now conceded to be the better vaccine virus.

Duty of Vaccination.—This is rendered far more imperative by the danger which every unprotected person in a community exposes his neighbors to by becoming the starting-point of an epidemic of small-pox. Hence, although a man may have the privilege of thus trifling with his own life and health, he has no right to imperil others by his perversity or ignorance; and the good of society, which is a higher law than that of personal liberty, demands that compulsory vaccination be legally established, as it is hoped it will be ere many years elapse.

Making Sure of Immunity.—Even after exposure the individual should be vaccinated, for though it may not prevent small-pox, it will certainly moderate the severity of the attack. The writer has had a case of this kind to come under his personal observation.

COW-POX OR THE VACCINE-DISEASE.

How Produced.—This disease, called Vaccina in medical books, is induced in the human being by the process of vaccination, either accidentally, as in the case of the young milkmaid who led Dr. Jenner to his grand discovery, or, as is usual nowadays, by being rubbed into a slight wound made for the purpose. It is apparently a modified form of small-pox, in which a cow-pox vesicle on the udder of a cow or heifer is the common original source of the infecting matter.

Character.—The disease is attended, as a rule, with no further eruption than the vesicle, ripening into a pustule at the point or points where the matter is inoculated. It is communicable by inoculation, but not by the other ordinary modes of infection, mild in its course, and yet, generally speaking, protective against small-pox.

Operation of Vaccination.—This is by no means so simple and unimportant as it seems at first sight, and it therefore ought always to be performed by a physician. It is better not to cut so deep in vaccinating as to cause much of a flow of blood, lest this fluid should wash the virus out of the incisions. The usual place for vaccinating is on the outside of the arm, an inch or two below the shoulder; but if the operation fails here, as is sometimes the case after repeated trials, an attempt may be made on the calf of the leg, just below the knee.

When to Vaccinate.—Vaccination should be performed on all children between the ages of one and three months, unless some special reason exists for its postponement, and it is recommended to insert the virus in four or five places close together, so as to produce several pustules, although, by a majority of physicians in this country, one pock is thought sufficient.

Revaccination.—Revaccination should be performed about once in seven years, as in some instances the protection afforded appears to wear out in that time; and, as there is no means of recognizing them, the safer way is to renew the vaccination.

The Virus.—The animal or bovine virus is supplied from carefully vaccinated calves by a number of producers in various parts of the country. It is usually furnished on little ivory points, shaped like a lancet-blade, or on pieces of quills. Either of these is to be moistened in pure water, and then rubbed on a lightly scarified surface, prepared as already described. The bovine virus is apt to make a very sore arm, but has the great advantage of avoiding all possibility of introducing the horrible poison of venereal disease into the blood of the infant operated upon.

VARICELLA OR CHICKEN-POX.

For full description and treatment of this disease, peculiar to children, see CHILDREN'S DISEASES.

MEASLES OR RUBEOLA OR MORBILLI.

For full description and treatment of measles, see DISEASES OF CHILDREN.

RUBELLA, ROTHELN OR GERMAN MEASLES.

Definition.—An acute infectious disease resembling both scarlet fever and measles, but differing from these in its short course, slight fever and freedom from complications.

Cause.—It is propagated by contagion and spreads with great rapidity.

Incubation.—About two weeks.

Symptoms.—This is a mild contagious affection, very similar in many respects to ordinary measles, but apparently differing from it, because neither disease affords any protection from the other. The color of the eruption is rather more rose-tint than in ordinary measles, the pimples are round instead of oval, and the crescentic arrangement is wanting or extremely obscure. Children are chiefly affected with German measles, although it also occurs after adult age is attained, but in any case the malady is so slight that the patients rarely feel sick enough to keep in bed, and no instances of death from the uncomplicated affection are recorded.

Treatment.—The treatment, diet and nursing appropriate to German measles are the same as those recommended in the ordinary form, in the few cases where any special care is needed.

SCARLET FEVER OR SCARLATINA.

For description and treatment of scarlet fever, see DISEASES OF CHILDREN.

BREAK-BONE FEVER OR DENGUE.

Synonyms.—Dandy, or break-bone fever.

Definition.—An acute and infectious disease characterized by febrile paroxysms; pain in the muscles and joints and sometimes by an eruption on the skin.

History and Geographical Distribution.—The disease was first recognized in 1779 in Cairo and in Java. The description by Benjamin Rush of the epidemic in Philadelphia in 1780 is one of the first and one of the very best articles ever written on the disease. S. H. Dickson gives a graphic description of the disease as it appeared in Charleston in 1828. Since that date there have been five or six widespread epidemics in tropical countries, the last occurring along the Gulf States in the summer of 1897, where for some time it was supposed to be yellow fever. None of the recent epidemics have extended to the Northern States, but in 1888 it prevailed as far north as Virginia.

Cause.—The rapidity of diffusion and the pandemic character are the two most important features of dengue. There is no disease, not even influenza, which attacks so large a proportion of the population. A micrococcus has been found in the blood of patients by McLaughlin, of Texas.

Symptoms—Incubation.—Three to five days, during which the patient feels well. Persons who catch this curious complaint are often attacked with it very suddenly, frequently in the night after retiring in their usual health. The temperature rises in a few hours to 103 degrees and in one or two days may reach 106 or 107 degrees, the skin becomes dry and hot, and the countenance indicates utter helplessness and prostration; with this febrile condition there is usually pain in the head, back, limbs and small joints, which latter swell up as in rheumatism. The pulse is rapid; loss of appetite, coated tongue, slight nocturnal delirium and concentrated urine. The pain may be so severe that the patient cannot move.

Duration.—The average duration of the first febrile stage is about forty-eight hours, although it may vary from twelve hours to three days, after which the symptoms begin to subside and a period of remission of two or three days occurs.

Debility and Eruption.—During this time general debility and muscular pains predominate, and fever is usually absent, but on the fourth day it reappears, and on the fifth or sixth an exanthematous eruption develops, which is sometimes more like the flush of erysipelas than the papules of either measles or scarlet fever. The color, however, is not so intense, and it spreads over the whole body in forty-eight hours.

Pains and Swelling.—When the eruption reaches its height, painful swellings of the lymphatic glands of the neck, back of the head, armpits and groins occur. With this tumefaction of the glands, the nose, mouth and throat become implicated, swelling up and growing excessively painful. On the seventh or eighth day desquamation commences and the acute stage terminates.

Malady Not Fatal.—The victims of dengue are to be commiserated for the horrible and agonizing pains which they are called upon to suffer, and which are peculiar to the disease; but they may find some comfort in the assurance that the malady is rarely, if ever, fatal.

Recurrence of Pain.—The recurrence of the excruciating pains in the limbs at a time long after the subsidence of the fever must be borne in mind, as influencing any opinion ventured in regard to the probable duration of the illness.

Diagnosis.—The diagnosis of dengue must occasionally be made from rheumatism, measles, scarlet fever and erysipelas; but a complete history of the case can hardly fail to clear up any doubts, particularly if dandy fever is prevailing in the locality as an epidemic.

Remedies.—Since the malady is not a dangerous one, anodynes to relieve the excruciating suffering, especially hypodermic injections of one-eighth or one-sixth of a grain of morphia. During convalescence iodide of potash is recommended for the arthritic pains and tonics are indicated.

TYPHUS FEVER.

Synonyms.—Ship, jail or putrid fever.

Definition.—An acute infectious disease favored by closely crowding human beings together, characterized by sudden onset, a maculated rash, marked nervous symptoms and a termination by crisis about the end of the second week.

Causes.—It is excited by an unknown poison which is capable of being carried in the clothes. It is rare in America, though there were two mild epidemics in the Philadelphia Hospital in 1866 and in 1883; it is not uncommon in England and Ireland. Bad food, impure air and overcrowding are predisposing factors.

Incubation.—Incubation is placed at about twelve days, but may be less, and its duration from ten days to two weeks.

Symptoms.—The fever begins abruptly with severe pain in the head, back and limbs; extreme prostration, and fever which reaches its maximum (104 degrees to 105 degrees) in two or three days. The temperature remains high for about ten days when it falls by crisis (suddenly).

The Eruption.—It is a continued fever, attended with a dark-red or purplish mottled rash over the body, with great nervous prostration, restlessness and delirium, or dullness and stupor, but without any specific affection of the bowels. The eruption, which makes its appearance from the third to the eighth day of the disease, is at first slightly elevated and disappears when pressed upon with the finger; but after the second day from the time it comes out, it is persistent under pressure and continues to show this character until it fades, ten or twelve days afterward.

Fatality.—When it proves fatal, as it does in about fifteen per cent of the cases, death usually occurs between the twelfth and twentieth days of the attack.

Advent Symptoms.—The advent of the disease is somewhat gradual, beginning with general soreness, discomfort and weariness, with loss of appetite and disturbed sleep. Shivering and a feeling of coldness, especially along the spine, sometimes amounting to an actual chill, not unfrequently mark the commencement and are soon followed by heat of skin, rise in temperature and severe frontal headache. This headache is occasionally very severe and rarely absent at first, but abates about the tenth day.

Disturbed Sleep.—Slumber is disturbed by dreams, is unrefreshing, and when the patient is not asleep there is a constant tendency to heaviness, the mind ceases to think and the attention cannot be concentrated upon any subject. He may lie with his eyes open, evidently not in slumber, yet indifferent or insensible to all which goes on around him.

Bodily Weakness.—This is frequently extreme, and the sufferer often voluntarily takes to his bed on the first day of his illness. This exhaustion and prostration is totally disproportionate to the amount of muscular exertion which has been made. The eyes, when examined, are found to be dull and heavy, the white portion injected or blood-shot and a peculiar dusky flush overspreads the cheek.

The Delirium.—As the days pass debility rapidly increases and delirium comes on the latter part of the first or early in the second week. In persons of nervous, excitable temperament it commences sooner and may appear on the third or fourth night of the fever, showing itself primarily, perhaps, by a little confusion of thought on awaking from a restless doze.

The Tongue.—The tongue is coated at first with a white fur, but after six or eight days often may become dry, swollen and covered with thick, brownish crusts of mucus and cast-off epithelial cells, which make up what is called *sordes.*

The Bowels.—The bowels are, as a rule, constipated, and this should especially be borne in mind, because it forms an important distinguishing mark between this disease and typhoid fever, with which typhus was formerly confounded.

The Pulse.—The pulse is quickened from the outset and in grave cases continues to increase in rapidity until it may more than double its ordinary frequency, beating from one hundred and forty to one hundred and sixty times per minute.

Complications.—Broncho pneumonia is perhaps the most common complication. It may pass on to gangrene; in certain epidemics gangrene of the nose, hands and toes have occurred.

Diagnosis.—The diagnosis of typhus fever requires to be made in this country chiefly from typhoid fever and relapsing fever, but it is sometimes difficult to distinguish it at first from small-pox, plague, erysipelas and cerebro-spinal meningitis.

Treatment.—As the treatment, diet and nursing of typhus fever are similar in most respects to what is required in the far more common disease, typhoid fever, the reader is referred to our article upon the latter affection for further information.

Isolation.—When an epidemic of typhus fever breaks out in a crowded jail, hospital or tenement, the great cause of its prevalence should, of course, at once be abolished by separating those exposed to it as widely as possible and treating the sick in isolated sheds, huts or even in tents.

TYPHOID FEVER.

Symptoms.—Enteric fever, autumnal fever or typhus albuminalis.

Definition.—An acute infectious disease due to the implantation and proliferation of the bacillus of Eberth, characterized by ulceration of the lymph follicles of the intestines of the mesenteric glands and by an enlargement of the spleen.

Historical.—The disease is easy recognizable in the descriptions of Hippocrates (B. C. 460-357) and Galen (A. D. 130-200). Doubtless John

Huxam's "slow, nervous fever," described in his "Essay on Fevers" was the typhoid of the present day, and his "putrid malignant" the yellow fever of to-day. It was, however, the writings and teachings of the great French physician, Louis, which did most to disseminate a knowledge of the true nature of typhoid fever, to which he gave the name it bears. Among some of his pupils were the Americans W. W. Gerhard and C. W. Pennock of Philadelphia and James Jackson, Jr., of Boston. To the former, however, is due the great honor of having first clearly laid down the difference between typhoid and typhus.

Causes.—Typhoid fever prevails in temperate climates in which it constitutes the most continued fever. It is widely distributed throughout all parts of the world.

Seasons.—It prevails most in the autumn months, especially following a dry summer.

Sex.—Males and females are equally liable.

Age.—Typhoid fever is a disease of youth and adult life. The greatest susceptibility is between the ages of fifteen and twenty-five. It is rare after sixty and infants are seldom attacked.

Immunity.—As in other fevers, not all exposed to the infection take the disease. Some writers claim that one attack protects, but others claim that one attack predisposes to another.

THE BACILLI OF TYPHOID.

Bacilli in the Body.—The bacilli are found in the lymphoid tissues of the intestines, in the mesenteric glands, in the spleen, liver, bile and in the bone marrow. They also occur in irregular clumps in the contents of intestines and in the stools; they have also been found in the blood, urine, sweat and sputa.

Bacilli Outside the Body.—The bacilli retain their vitality in water for weeks, but disappear from ordinary water in competition with saprophytes in a few days. In milk they undergo rapid development without changing its appearance. They may increase in the soil and retain their vitality for months. They are not killed by freezing, but, as Pruden has shown, may live in ice for months.

MODES OF CONVEYING BACILLI.

1. Contagion.—The possibility of the direct transmission through the air from one person to another must be acknowledged, although, as shown by Germano, when completely dried in air currents, the specific bacillus quickly dies. There are house epidemics in which water and food contamination can almost be excluded. The nurses and attendants who have to do with the stools and body linen of the patient are alone liable to direct infection.

2. **Infection of Water.**—This is unquestionably the most common mode of conveyance. Many epidemics have been shown to have originated in the contamination of a well or a spring.

3. **Milk.**—Milk may be the source of infection, as it may be contaminated in washing out the cans with infected water.

4. **Ice and Salads.**—In addition, the germs may be conveyed in ice, salad, celery, and so forth. A fly which has alighted on the soiled linen or discharges from a patient may contaminate the milk or food.

Bad Sewage and Drainage.—Filth, bad sewers or cess-pools cannot in themselves cause typhoid fever, but they furnish the conditions suitable for the preservation of the bacillus.

Symptoms.—Typhoid fever, also called gastro-enteric fever, owing to the circumstance that the stomach and intestines are the chief seats of the disease, is characterized by a faint, scanty eruption of rose-colored spots, appearing chiefly upon the abdomen, from the fourth to the eighth day, and coming out in successive crops. Each crop of spots continues visible for about three days.

Cess-Pool Fever.—On account of its frequent connection with bad drainage, this fever has received the vulgar but expressive name of "drain or cess-pool fever," which, despite its indelicacy, it would be well to perpetuate as a constant warning against that neglect of sanitary arrangements in buildings to which it is chiefly due.

Initial Symptoms.—The onset of this dangerous and fearfully prevalent disease is very often a gradual one. The patient for some days feels weak, languid and depressed, loses his appetite, suffers from headache, and is restless at night. In other cases, however, the malady begins with a slight chill, or a feeling of coldness running up and down the back, and among children the first decided symptom may be an attack of convulsions. Frequently, too, slight bleeding of the nose is noticed, and a little tendency to looseness of the bowels, which may even be aggravated by errors in diet, or other imprudence, into active diarrhœa.

Secondary Symptoms.—After the stage of invasion is completed, the pulse and temperature rise steadily, the former going up to 100 beats or 110 beats, and the latter ascending to 104 degrees, or sometimes 105 degrees during the first week. The heat of the body is almost always greater at night than in the morning, and this increment is so regularly advanced during the onset of the disease, that it is quite possible for a skilled physician to recognize typhoid fever by a glance at the record of temperature, or "temperature chart," alone in many instances.

The Diarrhœa.—The diarrhœa rapidly grows more severe, and in bad cases is frequently very profuse, fifteen or twenty thin, watery evacuations occurring in every twenty-four hours. In many cases the bowels are constipated. Pain in the abdomen, especially in the region of the right flank, is nearly always complained of, and with the diarrhœa is due to the characteristic ulceration of certain oval spots in the lower portion of the small intestine, which have received the names of Peyer's patches. Bronchial irritation and cough are common.

Facial Appearance.—The face sometimes wears an anxious, haggard look, but frequently, even early in the disease, it shows the dull, indifferent aspect, so often indicating an oppression of the brain, which will deepen into stupor, then coma and finally death. The flush of the face is apt to have a more dusky, purplish tint than in other fevers, and the skin is more dry and burning, or pungent, from the smaller amount of perspiration.

The Delirium.—In the second week delirium generally comes on, and although occasionally violent and requiring the patient to be controlled by physical force, it is more frequently of a low, muttering character. The tongue becomes dry and brown, and tympanites, or the accumulation of gas in the bowels, is generally considerable, and may cause by its enormous distension great suffering, or even lead directly to a fatal result. Ringing or buzzing in the ears with deafness is very often noticed. In bad cases the diarrhœa is often very profuse, and discharges of fluid blood, perhaps in large quantity, sometimes occur and prove quickly fatal.

The Third Week.—In the third week, if the case is to end unfavorably, the pulse grows frequent and feeble, the tongue is dry, cracked and covered with brown sordes, the delirium and stupor are constant, involuntary discharges from the bowels occur, and the patient may die exhausted, or if the fatal issue comes earlier, before complete prostration of muscular strength, it may be preceded by convulsions.

Signs of Recovery.—If, on the contrary, recovery awaits the patient, the pulse falls off in frequency, the temperature gradually diminishes, the tongue cleans off usually from the edges, appetite slowly returns and the mental powers are little by little regained.

Unfavorable Symptoms.—The unfavorable symptoms, besides those above mentioned, are an unusually high temperature, 106 degrees or over, picking at the bedclothes, slipping down in the bed, and entreaties, often of pitiful earnestness, to be taken home.

Special Features and Symptoms.—1. A severe facial neuralgia may put the practitioner off his guard. In cases when the patient has kept up, "fought the disease," the first manifestation may be pronounced delirium. In rare cases the disease sets in with the most intense cerebro-spinal symptoms, simulating meningitis.

2. There may be pronounced pulmonary symptoms. In a few cases the disease sets in with a single chill, with pain in the side and all the characteristic features of lobar pneumonia.

3. There may be intense gastro-intestinal irritation. Occasionally there are cases with such intense vomiting and diarrhœa that poisoning may be suspected.

Fever.—The fever has invariably a step-ladder rise; the evening temperature is from one to one and one-half degrees higher than the morning remission.

Fever of Convalescence.—After the temperature has been normal for five or six days the fever may rise suddenly to 102 degrees or 103 degrees, and after persisting from one to three or more days fall to normal. With this condition there is no furring of the tongue and no distension of the abdomen. This condition is by no means uncommon, and is of especial importance, as it is attributed in most cases to errors in diet, constipation, or excitement of any sort, such as seeing friends.

Complications.—1. Thrombosis of the femoral vein, more frequently on the left side, resulting in the "milk leg." It occurs, according to Murchison, in one per cent. of all cases. Embolic abscesses may occur in the kidneys and lungs.

2. Albuminuria is present to some extent in all severe cases, commonly as the result of the fever, but sometimes is the direct result of an acute nephritis.

3. Hemorrhages usually occur during the third week, and are indicated by a sudden fall of temperature, followed by dark red or tarry stools.

4. Cardiac complications, including pericarditis, endocarditis and myocarditis, are sometimes present. The latter may be the cause of sudden death.

5. Peritonitis may result from perforation or from extension by continuity; the former is more common and is recognized by a sudden pain,

a fall of temperature, distension of the belly and symptoms of peritonitis.

6. Pneumonia may supervene in the second or third week of a typhoid fever, as a complication, in which the true relation is difficult to determine.

Diagnosis.—The diagnosis of typhoid fever must be made in its early stage from typhus fever, relapsing fever, scarlet fever, measles and small-pox. At a more advanced period it might be confounded with the typhoid condition met with in uremia and pyemia, and also with enteritis or inflammation of the bowels, peritonitis or inflammation of the membrane covering the intestines, meningitis or inflammation of the membranes of the brain, acute bronchitis or pneumonia, and with acute consumption.

The Rose-Colored Spots.—If a patient who has been suffering from headache, prostration, loss of appetite, restlessness and gradually increasing fever, has a slight bleeding at the nose unprovoked by accident, we may strongly suspect typhoid; but until the rose-colored spots appear there is no certainty.

Treatment.—The medical treatment in typhoid fever must be directed toward mitigating suffering, warding off complications and obviating the tendency to death. In the early stages of the complaint headache is one of the most prominent symptoms. All we can hope for is to procure some mitigation of the intense suffering it frequently occasions.

Ice Application.—The application of ice to the head, either in a bladder or India-rubber bag, or, what is still better, by means of an ice-cap, made of numerous coils of thin rubber pipe, through which ice-water is kept flowing, generally diminishes the pain, which, if very intense, may require the application of one of two leeches behind the ears.

For Checking Diarrhœa.—Diarrhœa, if troublesome, is to be checked, but not stopped, by chalk-mixture, bismuth-mixture or astringents with opium, when necessary.

Creosote	6 drops
Bismuth subnitrate	3 drachms

Mix and make into 12 papers and take one every three hours.

Or, when ordinary measures fail—

Silver nitrate	5 grains
Extract of gentian	4 "

Mix and put into pills, making 20. Take one every three hours.

Its use, however, after the first few days, must be continued with great caution, on account of permanently blackening the patient's skin.

Rest.—Absolute rest in bed, with the use of the bed pan, must be enforced.

Rendering Stools Innocuous.—The stools should be rendered innocuous. This may be done by dissolving a pound of the chloride of lime in four gallons of water. Add a quart of this solution to each discharge and allow it to remain in the vessel at least an hour before disposing of it. Soiled bed clothes should be thoroughly boiled.

Restlessness.—In cases where restlessness rather than stupor predominates small doses of bromide of potassium or a five-grain suppository of powdered asafœtida in the bowel will allay the condition. When the tongue becomes dry, ten drops of the oil of turpentine given in mucilage every four hours, often have a very happy effect, and its influence upon the healing of the intestinal ulcerations is highly lauded, while it aids in the expulsion of the gas.

Stimulants.—Generally, during the second week, sometimes a few days earlier, and occasionally a few days later, according to the violence of the attack and the patient's strength of constitution, it is advisable to begin with the use of stimulants. The best indication of their becoming needful is a slight failure of the strength of the pulse, but much experience is necessary to judge correctly of the time, the quantity, and the frequency with which alcohol be administered.

Kinds of Stimulants.—At first half an ounce of good whiskey or brandy, with two or three ounces of milk and half an ounce of lime-water, if nausea persists, may be allowed three times daily, but this amount must generally be increased from day to day, sometimes with great rapidity, until in the worst cases a pint and a half of brandy is swallowed in twenty-four hours. Beef tea, beef essence, and some farinaceous food, such as arrow-root or cornstarch, ought also to be urged upon the patient at this time.

To Stop Hemorrhages.—In cases of hemorrhage from the bowels, ergotin hypodermically, in full doses, fred. extract of ergot by the mouth or morphia hypodermically; and if perforation of the intestine, in consequence of the eating through of one of the ulcers, takes place, the very slender hope of recovery is increased a little by the administration of large doses of a grain every hour of opium and by securing perfect rest in bed.

Hydrotherapy.—Since many of the worst symptoms of typhoid fever seem to be due to the effect of overheated blood upon the brain, efforts to reduce the temperature by the aid of cool baths of about 70 degrees Fahrenheit six or eight times daily, or cold sponging of the whole body, have of late years taken a very prominent place in the treatment of the disease, and are believed to reduce markedly its rate of mortality. Where, in spite of judicious employment of means to bring down the temperature, unconsciousness continues, great watchfulness is necessary in regard to the evacuation of the bladder, which may become dangerously distended, and even burst for want of attention.

Drawing the Urine.—When examined and found to be over-full, the urine should be at once drawn off by means of a catheter, and the operation repeated twice or thrice every twenty-four hours, until the patient resumes control over his functions.

Other treatment would be the

1. **Sponge Bath.**—The water should be cold or ice-cold, according to height of fever, and a thorough sponge bath should take from fifteen to twenty minutes. I have added alcohol to the water with good results.

2. **Cold Pack.**—If tub is not available the patient may be wrapped up in a sheet wrung out of water at 60 degrees to 65 degrees and then cold water sprinkled over him with a watering pot.

3. **The Bath.**—The tub should be long enough so that the patient can be completely covered, except his head. Every third hour, if temperature is above 102 degrees, the patient is placed in a bath at 70 degrees Fahrenheit, which, after the patient is put in, can be lowered a degree or two. In it he remains for fifteen or twenty minutes. He is then taken out, wrapped up in a dry sheet and covered with a blanket. The patient's limbs and body are gently rubbed while in the bath, and on removing he should have a stimulant. Rectal temperature should be taken directly after the bath, and again forty-five minutes later. Should the patient be too weak for the bath, frequent sponging or Leiter's coils should be used.

Constipation.—Should constipation be present, though as a rule it does no harm, it is well every third or fourth day to give an enema. If a laxative is needed during the disease give Hunyadi-János water.

Hemorrhage.—Should hemorrhage exist it should be treated with full doses of opium and acetate of lead. Ice should be freely given, and food should be restricted for eight or ten hours. If there should be any symptoms of collapse give stimulants.

Diet.—The diet of a typhoid fever patient must be watched over with unceasing vigilance, as upon it and proper nursing, more than upon medical treatment, the chances of success often depend. In the first stages it should be light, entirely unstimulating and unrelaxing to the bowels.

No Solid Food.—Throughout the whole course of the disease no solid food ought to be allowed, and this precaution should be rigidly enforced on account of thereby avoiding the risk of mechanically rupturing some little hole in the intestine, at the seat of an ulcer which had almost perforated the wall of the bowel. Such a catastrophe must, as already hinted, lead to almost certain death.

Drink.—As the thirst is usually very great, whilst the appetite is nearly lost, it is a good plan to make the drinks somewhat nourishing in order to support the strength. Hence, gum-arabic water, barley-water, albumen-water or milk thickened with tapioca, sago or cornstarch are often highly advantageous.

No Fruits.—If the usual tendency to diarrhœa is at all marked, fruits of all kinds ought to be entirely withheld by the nurse, and even where the bowels are not disordered, fruits and vegetables, other than those enumerated, should be very cautiously given, on account of the disposition to looseness of the bowels which generally exists. Many cases of death from typhoid fever may be directly traced to the murderous imprudence of nurses and attendants in this respect.

Diet for Second Week.—During the second week, when slight indications of debility usually begin to manifest themselves, a more nutritious diet becomes necessary. Thicker preparations of the farinaceous foods above mentioned should be employed, beef tea and beef essence may be added to the list, and as debility increases eggs beaten up with milk, flavored perhaps with a little wine, if they have been well borne during health, may be administered. In the latter stages, when the whole capacity of the enfeebled digestive organs is needed to take up sufficient food to sustain life, strong meat-soup, beef essence, eggs beaten up with wine, and milk punch should alone be urged upon the patient.

Injected Food.—Life has apparently been saved in some instances by frequently repeated small injections of beef essence, brandy and milk, with a few drops of laudanum, in order to prevent the enema from being rejected from the bowels, as is often the case in spite of all our efforts.

Nursing.—In nursing the case of a typhoid fever patient, watchful and judicious care of a skillful attendant often contributes in those instances having a favorable termination, as most candid physicians will admit, more than medical treatment to the sick man's recovery. The suitable administration of medicines to control diarrhœa, according to the varying phases of that important symptom; to relieve restlessness and allay excitement; the proper employment of baths to reduce febrile heat and diminish cerebral congestion; the constant guarding of the patient from injurious articles of food; the increasing effort to economize the failing strength, which otherwise may prove just a little lacking in the last great day of struggle with the disease, notwithstanding all the reinforcements called upon in the way of stimulants and nutrients to support it, all these offer an ample field for the highest intelligence and the noblest self-sacrifice.

Watching the Delirium.—The attendant upon a typhoid fever case must be on his guard, lest in his momentary absence the delirious patient gets out of bed and attempts to escape from the house, or perhaps throws himself out of a window. Even the effort at walking across the room may, in the weak conditions met with in the latter portion of the fever, so exhaust the failing strength as to lead to dangerous or fatal collapse.

Treating Bed-Sores.—The tendency to bed-sores, which are particularly apt to form over the portions of the body pressed upon in lying upon the back during typhoid and typhus fevers, must be overcome, as far as possible, by frequent change of position, the use of perforated pillows or cushions and of water-beds, and the patient should be well rubbed with alcohol twice a day, especial care being used over the parts of the body that the patient rests on while in bed, *i. e.,* back, buttock, and so forth. As a general rule, the formation of a bed-sore in a case of typhoid fever not lasting more than twenty-five to thirty days, is evidence of carelessness on the part of the nurse, and should never be permitted to occur. When once developed, bed-sores must be kept clean and carefully dressed once or twice daily, in the hope of preventing them from spreading, as the chance of curing them until the patient can sit up is exceedingly small. Not only is the suffering from bed-sores very great, but the free discharge of pus which they generally yield is extremely debilitating and quickly exhausts the little remaining stock of strength.

Typhoid Mortality.—The mortality of typhoid fever varies in different epidemics from 10 to 20 per cent. The older the patient the less is his chance of recovery from the malady, whilst among children the proportion of deaths is quite small.

Walking Typhoid.—Some of the mildest cases, those to which the name of "walking typhoid" has been appropriately applied, may suddenly terminate in perforation of the bowel, and death in a few hours from collapse or from peritonitis. On this account a typhoid fever patient, no matter how slight his symptoms of illness may be, should stay in bed, and swallow nothing but liquid food, until the searching test of the thermometer shows that all febrile movement has subsided.

Management of Convalescence.—Even after convalescence has fairly set in, great watchfulness is necessary. Permission to sit up in bed even ought not to be given until several days have passed without any fever, as proved by the thermometer, which should be used morning and evening throughout the complaint, and the return to solid food must be both slow and gradual. Any imprudence in diet, or slight over-exertion, may bring on a relapse, which is much worse than the original attack, and its causes ought therefore to be most sedulously shunned.

Prevention of Typhoid.—The great means of preventing typhoid fever by unceasing vigilance in regard to the purity of the water, milk and air supply has already been urgently insisted on. Prevention of typhoid is now being carried out in the army and institutions by means of hypodermic injections of bacterius.

CEREBRO-SPINAL FEVER OR SPOTTED FEVER.

Definition.—An infectious disease occurring sporadically and in epidemics, caused by a diplococcus, characterized by an inflammation of the cerebro-spinal meninges and symptoms of great pain in the head, back and limbs, convulsions, irregular fever, and at times petechial eruption.

History.—In 1801 Vieussens first described a small outbreak in Geneva. There had been several outbreaks in the United States prior to 1875, but since that time there have been several extensive epidemics. There was a serious epidemic in Western Maryland in 1802, in New York in 1893, and from the spring of 1896 to the spring of 1898 the disease has prevailed extensively in Boston and its neighboring towns.

Causes.—Over-crowding, poor food, foul air and bad drinking water seem to be the predisposing causes. The epidemics have occurred most frequently in winter and spring. The concentration of individuals, as of troops in barracks, seems to be a special factor; in civil life children and young adults seem most susceptible.

Symptoms.—Many different forms have been described, but they are best grouped into three classes:

1. **Ordinary Form.**—This is a malignant epidemic fever, usually attended with painful contraction of the muscles of the neck and retraction

of the head, and frequently accompanied by a profuse purpuric eruption. It is a disease which generally comes on suddenly, runs its course with great rapidity, and proves fatal in a majority of instances. The malady is more than a mere inflammation of the membranes of the brain, or meningitis, for the whole nervous system seems to be very gravely affected from the first.

Premonitory Symptoms.—Premonitory symptoms are rare, but when they are met with, show themselves simply as slight headache and pain in the back, or a little uneasiness and weariness experienced for several days before acute symptoms set in. These may commence with a chill or marked shivering-fit, followed by intense vertigo, headache of intolerable severity, obstinate and violent vomiting, painful muscular stiffness, soon developing into continuous spasms, affecting particularly the muscles of the head and back.

Head Distress.—Distress in the head is constant so long as consciousness lasts. The eyes are blood-shot, and express agonizing suffering, the pupils are contracted, and the countenance is pale. Excessive restlessness and general muscular agitation prevail, and the sensibility of the whole surface is so great that every touch and movement causes excruciating pain, and even touching the hair is painful.

Third Day Symptoms.—These symptoms increase up to the third or fourth day, when the power of swallowing begins to be affected, and the process of respiration to be imperfectly and irregularly performed, the head being dragged tightly back as far as possible, and the features fixed in the horrible and characteristic grin of lockjaw. The delirium usually developed during the third day, if it has not sooner appeared, passes into stupor, and this in its turn deepens into coma, from which or from suffocation death commonly releases the sufferer between the fifth and eighth day of the complaint, or in a few cases the patient may gradually improve, and after three or four weeks enter upon a tedious convalescence of many months' duration.

2. **Malignant Form.**—There is an abrupt onset with a chill, followed by vomiting, headache, moderate fever, convulsions and rash.

3. **Abortive Form.**—The disease begins abruptly with grave symtoms, but terminates in a few days in recovery.

Diagnosis.—The diagnosis between this disease—which, it should be stated, has also been named epidemic cerebro-spinal meningitis, or purpuric fever—and typhus fever, typhoid fever, tetanus or lockjaw, tubersular meningitis and typhoid pneumonia, is usually not difficult, except in the earliest stages. The fact of its epidemic prevalence generally aids at once to its recognition, except in the first few cases which occur, and even in these the intolerable headache, retraction of the head, and excessive sensitiveness of even the hair to the lightest touch, are almost always sufficient to characterize this strange and terrible malady.

Complications.—Deceptive vision from inflammation of the cornea or atrophy of the optic nerve; defective hearing from inflammation of the auditory nerve or from suppurative inflammation of the middle ear. Pleurisy, pericarditis and parotitis are not uncommon, and headaches more or less severe may remain for months or years.

Treatment.—The treatment consists of dry or wet cups to the nape of the neck and along the spine, cold to the head by means of ice-bags or bladders, or better still the ice-cap, opium in quantities of a grain every two or three hours, and especially hypodermic injections of morphia, to relieve the agonizing suffering as well as for the direct curative effect which opiates seem to possess in some instances, and iodide of potassium, in full doses of five grains every four hours, is indicated during convalescence, and blisters to the spine are also highly recommended.

General Remarks as to Prevention.—Cerebro-spinal Meningitis is a very contagious disease with a very high death rate. Death may occur within a few hours to a few days. It is caused by a germ which is found in the fluid in the spinal cord.

Outbreaks are more common in the winter and spring than in warm weather. It occurs both in large cities and sparsely settled country places. Its development is favored by the presence of filth, exposure to cold and wet, overwork, injury to the head, etc. Individuals of all occupations and professions can catch this disease. Its danger lies in its being a disease especially of children and young adults. After forty years of age it is rare, though in a severe epidemic anyone is liable to catch it.

The early symptoms of cerebro-spinal meningitis consist of a child or adult being seized with a violent headache, chill, nausea and vomiting. The patient is dizzy and acts like a drunken person. Dragging pains occur in the neck which extend along the spine and into the legs and arms. The patient suffers agonizing pain upon bending the head forward or from side to side. Later convulsions develop, and the patient becomes rigid, with only the back of his head and heels touching the bed. The back is arched, eyes may be crossed and bulging and he presents a terrible and hopeless picture of suffering and despair. The slightest touch will produce pain and cause the patient to utter terrifying screams. Delirium develops, followed by stupor, and unles the patient has a good constitution and receives special care and treatment, death follows.

The rash of spotted fevers occurs as tiny scattered reddish spots, some are dark or purplish red and contain, when stuck with a needle, a reddish fluid. In the severe cases death may occur in a few hours.

The germ causing this disease is supposed to enter the body through the mouth and nose and finally reaches the brain and spinal cord.

The after effects of spotted fever are what makes the disease so dangerous. Thus various forms of paralysis, loss of intelligence, due to the brain having been inflamed (meningitis), complete deafness and loss of vision.

The spread of the disease can be prevented by a person following the laws of personal cleanliness, and removing all filth, dust, etc., from about the premises. Avoid catching a cold, and do not approach a house where a case is.

Every case of spotted fever must be reported to the health authorities by the physician or guardian of the patient. Don't wait a minute. If there is a case in your neighborhood, be on guard and at the slightest sign of any child or young adult being taken ill with the symptoms, mention the above, summon your physician or the nearest health authority.

The patient must be placed in a darkened, well-ventilated room. Screen all doors and windows. The attendant or nurse must not leave the room without leaving the clothing inside and the hands must be dipped in chloride of lime.

The Board of Health will place a placard on the front and back doors. Whenever possible, send the patient to the contagious hospital. All bed linen, clothing, dishes, etc., must be dipped in chloride of lime solution (one-half pound to a pail of water) before being washed. All cloths in which the discharges from the nose and throat have been collected must be burned. The kissing of patients is dangerous as the disease may be contracted in this manner. No one must enter or leave the room in which the patient is confined except the doctor or nurse.

After recovery, the room must be fumigated by the Board of Health. Leave in the room all clothing worn by the patient and nurse, bed linen, carpets, curtains, etc., must be spread out so that the disinfectant can destroy all germs. Kill all flies or mosquitoes seen in or about the room or house, as they carry the disease.

RELAPSING FEVER OR FEBRIS RECURRENS.

Definition.—It is an infectious disease caused by the spirochetes of Obermeier, characterized by a definite febrile paroxysm which usually lasts six days, and is followed by a remission of the same length of time, then by a second paroxysm, which may be repeated three or four times.

Cause.—This disease is also known as "famine fever" and "seven-day fever." The special conditions under which it develops are similar to those of typhus fever.

Symptoms.—Period of incubation appears to be short and in some cases the attack develops promptly after exposure, more frequently, however, from five to eight days. Its onset is usually abrupt, without any preliminary symptoms, and the febrile attacks, usually severe though of short duration, pass away leaving the patient comparatively well for a few days. After an interval of about a week, however, a repetition of the primary attack is experienced, and this relapse, from which the disease takes its name, may recur four or even five times.

Blood Germs.—Relapsing fever is remarkable for being the first human febrile affection of a paroxysmal character which has been definitely connected with the development of a vegetable organism in the blood. The peculiar vegetable organisms belonging to the spirochetes are found in the blood of relapsing fever patients by tens of thousands, and disappear during the temporary convalescence, to reappear with the recurrence of the febrile attack.

Symptoms Beginning.—The onset of the malady is marked by a chill or shivering-fit, severe headache, vomiting and often jaundice; a white, moist tongue, tenderness over the pit of the stomach, constipation, enlarged liver and spleen, high-colored urine, a frequent, full and often bounding pulse, pains in the back and limbs, and frequently delirium.

Further Symptoms.—These symptoms abruptly terminate between the fifth and eighth day, as a general rule, by an exceedingly copious perspiration, and, after an interval of a week, during which it may be supposed that a new crop of bacteria are ripening, and in which time the patient is often well enough to get up and walk about, a sudden relapse takes place, running through the same phases as the original outbreak, except, perhaps, that it is a little shorter.

At Death.—When death occurs, it is apt to happen from a fainting-fit, following excessive perspiration, or from coma, the result of suppression of the renal secretion, but as seen in America the fatality is very small, being on an average less than two per cent.

Diagnosis.—The diagnosis of relapsing fever cannot be positively made by the general symptoms during the primary onset, but may be strongly suspected, and the relapse looked for if the disease is prevailing, and exposure to the contagion has occurred. A microscopic examination of the blood during the height of the febrile movement will, however, determine the presence of the spiro-bacteria, and this investigation ought therefore always to be made.

1. **Treatment.**—Although so far advanced in our knowledge in regard to the vegetable nature of the true contagion of relapsing fever, we have not yet made equal progress in the specific treatment of this complaint. The great problem, of course, is to find some mineral substance which can be taken up in the blood in sufficient quantities to check or prevent the growth of the bacteria in that vital fluid, without seriously injuring the patient himself. Quinine, so useful in intermittent fever, has proved almost worthless in this disease, and our chief reliance to reduce the high temperature is at present on cool baths or cold sponging.

2. **For the Headache.**—If the headache is very severe, dry cups to the back of the neck and along the spine may be employed, or one or two leeches may be applied behind the ears, although, since the tendency of the disease is toward great debility, it is better to avoid the abstraction of blood if possible. Opium or morphia by the stomach, or still better by hypodermic injection, is often necessary to relieve the headache and the severe pain in the limbs, and if symptoms of prostration come on early, wine or brandy must be resorted to.

3. **The Urine.**—A very careful watch must be maintained over the functions of the kidneys, since one of the great dangers of the disease appears to be the failure of these organs to perform their duty of purifying the blood from urea, which, when allowed by renal negligence to accumulate in the system frequently causes death by uremic poisoning. The urine should, therefore, be frequently examined, its total daily quantity noted, and the existence of albumen tested for. On account of its favorable action on the kidneys, sweet spirits of nitre in quantities of a teaspoonful every four hours is particularly applicable.

4. **For the Pain.**—For the muscular pains it is reasonable to expect that phenacetine, antifebrin or antipyrin will be of great service. The febrile paroxysm demands much the same treatment as typhus fever. Sponging or cold baths and nutritious and easily assimilated food.

FEBRICULA OR EPHEMERAL FEVER.

Definition.—A fever of short duration, depending on a variety of irritative causes. A febrile movement, lasting twenty-four hours and then disappearing, may for convenience be called ephemeral fever; if of three or four days' duration, febricula.

Causes.—The most frequent cause of this form of fever is probably the ingestion of foods difficult of digestion. As a rule dyspepsia is perhaps the most frequent cause of such a fever. This is especially the case with children, where it is often spoken of as gastric fever. Another cause is exposure to cold, insufficient to produce bronchitis, tonsilitis or some other affection too slight to be recognized by the usual signs.

Symptoms.—The symptoms of irritative fever are those usual to fever in a mild degree, *i. e.,* moderate elevation of temperature rarely above 103 degree Fahrenheit, frequent pulse, flushed face, headache, sense of lassitude and weariness, loss of appetite, nausea and restlessness; in children perhaps delirium. The fever is apt to terminate suddenly by crisis on the third or fourth day.

Diagnosis.—Typhoid fever—at first the diagnosis may be impossible, but the absence of diarrhœa, tympanites, abdominal tenderness, spleenic enlargement and eruption will soon make the diagnosis apparent.

Treatment.—Absolute rest in bed, a liquid diet and repeated doses of calomel may be employed to relieve the constipation. The fever may be controlled by the following mixture:

Tincture of aconite root .... 3 drops
Spirits of nitrous ether ....½ ounce
Acetate of liquid ammonia, add sufficient to make 3 fluidounces.
A dessertspoonful every two hours for a child 4 years old.

PROTRACTED SIMPLE CONTINUED FEVER.

Definition and Cause.—It seems necessary for the present to continue this term for a feverish process of a longer duration than febricula—a fever of long duration that is not typhoid, nor influenza—lasting from two weeks to three months and without definite lesions may be put under this head. Cases of prolonged fever succeeding pneumonia and pleurisy which subsequently recover may well be ascribed to this disease.

Symptoms are, as will be readily understood from this explanation, slight chill or chilly feelings for the initial disturbance, followed in a few hours by headache, quickened pulse, rise in temperature and constipation. Very often in persons of sensitive stomachs there is a little nausea or vomiting for twelve or twenty-four hours, and again with those of sensitive skins there may be a slight eruption of roseola, or prickly-heat, as it is often called, especially about the loins and over the back. The fever may run high enough for the overheated blood to disturb the brain and produce some delirium, especially at night; but at the end of a period, varying in duration from twelve hours to ten days, the febrile symptoms usually subside without any further derangement of the system than a very copious and debilitating perspiration, or perhaps an outbreak of the vesicles of herpes, commonly denominated "cold sores," about the face or elsewhere. Such attacks as these cause much needless anxiety, needless at least in the Northern States, to both physicians and patients, the former dreading the onset of typhoid fever or other dangerous disease, and the latter suffering an agony of suspense from which, for a time, all the knowledge of Hippocrates or Æsculapius himself could not deliver them.

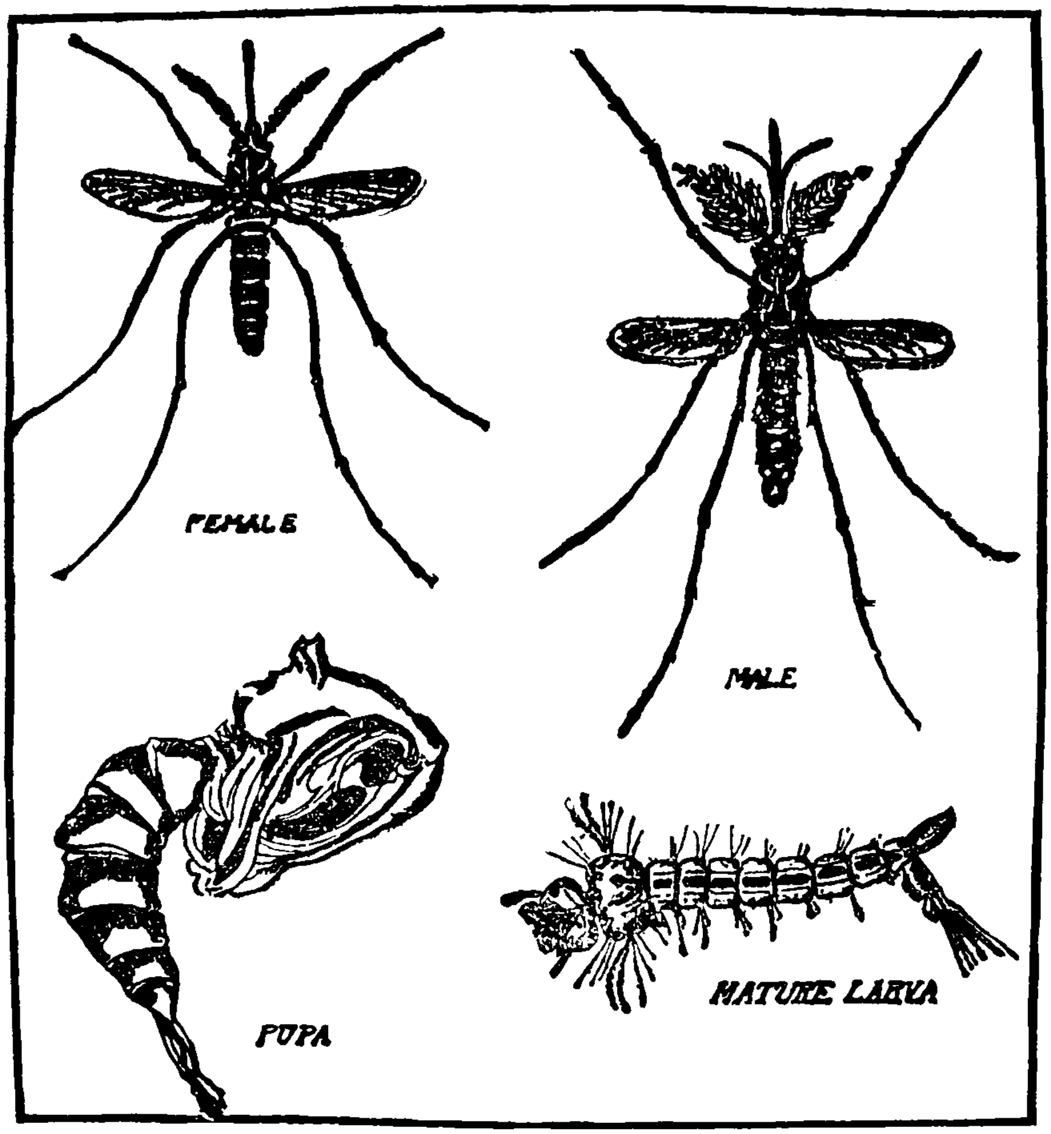
Treatment.—The patient in these puzzling cases should be kept in bed, and allowed only light and unstimulating liquid food. Cold applications may be made to the forehead and temples to relieve headache, and diaphoretics combined with anodynes, such as nitre and morphia, as already directed, to reduce fever and allay restlessness. Lumps of ice are useful and refreshing to the throat when swallowed and whilst there is constipation small doses of calomel repeated until there is a free bowel movement.

YELLOW FEVER.

These germs, in the course of ten to fourteen days, undergo a process of development and multiplication. At the end of the period of development the germs migrate to the biting organ of the mosquito, from where they are transmitted into the blood of a healthy person through the skin, when bitten. Each germ, in turn, when deposited in the blood vessel of the human body, multiplies and develops, and, liberating its toxin, spreads through the circulation and produces the yellow fever in it most pronounced form.

Yellow Fever, sometimes called Yellow Jack, Sailor's Fever, Black Vomit, Gibraltar Fever, etc., is a disease occurring in tropical and subtropical countries. Its cause is unknown, but science has proven that the poison causing Yellow Fever is carried from one sufferer to another by the mosquito called the *Stegomyia fasciata.*

Yellow Fever is supposed to have been imported into the Western Hemisphere by the Spanish navagitors. It was first described as a disease in the middle of the seventeenth century, where it was discovered in



THE YELLOW FEVER MOSQUITO.

the Antilles. The disease affects seaport towns and maritime districts in tropical and subtropical countries. Epidemics occurred in the seaport cities of the United States in the nineteenth century. Philadelphia suffered from a disastrous epidemic during the end of the eighteenth century.

Yellow Fever always occurs in the summer and autumn months and ends upon the appearance of frost. Havana, Cuba, Vera Cruz, Mexico; Rio Janeiro, Brazil, and New Orleans during the nineteenth century, until the occupation of Cuba by the Americans, were the cities known as the spots in which Yellow Fever was usually present, and from which the disease spread to other seaport cities of tropical and subtropical countries and the United States.

The Mosquito as the Carrier of Yellow Fever.—Dr. Finlay, of Havana, in 1881 first called attention to the fact that the mosquito was associated with Yellow Fever, and about 1890 was the first to explain clearly the mosquito theory of the transmission of Yellow Fever, but he could not prove it at the time by experiment.

The American occupation of Cuba, however, brought into application in a practical way this theory of Dr. Finlay's. Thousands of cases of Yellow Fever occurred throughout the island and became a menace to the health and lives of our troops. This brought home to the United States Government the dangers and prevalence of Yellow Fever in so close a neighbor, and renewed efforts were made to prove that the mosquito carried the poison which caused Yellow Fever.

In 1900 Dr. Finlay had produced yellow fever in a man by allowing a mosquito to bite him two days after the insect had bitten a sufferer from Yellow Fever. This lead to experiments carried on by the U. S. Yellow Fever Commission, which confirmed, without doubt, that the mosquito (*Stegomyia fasciata*) spreads the Yellow Fever. This Commission had a mosquito-proof house built with a partition dividing it into two rooms. Into one room was placed a non-immune person in a bed and mosquitoes which had previously bitten Yellow Fever patients were liberated. They attacked and bit the volunteer, who had purposely exposed his arms and chest. This procedure was repeated three successive times. Five days after this experiment, this man developed Yellow Fever. On the evening that this first man exposed himself to the mosquito, two other men who never had Yellow Fever slept in the second room, which was screened and contained no mosquitoes, and they did not catch the disease from the man in the adjoining room; this experiment proving that the disease could not be caught by being near or in contact with a patient.

A second mosquito-proof house was constructed in which bed-clothing and wearing apparel which had been soaked in the discharges from a sufferer from Yellow Fever, were placed, and this house was entered for twenty-one consecutive nights by two soldiers and a surgeon who handled and shook the soiled articles. This experiment was repeated by three different sets of men, each remaining twenty-one nights. Not a man contracted Yellow Fever, nor was any the worse for the experiment. This experiment proved that Yellow Fever was not contagious and could not be caught by the handling of clothes, etc., from a patient who had Yellow Fever.

The absolute proof that Yellow Fever was carried by the mosquito was put to a practical test by Dr. Gorgas, of the U. S. Army, who in the cleaning of Havana destroyed every mosquito seen, cleared away all breeding places and screened all homes, hospitals and camps where Yellow Fever patients were confined. Thus Havana was made as free from Yellow Fever and as safe to live in as the healthiest city in the world.

It requires three to four days for a person to develop Yellow Fever after being bitten by a mosquito which has sucked the blood of a patient suffering from the disease. Experiments have proven that the mosquito cannot convey the disease to another until he has had the poison in his body for twelve days after biting a Yellow Fever patient. One attack of Yellow Fever renders the person immune to another attack—that is, they cannot have it twice.

Prevention.—The best course in Yellow Fever is to prevent its spread. Place the patient in a screened room or hospital. It is not necessary to keep him or her away from others with the disease or to exclude the family, as Yellow Fever is not contagious. Only be sure that all mosquitoes are killed and kept out of the room by screened doors and windows. In cases of an epidemic the local Board of Health will do well to call upon the State and Federal authorities to aid in fighting this dreaded disease. Every town or city in tropical or subtropical countries should do everything possible to destroy the mosquito and its breeding places. The following are the rules adopted by the United States Army for the protection of troops from the yellow fever mosquito:

"1st. The universal use of mosquito bars in all barracks and especially in all hospitals, and also in field service when practicable.

"2d. The destruction of the larvæ or young mosquitoes, commonly known as 'wiggletails,' by the use of petroleum on the water where they breed.

"The mosquito does not fly far and seeks shelter when the wind blows; so it is usually the case that each community breeds its own supply of mosquitoes in water barrels, fire buckets, post holes, old cans, cesspools or undrained puddles.

"An application of one ounce of kerosene to each fifteen square feet of water, twice a month, will destroy not only all the young but the adult females who come to lay their eggs. The water in cisterns or tanks is not affected for drinking or washing purposes by this application if only it is drawn from below and not dipped out.

"For pools or puddles of a somewhat permanent character draining or filling up is the best remedy."

Definition.—An acute infectious disease characterized by yellowness of the skin and accompanied in the severer cases by black vomit, suppression of the urine, with hemorrhage from the stomach, nose and mouth. It is almost peculiar to tropical climates and not apt to spread in temperatures below 72 degrees Fahrenheit. It is extremely fatal. It is not contagious. It can only be acquired by bite of the female mosquito known as *Stegomyia fasciata.*

Symptoms.—Yellow fever presents three well-defined stages. The first is characterized by intense pain in the head and back, injected eyes, rapid pulse and elevated temperature. This stage may last from twenty-four hours to six days—according to the severity of the attack, nausea and vomiting are present and become more intense on the second or third day. The bowels are usually constipated. As early as the first morning, according to Guiteras, the face is decidedly flushed, more so than in any other infectious disease at such an early period. The second stage is characterized by the following symptoms:

The Pulse.—One of the diagnostic signs is that with an ascending temperature, there will be a descending pulse. On the first day the pulse is rarely more than 100 or 110; on the second or third day while the temperature keeps up the pulse begins to fall and may become slower to the extent of twenty beats. On the evening of the third day there may be a temperature of 103 degrees and a pulse of 75; it may, during defervescence stage, go down as low as 30.

The Fever.—On the morning of the first day the temperature may vary from 103 degrees to 106 degrees; during the evening of the first day and the morning of the second day the temperature keeps about the same. There is a slight diurnal variation in the second and third days.

The Calm Stage.—Third stage, the remission or stage of calm, as it has been called, is succeeded by a febrile reaction, or secondary fever which lasts one, two or three days, and in favorable cases falls by a short lysis. On the other hand, in fatal cases the temperature rises rapidly, becomes higher than in the initial fever and death follows shortly. The second stage is marked by depression of the nervous and muscular forces, and of the general and capillary circulations, slow and intermittent pulse, jaundice, urinary suppression, passive hemorrhages from the bowels, nose, gums, uterus and nearly all the organs lined with mucous membranes and, in cases of unusual severity, also from the eyes, ears and skin. Black vomit, delirium and coma generally terminate in death.

In more severe cases the symptoms resemble to a considerable extent those of relapsing fever, and it is impossible to foretell from any of these indications how serious these consequences may prove to be. In truth, these sequels constitute the most distinctive characteristics of yellow fever and comprise the "black vomit," so well known and dreaded as a fatal symptom. The black vomit is frequently preceded by the white vomit, as it is called, which is a clear acid liquid, and at this time some pain is usually felt on pressure over the pit of the stomach. The occurrence of this black vomit is well known, even among sailors to West Indian ports, as a fatal sign in yellow fever, although occasionally a patient recovers after this gloomy harbinger of death has manifested itself. The yellow-jaundiced hue of the skin, when well marked, indicates a severe form of the disease, but has by no means the terribly fatal import of the black vomit.

1. **Prognosis.**—There are epidemics in which all persons attacked are seriously ill or die. There are epidemics of medium intensity in which the progress of the disease is limited and the mortality low. Finally, there are mild epidemics in which nearly all the patients recover. The virulence of the epidemics seems to depend upon the month in which it is imported. The pathogenic bacillus increases in virulence in the months of May, June and July. On the other hand, the epidemics which are imported in the months of August, September and October are very mild, owing to the attenuation of the bacillus.

2. **The Individual Attacked.**—Should the patient prior to his attack have been addicted to the use of alcohol, should he be debilitated from overwork, sexual excesses or bad living, and lastly, if he be old, the prognosis is against his recovery. The younger, the healthier and stronger the patient the greater are his chances for recovery. When the fever reaches its maximum at the onset and defervescence is continuously noted at each visit, the disease is mild; even when the fever ranges between 103 and 104.5 degrees Fahrenheit during the first three days, with a remission of at least a degree in the morning and the exacerbations are less and less pronounced each night, the patient always gets well. When the fever

ranges between 104 and 105 degrees Fahrenheit, still with remissions of at least a degree, but with exacerbations above the degree of fever of the previous day, the disease is to be considered grave. The cases of recovery are more numerous than the fatal ones even here. But when the fever reaches 105 degrees Fahrenheit or above within the first twelve hours the disease is usually fatal, unless heroic treatment immediately produces a defervescence of two or three degrees. Copious urine is always a good augury, even should it contain five or ten per cent. of albumen.

Scanty Urine with twenty to twenty-five per cent. of albumen on the second day, accompanying a fever about 104 degrees, indicates great danger. When the urine froms a complete coagulum on being heated death is certain. When anuria lasts twelve hours death is absolutely certain.

Intense Jaundice on the third day, urine scanty and albuminous, with black vomit occurring at the same time, always results fatally.

Black Vomit is less grave in children and in young women than in adults, particularly those over forty years of age; the latter always die.

Profuse Bleeding of the gums coming before or at the same time as the black vomit indicates an almost desperate state. Should it, however, occur on the fourth day and the gums being sound, the prognosis is less gloomy.

Women having uterine hemorrhage on the fourth and fifth days with black vomit never recover.

Treatment.—There are two great principles to be carried out in the treatment of yellow fever:

1. To strengthen and sustain the organism by fortifying the nervous system, by arresting congestion and by increasing the blood pressure and diuresis.

2. To consume, destroy and eliminate the toxin.

First of Above.—The first of the above is met by means of cold sponging or cold baths, administered not in a routine way, but by taking the virulence of the disease and the degree of the fever as a guide.

Second of Above.—The second indication is met by putting the patient in a well aerated room, night and day, and making him drink in order to cleanse his blood and to dilute the toxin and eliminate them by way of the urine, two to four quarts of Vichy water in twenty-four hours.

It is during the first three days of the disease that the physician must act.

Absolute Best.—Put the patient to bed, rest is essential and indispensable, walking, moving or the least muscular effort always increases the fever, and consequently the disease.

Aeration of the Room.—The patient must be placed in the largest and best ventilated room in the house. Exposed to the rising sun if possible. Keep the windows open night and day; do not let patient be in a draught, but let the outside air enter and circulate freely.

Cleanliness.—The patient must be kept clean; should he be soiled by evacuation of the bowels or vomit, change the linen at once and plunge the soiled clothes in an antiseptic solution; cleanse the patient's teeth twice a day with cooking soda and warm water. Administer morning and night an enema containing a pint of warm water and a tablespoonful of sulphate of magnesia.

The Urine should be examined each day to see how the kidneys are acting.

Treatment of the Vomiting.—Let the patient eat small pieces of ice, but absolute rest for the stomach is the better plan.

Nourishment.—None should be given for the first seventy-two hours, after that milk every four hours. Starve your patient whether he be child or adult, unless the fever be below 102 degrees Fahrenheit. Vichy water in large quantities should be given from the onset of the disease.

Medicinal Treatment.—At the onset give one to three grains of calomel, depending on the age of the patient, but not enough to purge. In desperate cases enemas of strong black coffee to which is added two tablespoonfuls of brandy have been found beneficial.

BUBONIC PLAGUE.

Definition.—An acute infectious disease, which is identical with the pestilence of India and the black death of Europe in former ages, and is attended with buboes or boils of the lymphatic glands of the groins, as well as other glands and occasionally with carbuncles. It is very easily communicated by human intercourse and is probably the most fatal of all the eruptive fevers.

Cause.—The specific bacillus which causes this disease was discovered by Kitasato, and occurs in the blood and in the organs of the body. It obtains entrance through the digestive and respiratory tracts.

History.—The earliest positive accounts date from the second century of our era. From the great plague in the days of Justinian (sixth century) to the middle of the seventeenth century epidemics of varying severity occurred in Europe. Although the inhabitants of the United States have hitherto been spared any visitation from the plague, yet, as the shipments of rags from Italian ports with marble, for which they are used as wrapping, is carried on quite extensively, germs of this terrible malady may at any time be imported and planted within our borders. In the last great outbreak of plague in Astrakhan, a province of southeastern Russia, the starting-point of the whole epidemic was, it is said, traced to a shawl brought by a Cossack returning from the war in Afghanistan, as part of his booty, and presented to his sweetheart. The girl wore the fatal gift for a few days, when she sickened with all the symptoms of plague and died. During the following four days the rest of her family, six in number, sickened and died. Erom these poor people the disease spread rapidly, and proved very fatal, devastating nineteen villages in that district. Its deadly march was only checked by a double cordon of soldiers being placed around the infected towns, and absolute non-intercourse, on the plan of the shot-gun quarantines of our Southern States, enforced.

Symptoms.—In the milder cases, patients are attacked with violent headache, transient shiverings, alternating with intense heat of skin, sometimes terminating in death from prostration. In the more severe form the persons affected are suddenly seized with palpitation of the heart, irregularity of the pulse, vomiting, difficulty of breathing, spitting of blood, and syncope or fainting. The face becomes pale, the expression apathetic, the eyes dull and the pupils dilated. The patients lie for three or four hours in a state of absolute prostration and then a violent accession of fever with delirium followed, in which the urine is suppressed and the bowels constipated. Dark purplish spots, from one-tenth of an inch to one inch in diameter, appear over the body, which exhale a peculiar odor somewhat resembling honey, and death is preceded by lethargy and collapse. The corpses become putrid in two or three hours after decease. Death sometimes occurs in twelve hours from the first onset.

The fever may reach 104 degrees or 106 degrees Fahrenheit, and the tongue becomes brown. The inguinal glands are most often affected, then in order, the axillary, the cervical and the popliteal. Carbuncles also develop in different parts of the skin, particularly on the legs, buttocks or back.

Treatment.—Free stimulation, nutritious food, as in the most adynamic forms of typhus and typhoid fever together with cool baths to combat the fever, are the measures indicated. Antiseptic treatment of the abscesses should be practiced.

Preventive Measures.—In India, from 1896 to 1907, the number of cases of plague was 1,400,000, with 1,200,000 deaths. Owing to the filth and fanaticism of the people, neither curative nor preventive agencies were of much avail. It is evident that the greatest care is now demanded of every country to be watchful and to adopt all necessary measures to prevent a lodgment of the plague. Its introduction is due (1) to the arrival in a community of persons suffering from it, or who are in the incubative stage of the disease; and (2) through the instrumentality of rats, which are reagents of the plague.

Precautions as to Persons.—As to persons, precautions against the plague resolve themselves into measures of quarantine observance. Every vessel, its crew and all passengers arriving from infected ports should undergo most critical scrutiny. Temperatures should be taken on arrival, and efforts made to distinguish between the mild, or amulant, cases and those of the croupous, or pneumatic type. The history of each individual with a mild case should be carefully looked up. Examination should be made of the glandular regions, the groins, the axillæ, the neck, and if buboes are found they should be carefully distinguished from those due to venereal infection. For the detection of cases of the pneumatic type, the respiratory organs should be carefully examined, and the sputum subjected to microscopic or bacteriological tests to discover, if possible, the plague bacillus.

Incubation.—The period of incubation of the plague for quarantine purposes should be regarded as seven days, and individuals from ports or places where plague is known to prevail should be detained for a period to complete seven days from the last exposure to infection, and should be subjected to critical inspection twice a day.

Quarantine Against Rats.—To prevent the introduction of the disease through the agency of rats on vessels from infected ports, every part of the vessel should be disinfected by sulphur fumes for the destruction of the rodents, and their passage from vessel to shore should be prevented. The vessel should not be unloaded at a dock, but in mid-stream, by means of lighters. All rats found dead by the fumigation should be subjected to bacteriological examination, their bodies gathered and burned, and the places where they were found disinfected with a germicidal solution, or with boiling water. Fleas from the rats should be similarly guarded against, for they usually leave a dead rat, and thus help to spread the plague germs. All masters of vessels, agents and consular officers would do well to subject their vessels to disinfection for the destruction of rats at intervals of, say, three months.

Procedure in Cities.—When the plague has made its appearance in a city, the authorities should promptly pass anti-plague ordinances regulating garbage disposal, and placing all unsanitary buildings and places in sanitary condition. All garbage and kitchen waste should be collected and removed in covered, rat-proof cans; rat runs and burrows should be destroyed or filled in with broken glass; house drains should be repaired; all nuisances should be abated; garbage should never be dumped in places accessible to rats, but should be burned; an active campaign against rats should be inaugurated, either by traps or by poisons, such as arsenic, phosphorus paste and carbonate of baryta. Rat poisons should be frequently changed, as well as the manner of displaying them. After the appearance of the plague in San Francisco in September, 1907, the campaign against rats resulted, in a few months, in the capture of 278,000 rats, and the destruction by poison of 500,000. Perhaps no other agency was so potential in ridding the city of the plague.

Plague in the House.—The house or dwelling in which plague appears should be vacated. The house should be disinfected and fumigated, poison spread and trapping instituted to rid the premises of rats. Cellars and basements should be made rat-proof to prevent their return. Patients suffering with plague should be removed to a rat-proof hospital for treatment, and those who have been in contact with the dwelling should be isolated in some sanitary place for a time sufficient to cover the period of incubation of the disease.

Serum Treatment.—While, as has been seen, the U. S. Bureau of Health relies chiefly on preventive measures for the extermination of bubonic plague, it by no means ignores the agencies which modern science places at its disposal for immunization from the disease or for dislodging it from the system. It has, therefore, experimented much with the prophylactic (preventive) fluid of Dr. Haffkine, by inoculating the system with it. In some cases it gave gratifying results, and in others proved disappointing. So also the antipest serum of Dr. Yersin has been tried and found to contain prophylactic qualities of a decided character, but the duration of the immunity offered is very uncertain; however, in the treatment of actual cases of plague this antipest serum has been found decidedly beneficial if used sufficiently early in the disease and in sufficiently large doses. This serum is produced by the Pasteur Institute at Paris, France, and at the Bacteriological Institute at Lyon.

Outgoing Quarantine.—If the city in which the plague has made its appearance is a seaport, all outgoing vessels should be subjected to careful scrutiny, and should be thoroughly fumigated with sulphur before taking on cargo to insure the destruction of rats. Wharves should be rendered rat-proof; gangways should be fended and guarded day and night, and all articles of cargo attractive to rats should be kept in rat-proof enclosures. Rags intended for export from a plague-infested city should be thoroughly sterilized, or else destroyed entirely, for it is quite possible that they may contain the dressings used in the treatment of plague cases. They may also contain the dejecta of plague-infected rats.

Personal Protection Against Plague.—The following statement is made by Charles S. Braddock, Jr., M. D., of Haddonfield, N. J., late chief medical inspector of the Royal Siamese Government, in his "Notes on Bubonic Plague as Seen in Siam:"

"Personally in attending (plague) patients I always used plenty of coal oil on my shoes and stockings and on my leggings, as it has been shown that this kept the fleas away, a fact which was practically demonstrated in Bombay and Calcutta, where the coolie employees of the oil companies were found not to contract the disease which was raging all around them. The investigators in India found that on the death of a rat the infected fleas promptly left the dead rat, and if a non-infected rat was placed near them promptly attached themselves to him, and in a few days he was infected and died of plague. In the town of Petchaburi I traced the great and excessive death rate among the children to the fact that after the rats died the infected fleas took up their habitat on the pariah dogs, and, these being petted and fed by the children, the children suffered proportionately. As the people are Buddhist in religion, and will not destroy life, my application to have the dogs killed was not granted. One of the most effective measures to stop the disease after all disinfection and sanitation was accomplished was to wash all floors and furniture with crude coal oil, and sprinkle it with a watering pot in large quantities under the houses and over the ground in the vicinity."

SLEEPING SICKNESS.

(*Human Trypanosomiasis.*)

Sleeping sickness is a disease affecting human beings, which is caused by the parasite—Trypanosoma Gambiense, getting into the blood, due to the bite of the Tetse Fly. It is usually fatal.

Sleeping sickness has occurred for the last hundred years on the West coast of Africa, and the disease includes the country between the Gambia and Congo rivers.

In 1896 to 1901 this disease occurred in Uganda, Africa. It was evidently brought there by the natives who came from the Congo State where the disease prevailed. It was not recognized until 1901, when the cases became numerous.

Race.—This disease can develop in any race of people if exposed to the bite of the Tetse Fly.

Occupation.—Any work which leads a native or foreigner to spend much time on the shores of the rivers and lakes within the sleeping sickness territory, exposes himself to the disease. Native negroes contract sleeping sickness more than the whites, due to the fishermen, canoemen and other inhabitants being half naked and thus constantly bitten by the Tetse flies, 30 to 80 per cent. of them having the parasite in their blood.

Any person of any age or condition of health will develop sleeping sickness if bitten by a fly which has previously sucked the Trypanosoma from the blood of a sufferer from the disease.

Cause.—The sleeping sickness is due to a minute, wriggling, worm-like parasite, called the Trypanosoma Gambiense, named by Doctor Dutton of England, in 1901, who was sent to investigate this disease which was causing the slow death of thousands of negroes in Africa. This parasite is only seen when blood is drawn from a vein or lymphatic gland and examined under the microscope. It is very difficult to discover and often requires several examinations of the blood before it can be seen. When the Trypanosoma first is injected beneath the skin by the bite of the fly it passes to the lymphatic system, where it is found in great numbers, causing a swelling of the lymph glands, then passing in small numbers into the general circulation.

These parasites only reproduce themselves within the human body. They do not pass out in the urine or stools, but only when the lymphatic duct blood fluids are withdrawn.

Sleeping sickness is not contagious, but is considered infectious. A delicate parasite which is incapable of living outside of the human body cannot be conveyed by drinking water, food, dust, etc., as other germs are.

Entry of Germ into the Human Body.—The Trypanosoma is conveyed from the sick to the well by the Tetse Fly (*Glossina Palpalis*), and it is the only species of fly known to harbor the parasite. Wherever sleeping sickness prevails, the Tetse Fly is correspondingly abundant upon the shores of the rivers, lakes, etc. This has been proven by taking flies which were caught in the sleeping sickness zones and alluring them to bite monkeys, the latter developing the symptoms of the sleeping sickness. The Tetse Fly cannot transmit the disease after three days have elapsed since biting a sufferer. The disease usually develops in a new case from eight to forty-eight hours after the fly has bitten a previous sufferer.

The Tetse Fly is only found along the shores of rivers and lakes, where there is forest, which consists of high trees, thick jungles and dense undergrowth. They are never seen on open sandy beaches backed by grass plains, nor in the grass of the grassy plains even though long and tangled.

Symptoms, First Stage.—After a person is bitten by a Tetse Fly, the trypanosoma is injected beneath the skin and then reaches the lymphatic and blood fluids of the body, wherein it multiplies. As far as is known they do not appear in the general circulation until twenty days have elapsed. The course of this stage of sleeping sickness is very slow and takes months and possibly years for the symptoms to develop. The average is between three months to three years or more. During this period the sufferer is attending to his ordinary work and feels well, but there is an enlargement of the glands of the back of the groins and armpits, which can be observed and felt as swellings bulging the skin in these parts of the body. If fluid is drawn from these swelling glands, after many careful searches the trypanosoma can be seen by the microscope. These glandular enlargements, with, of course, the finding of the parasites, and the history of a person having been in a sleeping sickness area, and bitten by the Tetse Fly are symptoms and facts which will prove that the patient is suffering from this disease.

Second Stage.—During this period the patient is apparently lazy and inclined to lay around and sleep during the day. He becomes more sleepy as the disease advances, the expression of the face is sad and apathetic, he is mentally dull, the eyes are dull and heavy, the eyelids droop.

The body is well nourished until late in the disease, if the patient is well fed. Headache is present, or there is complaint of dull pains in other parts of the body. The pulse is rapid and weak. The lymphatic glands are seen and on feeling, are about the size of a pea to that of a bean. There is never any eruption (rash) upon the skin. The patient walks with a weak gait, uncertain and shuffling. The hand grip is lost and the hands tremble when held out at right angles to the body. The tongue trembles when extended. The voice is mumbling, weak and monotonous. The fever during this time is from 101 to 102 degrees Frahenheit in the evening. These symptoms generally grow worse until after weeks or months the patient is unable to talk, walk, or feed himself. He is confined to bed, sleeps continually, is usually neglected and not fed by the ignorant relatives and friends, and becomes very thin. During the last two or three weeks the urine and stools pass without his knowledge and the temperature drops to 92 degrees Fahrenheit and he dies in a state of coma (stupor).

Treatment.—There is no known remedy which will kill the trypanosoma in the human body, nor any drug which will aid the patient in fighting the attack. It is a fatal disease and so far as is known every sufferer from sleeping sickness sooner or later dies from its effects. Iron, quinine and arsenic have been used as tonics, but with no results as to cure, simply prolonging life. Every known drug has been tried without success.

Prevention.—Sleeping sickness is difficult to prevent owing to its occurrence in a country which is inhabited by ignorant and superstitious savages, infested with the Tetse Fly, which alone spreads the disease. The fly cannot easily be destroyed owing to the dense jungles and forests which spread out from the shores of the lakes and rivers in the sleeping sickness areas. These cannot be burnt owing to their green and damp condition. If the natives were intelligent they might be urged to move from the infested region, but only the intelligent ones do this, the remainder would rather die than leave their shambles and their tribes. If removal does take place care must be taken to see that no species of Tetse Fly is present which might convey the disease to the new location.

Among intelligent people the disease is preventable by not living in a sleeping sickness area, or if compelled to live there by wearing clothing which covers the body completely and mosquito helmets for the face, and the screening of all doors and windows of houses, etc. Kill all flies seen indoors and remove all vegetation in the vicinity of the dwelling and cultivate the ground if possible. Do not expose yourself in any way to the bite of the Tetse Fly.

HOOKWORM DISEASE.

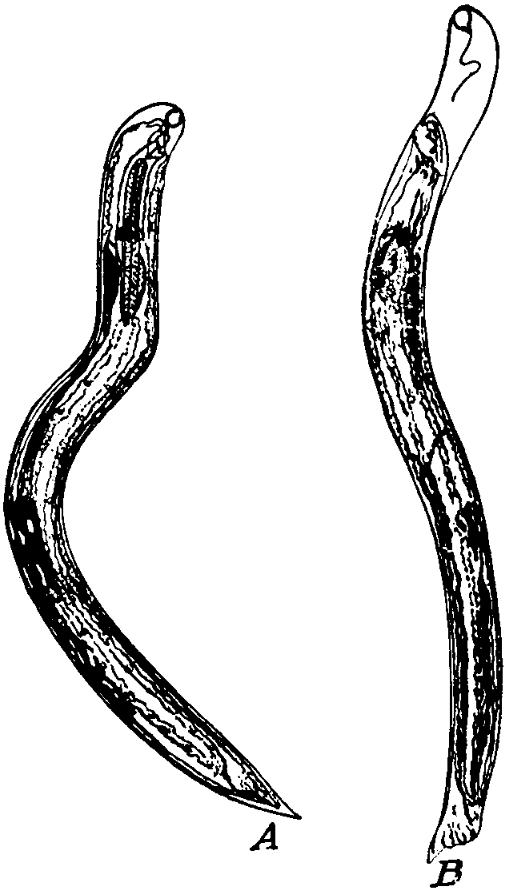
The spread of hookworm disease is due chiefly to the lack of sanitary privies in the Southern homes and schools of the people in the villages, towns, etc. The depositing of bowel movements upon the soil and a poor sewage disposal is a means by which the parasite reaches the water supply. In some of the Southern colleges thirty per cent. of the students and as high as ninety-five per cent. of the pupils in the common schools showed the hookworm in the discharges from the bowels and the bladder, as proven when they were examined by the microscope. Those who had the disease were backward students as compared with the uninfected pupils, thus showing how the disease lowered their capacity for work and study.

If one child has a case of hookworm disease in the home or school, and the latter have unsanitary privies, every child in them is liable and usually does contract this dangerous, contagious disease.

Cause of Hookworm Disease.—It is caused by a small, round worm about half an inch long and as thick as a pin. The forms occurring in man do not develop to maturity in the lower animals. The special variety discovered in this country has been named the "Necator Americanus" or "American Murderer" by Dr. Stiles. Its color varies from a dead white to a dirty gray, sometimes red from the continued blood which it has sucked from its victim.

How the Parasite Gets Into the Body.—The worms do not multiply in the body, but the adult females deposit great numbers of eggs in the small bowel, from a few hundred to three or four thousand every day, which are carried out with the normal bowel movement. The eggs hatch out the young worms called larvæ in the course of twenty-four hours. Within a week the tiny organism has shed its skin twice, like a snake does. It lives in this cast-off skin, but takes no food after the first few days following its escape from the eggs. After shedding its skin, the young worm is capable of entering the human body of another person when passed out in the bowel movement of the person in which it is developed. It may enter the human body in one of three ways. First, it may be swallowed with contaminated food, milk or water. Secondly, it gets into the body by boring through the skin. Third, the eggs, larvæ or young worms may be carried on the legs of flies.

In boring through the skin the young worms produce the condition known as "dew poison" or "ground itch" or "toe itch," which is usually the first symptom of hookworm disease. The "dew poison" occurs mostly about the feet and ankles, but in miners or farmers who work in infected or polluted ground, and sometimes in children, the "dew poison" appears in the hands and arms. After boring through the skin, the worm enters the blood stream and passes through the heart to the lungs, makes its way up to the windpipe or is coughed up and swallowed, and after its passage down the gullet to the stomach finally enters the small bowel. Having



HOOKWORMS.—A, female; B, male.

reached the bowel where it elects to remain, the tiny worm sheds its skin twice more, becomes fully developed and mates. The worms are provided with strong jaws and a hollow tooth somewhat like a snake. The worm hooks itself to the wall of the bowel by its strong jaws and sucks the blood of the child or adult in which it lives. Thus it wounds the wall of the bowel, sucks the red blood and weakens the patient. In addition the worm mixes the blood, after digesting it with its own poisonous bowel matter and injects or squirts it through this hollow tooth into the body of the patient. Thus the hookworm is first—a blood destroyer; and second—a blood poisoner.

Symptoms.—If a child is infected with the parasite before puberty (adultage), the physical and mental condition is retarded. A boy or girl sixteen may present the body and mind of one of eight or ten years of age, and young men and women of twenty may appear to be not more than twelve or fifteen. The skin is pale, perspiration or sweat absent, cuts or bruises heal slowly. In the early stages of the disease "ground itch," "dew itch" or "toe itch" is often found upon the feet, ankles or hands.

The hair may be normally developed upon the head, but on other parts of the body where it ought to be it is generally absent or scarce. The face, feet, ankles, and in extreme cases the entire body, may be swollen. This swelling disappears rapidly after treatment. Body weight is reduced. The chest is thin, ribs prominent, the shoulder-blades stand out upon the back and the patient appears "round-shouldered." The expression of the patient is anxious or very stupid. The appetite may be light or it may be ravenous, the child being unable to obtain enough food at an ordinary meal to satisfy its appetite. The patients often develop a desire for abnormal articles of food and this is why sufferers of hookworm disease are called "dirt eaters:" They crave and eat lemons, pickles, salt, pepper, sour milk, chalk, clay, ashes, tobacco, mortar, plaster, sand, gravel, sticks, decayed wood, paper and cloth. Nausea and vomiting are frequent and there is tendency to heartburn and pain over the pit of the stomach.

The blood is impoverished, the patient suffering from thin blood or anæmia as a result of the red cells of the blood being destroyed and the blood poisoned by the worms which suck it out and at the same time inject into it the poison from their bowel movements.

The only sure way of diagnosing hookworm disease is to examine the bowel movements of the patient under the microscope and find the eggs, or to see the tiny worms, the size of an ordinary pin with the naked eye, which appear before or after treatment in the stools.

Hookworm disease is termed the "lazy disease." This is due to the sufferers' muscles being very soft and weak. The shirking of work and study is not due to laziness, but is nothing more or less than weakness or weariness because the hookworm is sucking their blood. They must be considered ill and treated as such.

Treatment.—In curing hookworm disease. we do not treat the patient, but the worms. The remedies used either kill or cause the worm to loosen its hold on the wall of the small bowel. The treatment must always be given under the care of a physician. It is simple and usually very effective if directions are properly followed. It can be given to those who cannot afford to stay away from business or work by having them take the treatment on Saturday evening or Sunday morning. The best treatment is to give the drug thymol in capsule form.

The bowels must be thoroughly emptied before the thymol is taken, so that all mucous and undigested food which surrounds the worm is removed, thus giving the thymol an opportunity to come in direct contact with the hookworm to properly affect a cure.

Directions to Patient.—At bedtime for two nights before taking the capsules, take an ordinary dose of epsom salts and during the intervening day between the nightly doses of salts, eat only liquid foods, such as milk and soups. On the second morning after taking the first dose of salts, do not get up, and eat nothing at all, and at 6 A. M. take one-half of all the capsules of thymol and at 8 A. M. the remaining half. The number of capsules to be taken and the amount of each one depends upon the age (not apparent age) of the patient. This must be judged by the physician in attendance. At ten o'clock the same day take a dose of epsom salts, but do not take oil, fats or alcohol while taking the capsules, as these substances render the thymol absorbable by the digestive tract and poisonous symptoms occur. After the bowels have moved thoroughly following the ten o'clock dose of salts, the patient may eat an ordinary meal, and it will not be necessary to stay in bed. This treatment is recommended by Dr. Lock, Inspector of the State Board of Health of Kentucky.

The Size of the Total Dose of Thymol.—

Under 5 years old	7½	grains.
From 5 to 9 years old	15	grains.
From 10 to 14 years old	30	grains.
From 15 to 19 years old	40	grains.
From 20 to 59 years old	60	grains.
Above 60 years old	30 to 45	grains.

(Recommended by Dr. Stiles.)

It has been proven that after one treatment of thymol, as recommended by Dr. Lock and Dr. Stiles, ninety per cent. of the cases are cured. The bowel movements must be examined under the microscope two weeks after each treatment for the purpose of finding the pin-sized worms. If present, the thymol treatment must be repeated until all worms are absent from the bowel movements.

The anæmia and debility of all sufferers from the hookworm disease will soon disappear when the worms are destroyed and the food the patient takes is absorbed and used to make blood by the system, instead of being destroyed and poisoned by the hookworm. However, iron tonics and nourishing food must be given to build up the blood and aid recovery.

Prevention of Hookworm Disease.—Board of Health, state, county and city, in the Southern States are spending thousands of dollars to wipe out the hookworm. It has been discovered that the worm develops as a result of "soil pollution." Not only can it be prevented, but at the same time the methods us d are preventive of typhoid fever and other germ diseases, whose poisonous elements are carried in the bowels and urine from the infected person to the soil and water.

Hookworm disease is spread as a result of the carelessness of persons who dispose of their bowel matter upon the soil and by the use of unsanitary privies and toilets which drain upon the soil or a water supply.

Shade and moisture are necessary for the eggs and larvæ of the hookworm to hatch and develop. Therefore, those who are infected with hookworm disease, and use the shaded spots where no privies are, to pollute the soil, are depositing and spreading their disease by their carelessness; as shady spots are usually moist and make the best place for the hookworm to develop.

In some States even of this country many homes in villages outside of the towns and cities which have a sewage system and schoolhouses, etc., have no privies. (Think of it in the twentieth century in America.) Only the wealthier families have an occasional toilet on the premises, and these are absolutely unsanitary and are built apparently to only shield the user. Is it any wonder that hookworm disease, typhoid fever, cholera infantum and dysentery thrive amid such surroundings?

Hookworm disease can be prevented from spreading by first curing the present sufferers with the thymol treatment, the building of sewage systems in the larger towns and villages with sanitary toilets, the building of properly constructed fly-proof privies on farms, in schoolhouses, etc., the removal of all privies from a location where the waste matter can drain on to the soil which can be washed by rain or melting snow into a spring, creek, river or any other water supply of a house, camp, farm, dairy, etc.

Children or adults in a region where hookworm disease is prevalent must wear shoes to protect their feet and ankles from the larvæ upon the skin, as they will bore through and in this way get into the system. Boil all water and milk and cook vegetables.

In the Southern States particularly, and others also, any child or adult who is apparently "lazy" and always tired with a puffy abdomen, tremendous appetite, swollen eyes, and loss of weight with anæmia, must be taken to a physician or public dispensary to ascertain whether or not he is suffering from the hookworm disease, and if a sufferer, receive treatment at once. Kill all flies about, screen doors and windows and construct a sanitary privy.

PELLAGRA.

Pellagra is a disease the cause of which is not definitely known. So far scientific investigation has not disclosed any germ as the cause, though some physicians believe it is an infectious disease and can be caught from a new case appearing in a community for the first time. It has been proven though that it is the result of a poison which exists in spoiled maize, Indian corn or corn products. This theory was first explained by Ballardini, an Italian physician, in 1844, his theory being that the maize underwent a change by reason of the growth of a fungi on the grain, which acted as a poison to the system, and could be recognized in the grain as a greenish color. Another theory put forth by Dr. Scanlon, of the London School of Tropical Medicine, is that the "black-fly" or "sand-fly" (*simulium repatans*) causes it. Still another theory is that it is due to the stable-fly (*Stomonys calcitrans*); the mosquito is also considered as a carrier of pellagra. Others claim that no matter what the definite cause is, it is a disease which is being imported into this country by the hordes of immigrants from Italy.

Whatever its cause, pellagra is a serious disease and has been a national scourge in Italy and other European countries for more than a hundred years. An epidemic occurred in Italy in 1907 during which 100,000 cases occurred and at least 50,000 cases in Roumania. Thus it can be seen how prevalent the disease may become during an epidemic and cause great mortality as well as loss of health and money to citizens and the State. Several cases have occurred in women who have washed the clothes of patients suffering from this disease, due to a poison being thrown off from the glands of the armpits which has been collected upon the clothing and may have caused the disease in the laundresses, showing that the disease is apparently infectious.

People who eat spoiled maize or Indian corn have developed pellagra and from our present knowledge of the disease it would seem that this is the main cause of the symptoms.

The early symptoms of pellagra are marked enough to recognize the disease, but in cases seen where the patient has had it for some time, unrecognized, it is difficult to make the diagnosis. The first symptom compained of is an inability to walk straight. Persons can't step where they want to. They have an inclination to run forward, also a sudden contraction of the muscles of the back which may almost throw the sufferer out of bed. Later on a reddish rash appears, and this is characteristic of pellagra in that it appears upon the same spot on both hands, arms or sides of the chest, etc. Another marked symptom is the salty taste in the mouth, the mouth also is inflamed, patient also complains of great wearines and expresses it as "leg tire." The patient is dull, cannot think quickly and dizziness is complained of. Pain occurs along the spinal column.

Prevention of Pellagra.—Avoid eating corn bread or meal unless sure that the corn is fresh and has not undergone "heating." Avoid alcoholic drinks. All flies and mosquitoes must be killed, as they may carry the poison which causes the disease, and their breeding places must be removed. It is not necessary to isolate a patient from his family, but the ordinary precautions of disinfecting the hands after handling the patients, his or her clothes, etc., should be followed. A physician should be summoned, as the treatment requires such skillful handling that no layman can cure himself with any known remedy. A sufferer can only recover by following a course mapped by his physician, as to diet, mode of living and medicines to be taken.

Pellagra and Corn.—The scientists of Italy and Roumania where pellagra has existed for upwards of one hundred years, state that when corn is harvested, while the ear is yet moist, because of not having been given time to dry out in the field, it is particularly apt to mildew in the barn. The same thing is true of even matured corn in particularly moist climates. When corn that is damp from any cause is placed in tight barns or cars for shipping, it is likely to mold. This mold is extremely dangerous, regardless of what may be the cause of its development. The presence of the mold may be determined by any individual, for it is none other than the mustiness that we have all smelled in corn upon occasion. That musty odor is the warning of the presence of a danger that cannot be overestimated.

MALARIAL FEVERS.

Under this group are included infectious diseases caused by a parasite plasmodia, which are spread from one person to another by the bite of the mosquito (*anopheles maculopennis*) which contains the parasite in its body. Malarial fevers are spoken of by the public as ague, swamp fever, chills and fever, etc. The malarial fevers occur in periodic attacks and are classified as: (1) regularly intermittent periodic fever of the tertian or quarter type; (2) irregular fever of remittent or continued type; (3) chronic malaria or a condition resulting from repeated attacks of malaria with anæmia and enlargement of the spleen.

Etiology.—Influences predisposing to the spread of the disease. Conditions which favor the development of the mosquito as heat and moisture found in stagnant pools, lakes, rivers or any still body of water. Areas of special prevalence are found in tropical and subtropical countries—Panama, Central America, India, Northern Africa, especially along the coast and river basins. Malaria is prevalent along the shores of rivers in the Southern States of the United States, particularly along the Gulf States. Malarial fevers have almost disappeared from New England and New York. It is very infrequent in eastern Pennsylvania, New Jersey and Maryland. The Northwestern States, the Pacific coast, and the regions north of the St. Lawrence River are practically free from malaria.

Season.—In the tropics malarial fevers are most prevalent during the rainy season. In temperate climates a few cases occur in the spring, the greater number of cases occur in the early autumn.

Locality.—Malarial fevers occur more in the country or outlying districts of a large city. This is due to the fact that the *anopheles maculopennis,* the only species of mosquito which conveys the parasite, breed in small, shallow pools and stagnant waters. The *culcinioc,* the mosquito seen about the home in suburbs or cities free from marsh lands, etc., do not carry the parasite of malaria. They prefer human habitations and deposit their eggs in still water which is allowed to stand in rainpipes roof gutters, cesspools, barrels and other containers about the premises. Hence malaria is more prevalent outside of cities.

The cause of malarial fevers was discovered in 1880 by Doctor Laveran, a French army surgeon in Algiers. He examined the blood of patients suffering from chills and fever and found the parasite which caused the symptoms was present in every case. This tiny parasite has been termed the Plasmodium Malaria. It has been discovered and proven that the parasites causing malarial fever have a definite course and development in the blood of man and the body of the mosquito.

The Parasite in Man.—Three species of parasites are recognized as causing the different types of fevers in sufferers from malaria: (a) the tertian is caused by the Plasmodium Vivax; (b) the quartan by the Plasmodium Malaria; (c) the estivo-autumnal (Perincenis) by the Plasmodium Immaculatum.

The Tertian Parasite (*Plasmodium Vivax*).—This species when injected into the blood of a person by the bite of a mosquito—the *anopheles maculopennis*—causes a fever which occurs every forty-eight hours. The fever results from the parasite undergoing a development in the red cells of the blood, in which new parasites are developed at the same time, destroying the cells, then they attack fresh cells, at which times the fever develops and they repeat this until treatment is instituted. But the tertian parasite never causes chills or fever until its period of development is completed—forty-eight hours.

The Quartan Type (*Plasmodium Malaria*).—This species also carried by the mosquito is the cause of quartan fever. Its cycle of development in the red blood cells of man is seventy-two hours, when the new parasites are liberated and attack fresh blood cells, thus causing chills and fever once every seventy-two hours.

The Estivo-Autumnal Parasite (*Plasmodium Immaculatum*).—This parasite is the cause of estivo-autumnal fever (*Perincenis*), which is the most malignant type of malarial fever. It is conveyed by the bite of the mosquito—*anopheles maculopennis.* Its development takes place in the red cells of the blood in the liver, spleen and bone-marrow, and usually requires forty-eight hours to develop. This parasite will not cause a great deal of fever, but a continuous one which lasts for some time and goes up very high and remains up until recovery occurs, when it drops suddenly.

The parasites of tertian fevers can only be seen by withdrawing the blood from a finger or lobe of the ear and examining it under the microscope. The estivo-autumnal parasite is not often found in the peripheral blood of the body. Each parasite causes its own type of fever and no other.

The Parasite in the Mosquito.—The common species of mosquito which carries and spreads malaria is the *anopheles maculopennis.* There are many species, but wherever malaria is found the *anopheles* is always in the neighborhood. The *anopheles* cannot convey malaria unless it has sucked the blood of a patient suffering from malaria. Its bite alone does not cause the disease unless it has the parasite in its body, and the parasite does not develop in cold climates. Thus the *anopheles* can live in regions not malarious and still be harmless, but should one of this species bite a sufferer of malaria, who recently arrived and had the parasite in his blood, then the mosquito could spread the disease by biting another person.

Persons living in malarious countries should be familiar with the habits and appearance of the mosquitoes seen within the house or about the premises. The *culex* or ordinary mosquito which is not a carrier of malaria can be recognized by its position from the *anopheles maculopennis.* The former rests upon the ceiling or wall with its posterior pair of legs turned up over its back, and the body, if not dragged down by the weight of blood, is nearly parallel with the wall. Its wings show no special marking. The *anopheles maculopennis,* when resting, places the posterior pair of legs upon the wall or ceiling or allows them to hang down, and the body is held at an angle of 45 degrees with the surface upon which it rests. The wings of this species show distinct markings.

Part Played by Mosquito in Spreading Malaria.—Let us take, for example, a man suffering from the tertian type of malarial fever. In forty-eight hours the malaria parasite has undergone a development, sexual and non-sexual, in the man's red blood cells, thus forming new parasites. The non-sexual developments have formed spores, these spores find their way into a red cell and begin the sexual development, which progresses until the cell develops into a different shape, called Gametocyte, now the mosquito bites this patient and takes into his stomach these Gametocytes, which are at this time of both sexes—male, the Microgamiti, female, Macrogamet. The cells reproduced by the Macrogameti penetrating the body of the Macrogamet, a single cell resulting—called the Zygote, the latter passes into the wall of the stomach of the mosquito, when it develops in an oöcyst containing sporeblasts which develop into sporozoites. The mature oöcyst bursts and these accumulated sporozoites reaching the circulation of the mosquito are carried to the salivary glands, and when the mosquito bites a fresh victim, he injects the young sporozoites into his blood through his proboscis as he sucks the blood, and the development of the parasite is repeated, as in the first patient.

Symptoms.—Malaria usually develops in a person in from a few days to two weeks after being bitten by a mosquito. The symptoms of the tertian and quartan types are practically the same, and are spoken of as the paroxysm.

The paroxysm is known as the chill or "ague fit," and is described under three stages: cold, hot and the sweating.

Cold Stage.—During this period the patient at first complains of loss of energy, yawning, pain in the pit of the stomach, sometimes nausea and vomiting with headache. Shivering commences which develops into a chill. The teeth chatter, there is violent shaking of the whole body, and distressing sensations of extreme cold. The face is blue, the body is covered with goose-flesh, the temperature of the surface of the skin is subnormal. This stage lasts from fifteen minutes to an hour or more. The danger of the attack lies in how long the cold stage has progressed.

Hot Stage.—The cold sensations are replaced by those of heat. The face becomes flushed and the fever is high, 101 to 104 degrees Fahrenheit, the pulse is free and strong, headache is present and delirium occurs in some cases. The patient complains of urgent thirst and is distressed by the sensations of extreme heat which he feels within the body. The duration of this stage usually lasts from thirty minutes to three or four hours.

Sweating Stage.—Perspiration appears upon the forehead and face, later the entire body is drenched. The duration of this stage is variable. The patient finally falls into a sleep, from which he awakes very weak, but refreshed.

The entire paroxysm may last from two to six hours depending upon the severity of the attack. Between the paroxysms the patient feels well and considers himself in normal health. The paroxysms are due to the breaking down of the red cells and the liberation of a poison from the parasites, produced during the maturity of the parasites in the red blood cells of the sufferer; also the liberation of the new parasites (Sporozoites). A paroxysm which occurs every forty-eight hours in malaria is due to the presence in the blood of the tertian parasite, and it is called tertian fever. A paroxysm occurring every seventy-two hours is due to the presence in the blood of the quartan parasite; then we speak of this as quartan fever. In some cases of malaria, a paroxysm occurs every day (quoditian fever). Then it is due to the fact that two groups of parasites are present, which undergo segmentation on alternate days. This is spoken of as a double tertian period.

If two groups of the quartan parasite are present in the blood, the paroxysms occur every seventy-two hours on alternate days, thus there will be two days of chills, fever and sweats, with a day in between, free from an attack. This is spoken of as a double quartan; if three groups are present there will be a daily attack (Quotidian Fever), this is called a triple quartan.

The Estivo-Autumnal, or Perincenis Malarial Fever.—This type of fever prevails in southern Italy and Russia, tropical countries and the Gulf section of the United States. It usually develops in the last part of the summer or early autumn. It is characterized by irregularity due to the parasites in the blood, which have a cycle of development of about forty-eight hours, being in numbers or groups and does not mature upon certain definite days. The intensity is due to the dangerous nature of the poison produced by the parasite at the time of the sporulation of the numerous groups.

Symptoms.—The sufferer from the estivo-autumnal type of malarial fever does not have a paroxysm occurring at regular intervals, but suffers from a high fever, which begins and stays high until recovery. There may be no chills but fever and sweats are symptoms. The face is flushed, severe headache is present, the pulse is bounding and enlargement of the spleen occurs. Jaundice of the skin is seen. This fever may be very mild, or the patient may suffer from a severe form. The most dangerous types of estivo-autumnal fever are grouped under the perincenis fevers. These are characterized by grave symptoms and unless properly treated and protected against reinfection may result in death. These types of perincenis malaria are called (1) Algid form, (2) comatose form, (3) hemorrhagic form.

Malarial Cachenia or Chronic Malaria.—This is a condition of health occurring in patients who have had and been exposed to malaria numbers of times and did not receive proper treatment and protection from the bite of the mosquito which carries the parasite. It is characterized by an anæmia (thinning of the blood), with enlargement of the spleen. The patients are very thin and lose weight, the complexion is muddy with brown spots in the skin. Shortness of breath occurs upon slight exertion, and the ankles are usually swollen. The spleen becomes so large that it resembles a tumor known in the Southern states as "Ague Cake." Vomiting of blood may occur and is usually fatal if a symptom.

TREATMENT.—In the tertian and quartan types quinine is given in 15 to 30 grain doses (preferably in solution), at the time the temperature declines and repeated if necessary upon the following day. The treatment should be continued for at least a month, but the dose must be gradually reduced. Keep this up however if the paroxysms occur or the parasite is seen in the blood of a patient when examined under a microscope.

In the estivo-autumnal type quinine should be given in five grain doses every four hours until the active symptoms have cleared up, then five grains every six hours for the next three days. During the following week the patient must receive 15 grains once a day every other day, and for two months, following give 15 grains every sixth day until all danger is passed. In this way the disease can be cured. Also be sure that the patient is protected from reinfection or moves away from the malarious country until cured. Do not stop quinine treatment until parasites cannot be found in blood, and chills and fever and enlarged spleen, etc., are absent.

Treatment of Malarial Cachenia, or Chronic Malaria.—Quinine, iron, arsenic and various tonics have been used, but the best treatment is to remove to a non-malarious country with a high altitude and avoid living again in a malarious country. Sufferers from malarial fever will recover more quickly if confined to bed. Quinine acts in curing malaria by directly destroying the malarial parasite.

Prevention of Malarial Fevers.—As malaria microbes are carried from one person to another by the mosquito (Anopheles Maculopennis) its spread can be prevented by destroying the mosquito, screening all doors and windows, etc., wearing clothing which protects the body completely, wearing a mosquito helmet over the head and face, or smearing oil of citronella over the face and hands at intervals.

If choosing a site for a house or camp, or any building, high, dry ground should be selected, away from all still bodies of water, if possible drain all stagnant pools, etc., fill in with earth water which cannot be drained and prevent mosquitoes from laying their eggs in these hiding places. Kerosene freely used about the premises upon any still body of water will prevent the development of the anopheles and thus destroy the common carrier of malaria.

Persons living or traveling and exposed to malaria can oftentimes protect themselves from contracting the disease, even though exposed to the bites of the mosquito, by taking five to ten grains of quinine once a day, two or three days a week. Of course some people contract the disease regardless of this precaution. See Part I of Book III (Preventive Medicine for further habits of the mosquito and methods of destruction.

AGUE OR INTERMITTENT FEVER.

Ague or intermittent fever is invariably prevalent in swampy countries. In olden times it was attributed to the insects rising at night-time from the swampy ground, but now it is known that it is obtained only by means of the mosquito, which finds its best breeding place in swamps and still waters. It is to be observed that it is only the female mosquito which is able to impregnate malaria in the human victim.

Symptoms.—Characterized by three distinct stages of fever, chill and sweat. The paroxysm is usually preceded by a feeling of uneasiness and discomfort, sometimes langour and yawning, which forewarns the patient of its coming.

1. **The Chill or Cold Stage.**—Begins gradually; first there is a creep, then another, a little more severe, then another, each growing in severity until the teeth chatter and the body shakes violently. Not only does the patient look cold, but a surface thermometer will indicate a reduction of the skin temperature. The rectal temperature during the chill may be greatly increased. It lasts from fifteen minutes to an hour.

2. **The Hot Stage.**—Next comes the hot stage, in which all the symptoms of fever are manifested, comprising headache, nausea or vomiting, heat of skin, which may attain an elevation of 105 degrees, full, strong, rapid pulse and occasionally delirium lasting from a half hour to four hours. After this follows the sweating stage, during which profuse perspiration takes place and the temperature is reduced, as a consequence, nearly or quite to the natural standard. The paroxysms, thus constituted, generally recur with considerable regularity, but may vary a good deal in different cases in regard to the interval between each paroxysm.

Varieties of Ague.—The varieties of ague designated in accordance with this difference are, first, the quotidian or daily ague, in which the fit comes on usually at the same hour every day; second, the tertian ague, the most common form, when the paroxysm returns every forty-eight hours whilst the disease continues; third, the quartan, where the fit occurs every seventy-two hours, or on every fourth day; and fourth, the irregular ague, in which the fits are not distinctly periodical. Under this head is included the kind of periodical neuralgia affecting the forehead, and hence denominated brow-ague. In the quotidian form the paroxysm is apt to be the most prolonged and may last for sixteen hours out of the twenty-four, leaving of course only eight hours between its termination and the commencement of a new chill; in the tertian form, the fit is less protracted, lasting on an average about ten hours; and in the quartan it is still shorter, having an average duration of only six hours. In a fit of tertian ague continuing ten hours, we may expect to find the chill lasting from half an hour to an hour, the febrile stage, during which the patient often declares he feels as though he were burning up, extending over from three to five hours and the sweating stage occupying the remainder of the time.

Complications.—The most common secondary affection which occurs in the course of intermittent fever, and appears to be directly dependent upon it, is the chronic enlargement of the spleen, called "ague-cake." During the cold stage of the fit, it is probable that the spleen is always more or less distended with blood, which, being driven from the surface of the body whilst the chill lasts, finds its way to the internal organs and especially the spleen, in unusual quantity. Such congestion, if frequently repeated, seems to lead, in a majority of cases, to a real increase in amount of the structure of the spleen, and consequent enlargement of the organ.

The Ague-Cake.—The "ague-cake," when fully developed, may attain a magnitude of a foot or more in length by ten inches in breadth, and even when much smaller than this may be felt as a hard, painful and movable tumor, on the left side of the abdomen, a few inches below the heart. Such increase in size of the spleen generally indicates a rather profound impression of the malarial poison upon the system, and renders the prospect of speedy cure far less hopeful.

Lack of Blood.—Another serious complication of prolonged ague is the intense anemia, which so many persons who suffer from malarial poisoning often exhibit to a marked degree. The absence of the natural supply of good, rich, red blood gives to the skin, and especially that of the face, a dull, yellowish tint, which in malarious regions is displayed by most of the inhabitants, even the children exhibiting a pallid sallowness pitiful to behold. There is also a peculiar dejected, woe-begone expression of countenance, which is almost characteristic of malarial poisoning, and feelings of muscular weakness and fatigue on the slightest exertion are very common.

Diagnosis.—The diagnosis of ague is seldom difficult after the first paroxysm, as the regular recurrence at the same hour of the day is a feature which is so characteristic that it has given the name of "periodical fevers" to the febrile affections caused by malaria. At the first onset, it is impossible to distinguish the chill from the initial symptom of a great number of diseases, but a microscopical examination of the blood will quickly decide. The plasmodium of malaria is found in the blood during the paroxysms.

Treatment.—In the medical treatment of all the periodical fevers, we fortunately possess a specific of wonderful power in quinine and the other alkaloids of Peruvian bark, which have a direct control over the malarial poison, by checking the development of the *bacillus malariæ,* which has been already referred to as being the cause of ague.

Quinine Treatment.—It is the custom to prepare the system for the administration of quinine, by the purgative action of full doses of blue-pill or other active cathartic. Give quinine in sufficient doses, during the sweating stage, to produce the slight deafness and ringing in the ears which mark the occurrence of cinchonism, as it is denominated. As a general rule, it is quite possible to do this before the time for another paroxysm, even with an attack of intermittent fever of the quotidian type. The antiperiodic must, however, in order to effect a cure, be continued in full doses of from ten to thirty grains daily, for three or four days, then reduced to half or one-third this quantity for a few days, and so persevered in for three weeks.

Preventing Fever Recurrence.—For the purpose of counteracting the tendency which intermittent fever possesses of recurring in its original violence at intervals of exactly one week, it is advisable to take the full dose of from ten to thirty grains, or whatever amount has been found to produce slight buzzing in the ears, on the sixth and seventh, the thirteenth and fourteenth, and the twentieth and twenty-first days from that on which the last chill was experienced. In this way not only the periodicity of single ague-fits, but also the periodicity of groups of the intermittent fever paroxysms, appears to be most effectually extinguished.

An East Indian Cure.—In case quinine fails or is not tolerated, other alkaloids of Peruvian bark, and preparations of the bark itself, should be fairly tried. A famous East Indian mixture for the cure of ague is Warburg's tincture, and it may be resorted to when ill-success with other forms has been met with.

Use of Peruvian Bark.—The alkaloids of Peruvian bark are, as a rule, much more efficacious in solution with some mineral acid, such as the dilute sulphuric acid.

Other Treatments.—Where for any reason Peruvian bark and its preparations fail to cure ague, the best substitute, although a far inferior one, is probably arsenic, particularly in the form of Fowler's solution, administered in quantities of five drops thrice daily, and formerly well known under the name of the tasteless ague-drop. For the cold stage, wrap the patient up well in blankets and apply hot-water bags, besides giving hot drinks. For the fever, cool sponging will relieve the patient.

Diet.—No particular care of the diet is requisite in intermittent fever, except to counteract as far as possible the tendency to anemia and general debility, by a liberal supply of the most nutritious food which the digestive powers are able to assimilate. In like manner, as the patient is not confined to bed, directions about nursing are unnecessary.

Prevention of Ague.—The remedy to be used in preventing an attack of malarial poisoning, when temporary residence in a fever and ague district is unavoidable, is quinine used internally, as already suggested, in doses of six or eight grains daily.

THE MORE IRREGULAR, REMITTENT OR CONTINUED FEVERS.

Place and Seasons.—This type of fever occurs in temperate climates, chiefly in the later summer and fall; therefore it is sometimes called estivo-autumnal fever. The severer forms of it prevail in the Southern States, where it is known as the bilious remittent fever. The entire group of cases included under the term remittent fever are bilious, remittent and typho-malarial fevers.

Symptoms.—These, as to be expected, are often irregular. In some instances there may be regular intermittent fever, occuring at uncertain intervals of from twenty-four to forty-eight hours, or even more. In the cases with longer remissions the paroxysms are longer. Commonly, however, the paroxysms show material differences; their length averages over twenty hours, instead of ten or twelve; the onset occurs often without chills and even without chilly sensations. The rise in temperature is usually gradual and slow, instead of sudden, while the fall may occur by lysis instead of by crisis. There is a marked tendency to anticipation, while frequently from anticipation of one paroxysm and retardation of another more or less continuous fever may result. In the cases of continuous and remittent fever the patient, when seen early in the disease, has a flushed face and looks ill, the tongue is furred, the pulse full and bounding, but rarely dicrotic. The temperature may range from 102 degrees to 103 degrees or go even higher.

Diagnosis.—The diagnosis of remittent malarial fever may be definitely made by an examination of the blood. The small, actively, motile, hyaline forms of the estivo-autumnal parasite are to be found, while if the case has lasted over a week, the larger cresentic and ovoid bodies are usually seen.

Treatment.—The treatment of remittent fever is essentially that of intermittent fever. The continued nature of the fever and the tendency to a typhoid state demands a liquid diet, with the careful addition of stimulants.

PERNICIOUS MALARIAL FEVER OR CONGESTIVE CHILL.

Character.—Pernicious malarial fever differs in no respect from ordinary ague and bilious remittent, except in its greater severity. The disease is observed under three forms: First, the comatose or apoplectic form, the patient speedily loses consciousness, as though the chief force of the poison was expended upon the brain, disturbing its functions to such an extent as almost to abolish them. The fever is usually high and the skin hot and dry. Should the patient regain consciousness a second attack may come on and prove fatal.

Second Form.—In the second or algid form the symptoms of intense chill are prolonged, it may be for some hours, and death occurs in fatal cases from pure debility or asthenia, without reaction coming on. Although the patient is apathetic, the mind remains clear to the last. Vomiting and purging are the prominent symptoms, and the disease might readily be mistaken for Asiatic cholera, if it happened to occur whilst an epidemic of that malady was raging, were it not that the urine is never albuminous.

The Hemorrhagic Form.—In the third group of cases, denominated hemorrhagic malarial fever, the prominent peculiarity is bleeding, generally from the kidneys, but sometimes from the stomach, bowels, nose and mouth.

Diagnosis.—As one might expect, the blood shows marked changes in malarial fever. In the regular intermittent type there is a loss in the red corpuscle after each paroxysm, which may be considerable, but which is rapidly compensated for during the intermissions. In the estivo-autumnal fever the losses are often greater and more permanent.

Treatment.—As in the other kinds, give quinine, but in larger doses. In the case of the pernicious disease to get the effect more rapidly give quinine hypodermically as much as thirty grains at a time. Excessive care must be used to avoid abscesses.

Quinine sulphate .... 60 grains
Saturated solution tartaric acid .... 68 drops
Distilled water to make 2 drachms.
Take 30 drops three times daily.

In addition to the use of quinine, stimulants must be given for the asthenia, artificial heat for the low temperature. Morphine hypodermically to relieve pain and allay nausea.

CHOLERA MORBUS.

Definition.—An acute gastro-intestinal catarrh, characterized by profuse vomiting, purging and painful cramp.

Causes.—This malady, which is not contagious, occurs at times almost as an epidemic, and is occasionally fatal, so that no instance of it, however mild at first, ought to be allowed to run on without treatment. Although generally induced by indulgence in indigestible food, especially unripe fruits, there seems to be at certain seasons of the year some external influence promoting the tendency to disorder of the bowels, which is atmospheric. Especially frequent are these attacks in July and August. Cold and dampness are also regarded as predisposing agents.

Symptoms.—The primary symptoms are uneasiness at the pit of the stomach, nausea, retching and then vomiting, followed by severe watery diarrhœa, consisting of a large amount of the watery portions of the blood, and containing only a little albumen. The whole system is thus affected, in part by sympathy, but also to some extent, it is probable, by the change in the specific gravity and constitution of the blood. The attack is often abrupt, a patient being awakened out of sleep by a sudden seizure during the night. This is, however, no doubt because the preliminary uneasiness, nausea and slight colicky pains, which manifest themselves in a diurnal onset of the malady, are unfelt in the unconsciousness of profound slumber. The vomiting and purging, when once commenced, recur in rapid succession, and sometimes even simultaneously, and enormous quantities of fluid are evacuated from the system, often with the result of producing intense thirst. This thirst cannot, however, be gratified for some time, because the irritable stomach refuses to retain the smallest amount of fluid. Collapse may supervene and the skin become cold, clammy and ashen hued, the eyes sunken and the pulse frequent and feeble.

Diagnosis.—The only difficulty about the diagnosis of cholera morbus or sporadic cholera is when true Asiatic cholera is epidemic, then, if a microscopical examination of the dejecta be made, will, if it be Asiatic cholera, reveal the comma-shaped bacillus.

Treatment.—For the pain in the abdomen hot applications, morphine, one-quarter grain, hypodermically; to be repeated when necessary. When the pain is less severe opium may be given by the mouth or rectum in the form of laudanum—ten drops by the mouth or twenty-five drops in a tablespoonful of thin starch by the rectum. When vomiting is the most troublesome symptom the following is beneficial:

Creosote	6 drops
Bismuth subnitrate	2 drachms

Mix and put into 12 papers. Take one every hour.

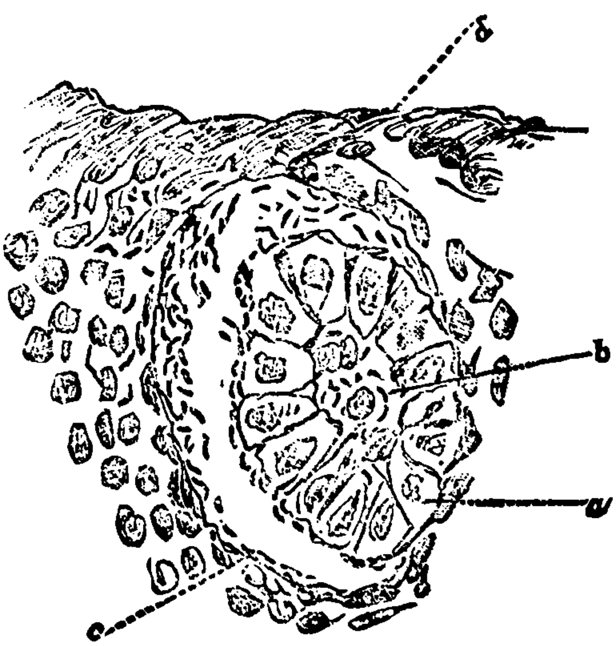
The prostration requires stimulants like aromatic spirits of ammonia, thirty to sixty drops at a dose or whiskey.

ASIATIC CHOLERA.

Definition.—An acute infectious disease, due to the implantation of the comma bacillus of Koch, characterized by vomiting, purging, rice-water evacuations and suppression of urine.

History.—It first made its appearance in the United States in 1832. Since that time there have been several epidemics, all of which are traceable to immigration. The most serious epidemic of recent time started in India in the spring of 1892, passing from thence to Persia, Austria, Germany and Holland. A few cases reached London and New York.

Causes.—The disease-poison of cholera undoubtedly reproduces and multiplies itself during the course of the complaint, being propagated by a contagion, given off mainly, if not entirely, by the evacuations from the bowels, in which the germs of disease propagate themselves, even after their discharge, so that the stools be-



The Cholera Germ.

come more virulent after they are passed, especially when mixed with water. The extended researches of Dr. Koch have proved beyond all question the existence of the cholera germ (*comma bacillus*) in drinking water, and traced its development in the intestines of persons who had died of the disease. The illustration shows the appearance of this cholera germ, which it is so important for every one at the peril of his life to avoid. When magnified about six hundred diameters one of the minute intestinal glands may be found to contain, as shown at *a, b* and *c,* minute bacteria or bacilli, as they are technically called, which, from their resemblance to the curved portion of a comma, but without the head of that punctuation mark, have been named the *Comma bacilli.* Sometimes these bacilli unite at their ends with their curves turned in opposite directions, so as to produce an S shape, or even a spiral formation.

This Comma Bacillus is the direct cause of cholera by its lodgment in the intestines, where it has been proved, by examination of nearly one hundred cases, to develop with great rapidity. It is easiest to detect in the earlier stages of the disease, because later on it is obscured by the development of a great many other forms of bacteria. It is distinctive of the mildest as well as of the most severe attacks, and has therefore an important diagnostic value. It is capable of successful cultivation in meat broth, in milk, on slices of potato, and especially on gelatine, in which it grows in a singular manner, producing a gradual liquefaction of the stiff gelatine around the growing colony, which sinks down into the jelly in a peculiar way. The comma bacillus thrives best at temperatures between 70 degrees and 135 degrees Fahrenheit, but is not destroyed and only has its growth checked by a cold of 18 degrees below the freezing point. It is, however, readily killed by drying, by the removal of all animal material upon which it can feed, or by acidifying the medium in which it is growing with a mineral acid. Under ordinary circumstances the bacillus when swallowed is destroyed by the gastric juice being digested in the stomach, but when there is any derangement of the stomach, from errors of diet or any other cause, so that the acid digestive liquid is deficient or absent, the bacillus escapes destruction, and may pass on into the intestine where the fluids are alkaline and it is able to develop with great rapidity. This fact in regard to the growth of the bacillus in alkaline fluids solely is one of great importance, not only in regard to the treatment of cholera, but also in connection with the subject of diet, since it is obviously highly necessary to avoid everything which, by producing indigestion, could interfere with the production of the precious gastric juice.

Modes of Infection.—In cholera epidemics we have, says Dr. Koch, instances amounting to actual experimental infection of man, as, for example, in the infection of those engaged in washing linen soiled with the discharges from the bowels of patients affected with cholera. An event of this kind is reported in the first outbreak of cholera in this country, when it was introduced into Quebec forty-two years ago.

Infection by Clothing.—Linen or other clothing soiled with choleraic discharges contains the bacilli often in a pure form, and if infection occurs through this medium it must be by the comma bacilli, frequently the only microscopic organism present, except those which are known to be innocent.

Infection by the Hands.—The hands of a person washing or handling such clothes may be soiled, and the bacilli introduced into the mouth by direct contact, or through the food which thus becomes contaminated, or the washing water may come in contact with the lips, and thus in some way the human being be fed with an extremely minute quantity of a pure culture of the comma bacillus.

Infection by Water.—When Dr. Koch was investigating the disease in India he observed an instance in which a certain tank furnished the water for drinking and other purposes to many people among whom the cholera was raging. He found the comma bacilli in this tank, and learned on inquiry that the clothes of the patients were washed in it. Around the tank were some thirty or forty huts inhabited by upward of two hundred people, and of these persons seventeen died, whilst the number of those taken sick was not ascertained. The tank in this case also received the refuse from the dwellings. In fact, it is common in India for the Hindoos to bathe in the tank which affords their water-supply, to wash their utensils in it, to deposit their excrement upon its bank, and if a hut has a latrine, or substitute for one, its outflow is apt to be into the tank. In this particular instance it was found, after a time, that the bacilli became less abundant in the tank-water, and coincidently the cholera declined among the inhabitants of the huts along its shore. Here, if the epidemic had been the cause of the bacilli, instead of the result of their development, the number of these minute organisms ought to have been augmented after the disease began to be less violent. For further dissemination of the disease, the cholera discharge must be retained in a moist state, since complete drying seems to destroy the poisonous property of

of sense in man. It consists of an expanded sheet of cartilage
true trumpet fashion, for collecting the sound waves and conv
to the external meatus or mouth of the auditory canal.

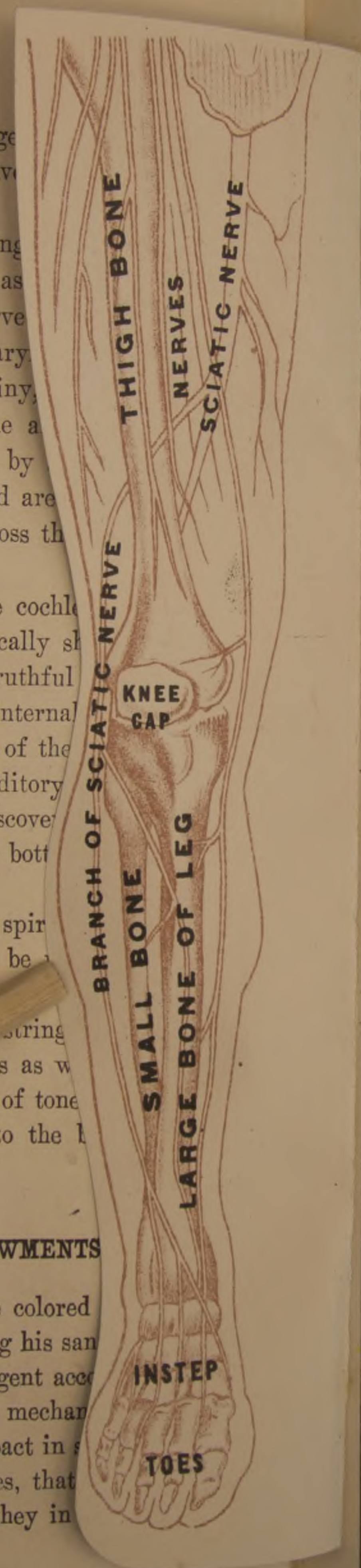
The Ear Drum.—On the back of this flap is seen a strikin
representation of the middle ear, the tympanum or drum, as
quently called. From the bottom of the tympanum is observe
stachian tube, through which is conveyed air from the phary
middle ear. Across this chamber is seen stretched three very tiny
bones, which, from their shape, are called the hammer, the a
the stapes. These delicate bones are connected together, one by
socket joint, the other by a hinge-joint and by ligaments, and ar
by small muscles; they serve to convey the wave sounds across th
panum cavity to the internal ear.

Show of Ear Canals.—The semicircular canals, and the cochl
named from its resemblance to a snail's shell, are also typically s
In the next colored illustration we observe a graphic and truthful
of the delicate internal arrangement and mechanism of the interna
of the organ of hearing. Here we observe the winding stair of th
lea, over the surface of which the delicate fibrils of the auditory
expand, and the minute fibres of Corti, called from their discove
seen arranged with geometrical precision, the longest at the bot
the shortest at the top.

Wonders of the Spiral Plate.—If this curious and artistic spir
which is seen to wind two and one-half times round, could be
and made to stand in an upright position, it would make a be
scopic harp, not of a thousand strings, but of three th string
if it were possible to strike these delicate infinit cords as w
the keyboard of an organ or piano, every co e variety of tone
the ear can distinguish would be pro and conveyed to the l
as the product of sound.

THE HAND; ITS ME NISM AND WONDERFUL ENDOWMENTS

Engravin e Hand.—To tell one that this exquisite colored
graving nts a human hand seems almost like questioning his san
Yet it is; but how few there are who can give an intelligent acc
e hand, describe its beautiful arrangements and complex mecha
or tell of its wonderful endowments. Small in compass, compact in
ture, yet so skilfully arranged are its blood-vessels and nerves, tha
form a complete net-work over its surface. So minute are they in



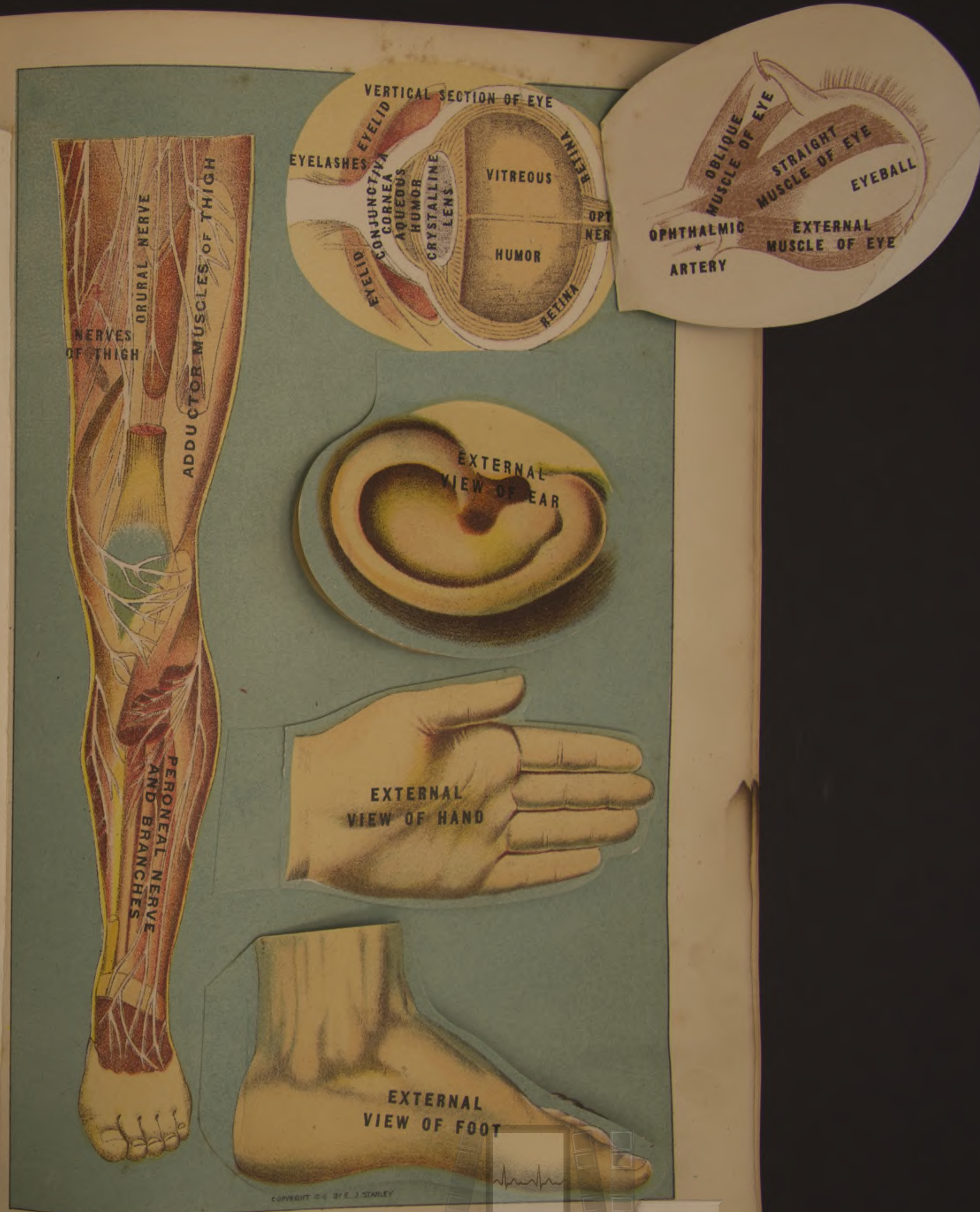


CHART 3.

the virus; and this view is sustained by what we have long known in regard to the spreading of cholera by contaminated water-supply, or more directly by soiled hands, or even conveyance by insects, as, for example, by blow-flies alighting upon meat and other food. Drains may be infected, and through them the drinking water polluted; but as the virus cannot preserve its activity in a dry state little can be hoped for from aerial disinfection, nor does it seem probable that, except under certain conditions of unusual moisture can cholera be transmitted by merchandise or by letters, even if the latter are not disinfected, but only by human intercourse.

Symptoms.—Period of incubation ranges from two to five days. The symptoms of cholera commonly present themselves sufficiently gradual to admit of arrangement into three distinct groups or stages:

1. **Preliminary Diarrhœa.**—This may set in abruptly without any previous indications. More commonly there are for one or two days colicky pains in the abdomen, with looseness of the bowels, perhaps vomiting, with headache and depression of spirits. As a rule the temperature is not elevated.

2. **The Stage of Collapse.**—Spasmodic griping pains are felt and depression of the powers of circulation and respiration come on, attended with a sense of faintness and oppression over the heart, whose beat at times is hardly discernible, and the pulse at the wrist may be absent. Copious purging, at first of the contents of the intestines, and afterward of a thin, watery fluid, resembling water in which rice has been washed, having an alkaline reaction, and sometimes tinged red with blood, soon commences, and is usually accompanied with violent vomiting and a sensation of burning heat in the stomach. In a short time, perhaps within a few hours, there results from this excessive drain upon the circulation, coldness and dampness of the whole surface of the body, lividity of the lips, cold breath, an unquenchable thirst, a feeble, rapid pulse, difficult respiration, with extreme restlessness, and suppression of the secretion of the kidneys.

Symptoms in Fatal Cases.—In fatal cases are noticed blueness of the whole body, the sunken and horror-stricken countenance denominated the Hipprocratic face, popularly known as the appearance of being struck with death, and a peculiarly suppressed voice, this condition ending either immediately in fatal collapse or in reaction followed by violent secondary fever.

3. **Stage of Reaction.**—This is characterized by return of warmth

and colds, the latter more slowly and the re-establishment of secretions. Especially favorable is the return of the urinary secretion. Along with these changes the vomiting and purging occur at longer intervals. The heart's action becomes stronger, and there are no abdominal pains. Not infrequently this favorable condition is interrupted by a recurrence of a severe diarrhœa, and the patient is carried off in a collapse. Other cases pass into a condition of what has been called cholera-typhoid, a state in which the patient is delirious, the pulse rapid and feeble and the tongue dry. Death finally occurs with coma. These symptoms have been attributed to uremia.

Diagnosis.—The only affection with which Asiatic cholera could be confounded is the cholera morbus, which occurs as a rule during the summer months, of which mention has been made.

Preventive Measures.—Preventive measures are all-important, and isolation of the sick with thorough disinfection have effectually prevented the disease from obtaining a foothold in either the United States or in England.

The course of cholera during the last epidemic which visited the United States, and ravaged the Mississippi Valley in 1873, reaffirmed the lessons of previous outbreaks of this disease abroad. This was especially the case as regards the supreme importance of pure water-supplies in cities and villages, all of which should be boiled before using, and of having all wells and water-springs which are used by the people effectually guarded against any possible soakage and contamination from privies and other sources of defilement by excrement. It must be admitted that the history of outbreaks of cholera, in all parts of the world, conspicuously illustrates the vital importance of procuring all supplies of drinking-water from sources which cannot become polluted by the soakage into them of intestinal discharges, or from outflowings in any such way as to be carriers of bowel-diseases, particularly not of cholera and typhoid fever. The story of the Broad street pump in London, which killed five hundred people in one week during the last great cholera epidemic, and was found to have its water contaminated by soakage of cholera evacuations from an adjoining cess-pool, has already been related, but it should be retold to every one as a terrible warning against the almost universal dangers of water-pollution. An item in the London *Lancet,* printed in 1882, states that a recent analysis of the water of the Holy Well of Mecca, which is so eagerly drunk by the pilgrims, as a part of their religious rites, shows the water to be sewage, about ten times stronger than the average London sewage. And during the same month that this report was given, came the news that the cholera had made its usual annual appearance among the pilgrims to the shrine of Mahomet in the Holy City of Mecca. It therefore appears extremely probable that by suitable investigation of the water of the Holy Well, there might be found in it a perennial supply of the cholera germs, and such a demonstration of the true origin of the frightful cholera epidemics which, spread by the caravans of returning Moslem pilgrims, have so often devastated large sections of Europe and Asia, would be a triumph for experimental hygiene of which the whole world of science might be proud.

The impurity of the local atmosphere of a dwelling, a village, or a particular district, is proved to be a matter also of public concern, and environed in a polluted atmosphere, the palatial mansions of wealth and gayety may suffer equally with the tenements of the humblest classes. The specific migratory power of cholera, whatever its nature, has the faculty of infecting districts in a manner most detrimental to health only when the atmosphere is fraught with certain products, susceptible under its influence of undergoing poisonous transformations. Through the unpolluted atmosphere of cleanly districts it migrates perhaps without a blow because that which it can kindle into poison is not there.

Disinfection.—1. The vomited matter and the discharges from the bowels are to be gathered and put in a carbolic solution one to twenty, or chlorinated lime one to ten, some of which should be in the vessel before it is used. In the country where the excreta can be thrown in a pit, "whitewash" is a cheap disinfectant.

2. After vomiting, the mouth of the patient should be rinsed with a solution of hydronapthol one to five thousand, care being taken that none of it is swallowed. After each evacuation from the anus the buttocks and thighs should be washed with soap and water.

3. All body and bed linen soiled with the discharges should be immediately moistened with a carbolic solution one to sixty, removed from the apartment in a covered vessel and boiled for one-half hour in a one per cent. solution of washing soda, or 1 to 2000 of bichloride of mercury.

4. Napkins, towels, and so forth, should be treated in like manner.

5. All dishes, knives, forks, spoons, and so forth, after each meal, should be boiled for the same length of time in the same medium.

6. The remains of meals should be thrown in whitewash and removed at the end of each day.

7. Door knobs are liable to be soiled by the hands of one carrying out the excreta and should be carefully watched.

8. In cases of death the body, without being washed, should be wrapped in sheets wet in a solution of bichloride of mercury and should be buried promptly.

Directions for Nurses.—1. Nurses should not hold any direct communication with others while in attendance on the case.

2. They should under no conditions take their meals in the same room with the patient. After touching the patient her hands should be washed in bichloride of mercury one to one thousand.

3. The teeth should be cleansed after each meal, as the mouth affords a peculiar favorable nidus for decomposing matter and would therefore be favorable for the growth of the cholera bacillus.

Treatment.—The successful treatment of cholera depends largely upon how promptly remedial measures are commenced, for if the first sign of relaxation of the bowels is met at once by an energetic astringent and opiate, such as the mixture of a teaspoonful of syrup of galls, ten drops of laudanum, and one drop of chloroform, repeated every hour if necessary, or a compound of ten drops each of spirits of camphor, tincture of capsicum and laudanum, to which, if there is any vomiting, five grains of bismuth should be added, it is certain that many lives might be directly saved by medical treatment. External applications of heat should be made, warm applications to the abdomen will be found grateful to the patient. Sometimes a pill of opium and acetate of lead, with a little capsicum, using, for example, one-half of a grain of opium, two grains of the sugar of lead, and a quarter of a grain of cayenne pepper, is singularly serviceable, and being carried in small compass is especially convenient for travelers.

Pain Treatment.—Should the pain be great control it with one-fourth grain injections of morphine hypodermically. As owing to the profuse discharges the blood is very much concentrated, subcutaneous injections of normal salt solution should be given.

The following well-known cholera or diarrhœa mixture is of great value in the early stages:

Spirits of camphor	1 "
Tincture capsicum	1 "
Pure chloroform	3 drachms

Alcohol sufficient to make 5 ounces.

Mix and take one teaspoonful every one or two hours.

DIPHTHERIA.

Definition.—An acute infectious disease due to Klebs-Löefler bacillus, characterized by a local fibrinous exudate usually upon the mucous membrane of the throat, with a moderate fever, glandular enlargements and great prostration.

Cause.—The disease is endemic in all large cities, and becomes epidemic at times; while other contagious diseases have diminished in the past decade, diphtheria has increased, particularly in cities.

Contagiousness.—Diphtheria is a highly contagious disease, and is readily transmitted from person to person. The bacilli may be received from (1) discharges of diphtheria patients, (2) from the secretions of the nose and throat of convalescent cases, in which the virulent bacilli persists, (3) from the throats of healthy individuals who have acquired the bacilli from being in contact with others having the virulent bacilli on their persons or clothing.

Dangers of the Disease.—No disease of temperate regions proves more fatal to physicians and nurses. There seems to be particular danger in examining and swabbing out the throat; for in the gagging, spluttering and coughing efforts the patient may cough mucus and flakes of membrane into the physician's throat. The bacillus attaches itself to the bedding, clothes and room of the patient with great tenacity.

Attack Upon Children.—Very young children are rarely attacked, the age of predilection being from the second to the fifteenth year. The greatest number of deaths occur between two and five years of age. Girls are attacked in larger numbers than boys. Adults are frequently affected.

Symptoms.—Period of incubation is from two to seven days; oftener two (Tyson).

According to the location we may speak of the pharyngeal, laryngeal and nasal varieties.

1. **Pharyngeal.**—The symptoms are those of an ordinary febrile attack. Slight chilliness, fever and aching pains in the back and limbs, usually the temperature rises in the first twenty-four hours from 102 to 103 degrees Fahrenheit. There is a slight redness and feeling of soreness in the throat, generally upon one or both tonsils, and on careful examination the tonsils and adjacent portions of the fauces are found to be a little swelled. A whitish-gray patch of false membrane, looking at first like a small ulcer in the mucous surface, next makes its appearance, and this may spread until, by the third day, it has covered the tonsils, fauces and perhaps the uvula.

The False Membrane.—If this false membrane is forcibly torn away, as, for example, by some of the various forceps which were at first invented for the purpose, a raw bleeding surface is exposed, which in a few hours is again covered with a new growth of the layer of membrane. This structure, which is partly composed of an exudation of lymph and partly of a fungoid growth, the micrococcus diphtheriticus, quickly undergoes putrefactive changes, together with the outer layer of mucous membrane lying immediately beneath it, so that there is often a superficial ulceration, from which an unhealthy discharge flows, and a putrid odor frequently emanates constantly, in severe cases of diphtheria.

Thickness of the Membrane.—The thickness and density of the false membrane varies greatly in different cases, and in different epidemics. Sometimes it is scarcely thicker than writing-paper, and has hardly more consistence than thick cream. At other times it is firm and tough, almost like leather, and may even attain the thickness of a quarter of an inch. Although in mild cases and those of moderate severity, its color is grayish-white, in debilitated states of the system, and when there is a tendency to bleeding from the throat and other mucous surfaces, it may be tinged, probably by the altered blood elements of a yellow, yellowish-brown, or dark-brown hue.

Diagnosis.—(*a*) There may be no local manifestation of the membrane, but a simple catarrhal angina, associated sometimes with a croupy cough. The detection in these cases of the Klebs-Löefler bacillus can alone determine the diagnosis.

(*b*) There are cases in which the tonsils are covered with a pultaceous exudate, not a consistent membrane.

(*c*) Cases which begin and often run their entire course with the local picture of a typical lacunar amygdalitis, they may be mild, but in other cases there is a rapid development of membrane and extension of the disease to the pharynx and nose with septic and constitutional symptoms.

2. **Nasal Diphtheria.**—In membranous or fibrinous rhinitis, a very remarkable affection seen usually in children, the nares are occupied by thick membranes, but there is entire absence of constitutional disturbances. Ravenel collected seventy-seven cases, all of which ran a benign course, and in all but a few the membrane was limited to the nose and the constitutional symptoms were slight or absent. On the other hand, nasal diphtheria is apt to present a most malignant type of the disease, high

fever, marked glandular evolvement and great prostration by epistaxis and by excoriation of the lips.

3. **Laryngeal Diphtheria.**—The affection begins like an acute laryngitis, with a slight hoarseness and rough cough, to which the term croupy has been applied. After these symptoms have lasted a day or two, with varying intensity, the child suddenly becomes worse, usually at night, and there are signs of impeded respiration. These cases are always serious.

Difficulty of Breathing.—At first the difficulty in breathing is paroxysmal, owing probably to a spasm of the muscles of the glottis. Soon the dyspnœa becomes continuous, inspiration and expiration become difficult, particularly the latter. The voice is husky and is reduced to a whisper. The color gradually changes and the imperfect aeration of the blood is shown in the lividity of the lips and finger tips. Restlessness comes on and the child tosses from side to side, vainly trying to get breath. Occasionally in severer paroxysms portions of the membrane are coughed up.

The Fever.—The fever is rarely very high, and the condition of the child at the onset is good. The pulse is always increased in frequency. In favorable cases the dyspnœa is not very urgent, and the color of the face remains good. In unfavorable cases the dyspnœa becomes more and more urgent, the cyanosis deepens, and the child, after a period of restlessness, sinks into a semi-comatose state, and death finally occurs from poisoning of the nerve centres by carbon dioxide.

1. **Complications.**—Hemorrhages from the nose or throat may occur in severe ulcerative cases. Skin rashes are not infrequent. In very bad cases, with extensive sloughing, the septic particles may reach the bronchi and excite gangrenous processes, which may lead to severe and fatal hemorrhages.

2. **Renal Complications.**—These are common, albuminura is present in all severe cases; nephritis may set in quite early in the disease; it sets in at times with complete suppression of the urine.

3. **Paralysis.**—This is rather frequent, occurring in from ten to even twenty per cent. of cases.

Diagnosis.—The onset is more sudden than in scarlet fever, the fever higher, the pulse more rapid and the tongue presents a strawberry appearance. For the rest of the diseases it is sufficient to state that, for the purpose of insuring proper sanitary precautions, it is advisable to consider all cases of sore throat, with fever and prostration of strength, in which patches of false membrane, however small, appear upon the tonsils or fauces, as diphtheritic in their character. All cases should be treated as diphtheria until the contrary is proven by a culture.

Preventive Measures.—Recent investigations having proved that the poison of diphtheria is portable, communicable by infection, and capable of reproducing itself outside of the human body, diphtheria must now be ranked as both a contagious and infectious disease. The following rules are therefore more imperative than ever before:

1. When a child or young person has a sore throat, a bad odor to its breath, and especially if it has fever, it should immediately be separated and kept secluded from all other persons, except necessary attendants, until it be ascertained whether or not it has diphtheria, or some other communicable disease.

2. Every person known to be sick with diphtheria should be promptly and effectually isolated from the public. Only those persons who are actually necessary should have charge of or visit the patient, and these visitors should be restricted in their intercourse with other individuals. Children residing in a house where there is a case of diphtheria should not be permitted to attend school.

3. When a case of diphtheria is fully developed, the same precautions in regard to free ventilation, disposal and disinfection of discharges, bed or body linen, and so forth, isolation during convalescence (or management of the corpse should death unfortunately occur), and so forth, ought to be enforced which have already been recommended in regard to smallpox and cholera.

4. It is particularly important that persons whose throats are tender or sore from any cause, should avoid possible exposure to the contagion of diphtheria. Children under ten years of age are in much greater danger of taking the disease, and after they do take it of dying from it, than are grown persons. But adults are not exempt, and mild cases in them may cause whole series of fatal attacks among children.

5. Numerous instances are recorded where the contagion of diphtheria has retained its virulence for weeks or months, in cesspools, heaps of decaying vegetable matter, damp walls, and so forth, and been carried for long distances in clothing, in sewers, in waste pipes from stationary washstands, and in other conduits. Hence all sewer connections and other carriers of filth should be well ventilated and disinfected, and children particularly should not be allowed to breathe the air of any water-closet, cesspool, or sewer into which discharges from patients sick with diphtheria

have entered, nor drink water or milk which has been exposed to such air or the atmosphere of the sick-room.

6. Beware of any person who has a sore throat; do not kiss such a person or take his or her breath; do not drink from the same cup, blow the same whistle, nor put his pencil or pen into your mouth.

2. **Treatment.**—Local treatment—germicides and disinfectants are best applied when possible by the spraying apparatus at intervals of an hour, or at most every two hours. If the spray cannot be used, as is often the case with children, a soft sponge may be used. The most satisfactory solution for this purpose is equal parts of peroxide of hydrogen and Dobell's solution. Carbolic acid may be used in the proportion of fifteen drops to an ounce of glycerine and water. Boric acid in saturated solution is fairly good. Where there is the laryngeal form the patient should breathe an atmosphere saturated with the vapor of slacked lime. In all cases antitoxin should be given.

2. **Constitutional Treatment.**—For checking the growth of the membrane the preparations of mercury are good. The bichloride of mercury in dose of one-forty-eighth to one-twelfth (Tyson) for an adult, in conjunction with the tincture of the chloride of iron and chlorate of potassium every two hours. Early in the cases calomel in small doses every hour. These doses are given to adults, and they need not be much reduced for children. Quinine should form part of the medical treatment in doses from ten to twenty-four grains in twenty-four hours.

Other prescriptions are:

1.

Bichloride of Mercury ....1 grain
Tincture Chloride of Iron ....1 ounce

Two to six drops every three hours in water.

2.

Chloride of Potash ....1 drachm
Tincture Chloride of Iron ....1½ drachms
Syrup of Lemon ....1 ounce
Spirits of Mindererus ....4 ounces

Mix. Dose: one teaspoonful every two hours.

If this prescription cannot readily be filled a fairly good substitute is the Tincture of Chloride of Iron. Get about one ounce of this and take ten drops in a wineglassful of water three times a day. This is a valuable tonic, but if there is much failure of strength, use the following in addition to the chloride of iron:

3.

Sulphate Quinine (Powder) ....1 drachm
Best Brandy ....1 pint

Mix and dissolve. Dose: two teaspoonfuls every three hours in half a glass of water.

Diet.—Stimulating, nourishing and easily assimilated food is necessary. Milk is preferred to all else, fortified with full doses of whiskey, two drachms to an ounce being required in all severe cases. Milk may be alternated with animal broths. When deglutition is difficult nutrient enematas may be given. For this peptonized milk is best.

Opening the Windpipe.—When laryngeal obstruction is imminent intubation or tracheotomy should be performed. This is rarely necessary when antitoxin is used. Lives have been saved by both these operations. Such cases should breathe air charged with vapor of lime.

3. **Serum Treatment.**—It has been fully demonstrated that antitoxin or the serum of immunized animals, is the best therapeutic agent in diphtheria. The investigation conducted by the American Pediatric Society has shown that the mortality under the serum treatment in 5,794 cases was only 12.3 per cent. The strength of the serum is measured in units, the latter being equal to 1 c.cm. of "normal serum," which is the blood serum of an immunized animal so active that one-tenth of a c.cm. will antagonize ten times the minimum of diphtheria poison fatal to a guinea pig weighing 300 grams. For children over two years old the initial dose should be from 1,500 to 2,000 units in all severe cases, including those of laryngeal stenosis; this dose to be repeated in from eighteen to twenty-four hours if there is no improvement seen, and again in twenty-four hours if the course of the disease is unfavorable. The third dose is rarely necessary. Mild cases should receive 1,000 units for the first injection, a second is rarely necessary. In cases injected during the first two days the mortality is less than 5 per cent. The question of immunizing those exposed to the disease is a very practical one. It has been carried out on a very large scale in some institutions with satisfactory results. The immunity is only transient and only persists a few weeks.

Diphtheria antitoxin is injected beneath the skin and is not a painful procedure and rarely has ill-effects if properly given and the precautions of cleanliness are followed as to the skin of the patient, the needle used and hands of the nurse and physician. Every adult case should receive a dose of antitoxin of 3,000 units immediately upon the physician being sure that the patient has diphtheria. In severe cases as high as 20,000 or more units have been given in repeated doses without ill effects and the child has recovered. Those in attendance, as nurses, physicians and all persons who have come in contact with the patient, must receive at least 500 units as a preventive measure against taking the disease.

Those who cannot afford to purchase antitoxin can secure it from the authorities of the local Boards of Health in most States. In large cities it can be procured from the police stations.

Every parent or guardian should submit to the early use of antitoxin and thereby save human life. Those exposed to it should also submit and protect themselves and prevent the spread of this highly dangerous and contagious disease. Public funerals cannot be held in case of death from diphtheria. Cremation or burial in a sealed casket is necessary.

General Remarks.—Diphtheria is a highly contagious disease, occurring mostly in children between the ages of two and fifteen years. Infants in the first year of life are rarely affected. Death is most frequent between children of two to five years of age. It occurs mostly during the winter. It can be caught by persons of all walks of life by coming in contact with a patient or his or her clothing, bed linen, etc., which has not been disinfected. It can be carried in water, milk, by the dried discharges from the patient's nose and throat, being blown about in the air, dirty streets, gutters, alleys, cesspools, etc.

It requires from two to seven days for a person to develop diphtheria after being exposed to it. Its early symptoms consist of slight chilliness, in young children convulsions, older children and adults complain of a sore throat. There may be vomiting. Examine the throat at once. The tonsils and arches of the soft palate appear reddened, swollen and a whitish membrane in spots or as a solid layer will be seen covering the tonsils and later on this spreads to the nose, throat, larynx, etc., depending on the severity of the attack. The child will complain of a tightness in the throat, pain or swelling and if the attack is sudden and severe, the face and lips become bluish and breathing is difficult, and there may be a whistling sound upon taking each breath, due to the membrane filling the larynx and throat. The germs of this disease are present in the nose and throat of the patient. Summon a physician at once. The guardian or physician must notify the local Board of Health.

The sick person must be placed, whenever possible, in a room away from the rest of the family, all unnecessary furnishing removed, a nurse or attendant placed in charge and no one permitted to enter or leave the room but the nurse and physician until disinfection is completed by the Board of Health. Cats, dogs and all the family pets must be removed from the room and quarantined outside of the house. The physician should wear a cotton gown and cover his head with a cloth of suitable texture. The nurse must wear a similar gown and cover the hair with a cloth. On leaving the room, the physician and nurse must leave the head covering and gown in the room, also disinfect their hands in a disinfectant of 5 per cent. carbolic acid solution or bichloride of mercury (1 tablet to a pint of water).

Persons living in a house where diphtheria has developed should not leave until they have taken a bath in water containing bichloride of mercury, washed their hair and had their clothing disinfected by the Bureau of Health. A sheet must be hung across the door leading to the sick room and this sheet dipped in and kept moist by a solution of chloride of lime (1 tablespoonful to a pail of cold water). The knob of the door should be washed off daily with the chloride of lime solution.

INFLUENZA OR LA GRIPPE.

Definition.—An acute infectious disease, appearing at irregular intervals, characterized by extraordinary rapidity of extension and the large number of people attacked.

Causes.—It is caused by the bacillus of Pfeiffer. It spreads with remarkable rapidity. In the large pandemic of 1889-1890 some of the large prisons escaped entirely. The outbreaks of the epidemics are independent of all seasons and meteorological conditions, though the worst epidemics have been in the colder seasons of the year. One attack does not protect. A few persons do not appear liable to the disease.

Symptoms.—Incubation is from one to four days. The onset is usually abrupt, with fever and its associated phenomena. Usually there is coryza and sneezing, with or without watering of the eyes and headache. No age is exempt, as it attacks with impunity the infant as well as the old man. There is generally a cough, to which is added very soon profuse expectorations.

Expectorations.—The cough may be paroxysmal, with prostration at the end of the spell. It often persists, while the bronchitis may pass into broncho-pneumonia, or a croupous-pneumonia may supervene. Another mode of onset is by extreme and sudden prostration. This prostration is apt to be prolonged even in mild cases far beyond what seems reasonable.

Mental Depression.—This is a frequent symptom, and suicide has been its terminal act. There is always more or less fever, ranging from 101 degrees to 106 degrees Fahrenheit. Delirium is nearly always associated with a high fever.

Nausea and Vomiting.—With the onset of the fever there may be nausea and vomiting, or the attack may set in with abdominal pains, profuse diarrhœa and collapse.

Diagnosis.—During a pandemic the cases offer but slight difficulty. The profoundness of the prostration, out of all proportion to intensity of the disease, is one of the most characteristic features.

Treatment.—Isolation should be practiced if possible. Old people should be guarded against all sources of infection. The secretions, nasal and bronchal, should be disinfected. In every case the disease should be regarded as serious and the patient kept in bed until the fever has completely disappeared. From the onset the treatment should be supporting, and the patient should be well fed and nursed. At night ten grains of Dover's powder may be given. At the onset a warm bath is sometimes grateful in relieving the pains in the back and limbs. If there is much fever and delirium small doses of antipyrin or phenacetin may be given and an ice-cap applied to the head. In cases with great cardiac weakness stimulants should be given freely and during convalescence. Strychnia in full doses and good, nutritious diet, cheerful surroundings and change of air are essential. The depression of spirits following this disease is one of its most unpleasant and obstinate features.

GLANDERS OR FARCY.

Definition.—An acute infectious disease, usually commencing with a specific inflammation of the mucous membranes of the nose and throat, and originating in contagion derived from a glandered horse, ass or mule, and characterized by the appearnce of vesicles in the mucous membrane of the mouth and between the toes and nodules beneath the skin; in the latter it is called farcy.

Cause.—The disease belongs to the infective granulomata. The local manifestations in the nostrils and skin of the horse are due to one and the same cause. Man becomes infected by contact with diseased animals, and usually by inoculation on an abraded surface of the skin. The contagion may also be received on the mucous membrane.

Symptoms.—The disease has an incubation of from three to five days. At this time there is a febrile movement, with malaise and loss of appetite. On the mucous membrane of the lips and tongue and sometimes on the hard palate come vesicles containing a yellowish serum. There is a sensation of heat and burning through the mouth, and the swelling may be so great as to make speech difficult and swallowing painful. There is copious salivation. Almost simultaneously appear vesicles between the fingers and toes and around the nails.

Treatment.—If seen early the wound should be either cut out or thoroughly destroyed by caustics and an antiseptic dressing applied. In the acute cases there is very little hope. In chronic cases recovery is possible, though often tedious.

ANTHRAX OR MALIGNANT PUSTULE.

Definition.—An acute infectious disease of animals, due to the bacillus anthracis, especially affecting cattle and sheep, but transmissible to man.

Causes.—It is very prevalent in Europe and Asia, but is rare in this country. A protective inoculation, with a mitigating virus, has been introduced by Pasteur. In animals the disease is conveyed sometimes by direct inoculation, as by the bites and stings of insects, by feeding on the carcasses of animals which have died of the disease, but more commonly by feeding in pastures in which the germs have been preserved. Pasteur believes that the earth worm plays an important part in bringing to the surface and distributing the bacilli which have been propagated in the buried carcass of an infected animal. Certain fields or even farms may thus be infected for an indefinite period of time.

Symptoms.—Anthrax has a period of incubation of about one week, after which there are a number of modes of manifestation of the disease.

1. **External Anthrax or Malignant Pustule.**—This occurs most frequently on the exposed surfaces, the arms, face or hands, and produces in a few hours a slight redness like that from a mosquito bite, and afterward a little blister. This is soon succeeded by a spreading hardness of the surrounding tissues, which mortify and turn black. Crops of secondary vesicles appear, the neighboring lymphatic glands become in-

flamed, the breath grows fetid, and there is thirst, high temperature and frequent pulse, and death may take place in from twelve to forty-eight hours, with all the symptoms of profound blood-poisoning. Occasionally recovery takes place, but it is only in mild cases, in which all the symptoms, local and general, are less severe; the vesicles dry up into scabs and the hardness passes away.

2. **Malignant Anthrax, Edema.**—This form begins in the eyelid, and from thence passes into the head, arms and hands. It is characterized by the absence of the vesicles and by the most extensive œdema, which may follow, rather than precede, the constitutional symptoms. The most fatal cases are seen when inoculation takes place about the head and face. A feature in both these forms of malignant pustule, to which many writers refer, is the absence of feelings of distress or anxiety on the part of the patient, whose mental condition may be perfectly clear. He may be without apprehension, even though his condition is very critical.

Diagnosis.—Diagnosis can be readily made from the character of the lesion and the occupation of the patient. When in doubt a microscopical examination of the fluid from the pustule may show the presence of the bacillus.

3. **Intestinal Form.**—In these cases the infection is usually through the stomach and intestines and results from eating the flesh or drinking the milk of diseased animals. It may, however, follow an external infection if the germs are carried to the mouth. In acute cases there are dyspnœa, cyanosis, great anxiety and restlessness, and toward the end convulsions or spasms of the muscles.

4. **Wool Sorters' Disease.**—This important form of anthrax is found in large establishments in which wool or hair is sorted and cleansed. The hair and wool imported into Europe from Russia and South America appear to have induced the largest number of cases. Many of these show no external lesion. The infected material being swallowed or inhaled with the dust.

Symptoms.—There are rarely any preliminary symptoms. The patient is seized with a chill, becomes faint and prostrated, has pains in the back and legs and the temperature rises to 102 degrees or 103 degrees Fahrenheit. The breathing is rapid, and there is much pain in the chest. There may be a cough and signs of bronchitis. There may be vomiting, and death may occur within twenty-four hours. In more protracted cases there may be diarrhœa, delirium and unconsciousness.

Treatment.—In malignant pustule, the site of inoculation should be destroyed by the caustic or hot iron and a little powdered bichloride of mercury sprinkled over the exposed surface. The local development of the bacilli about the site of inoculation may be prevented by the subcutaneous injections of carbolic acid or bichloride of mercury. The injections should be made at various points around the pustle, and may be repeated two or three times a day.

Internal Treatment.—The internal treatment should be confined to the administration of stimulants and plenty of nutritious food. Davies-Colley advises ipecacuanha powder in doses of five to ten grains every three or four hours. In the malignant form, particularly the intestinal variety, little can be done. Keep the bowels active.

ERYSIPELAS OR ST. ANTHONY'S FIRE.

Definition.—This is a specific, contagious inflammation of the skin, tending to spread over large portions of the cutaneous surface with the usual signs of inflammation—pain, heat, redness and swelling.

Causes.—This complaint has, as a rule, for its starting point some slight wound or abrasion of the skin, although occasionally it seems to arise spontaneously, affecting the head and face in such instances more frequently than any other portion of the body. It is particularly prevalent in the spring of the year. It can be conveyed by a third person. The poison certainly attaches itself to clothing, furniture and bed-room walls. Recently delivered women and persons who have been the subjects of surgical operations are particularly susceptible to it.

Predisposing Causes.—Predisposing causes are Bright's disease, alcoholism and debility. The specific agent of the disease is a streptococcus growing in long chains, the streptococcus erysipelatous.

Symptoms.—Period of incubation is variable from one to eight days. The stage of invasions is often marked with a rigor and followed by a rapid rise in temperature and other signs of an acute fever, when there is a local abrasion, the spot is slightly reddened, but if the disease is idiopathic there is seen within a few hours a slight redness over the bridge of the nose and on the cheeks. The swelling and tension of the skin increase and within twenty-four hours the external symptoms are well marked.

The Skin.—The skin is smooth, tense and œdematous. It looks red, feels hot and the superficial layers of the skin may be lifted as small blebs. The swelling increases rapidly, and during the second day the eyes are usually closed.

Further Symptoms.—The first affected parts gradually become pale and less swollen as the disease extends. When it reaches the forehead it progresses as an advancing ridge, perfectly well defined and raised; and often on palpation hardened extensions can be felt beneath the skin, which is not yet reddened. Even in cases of moderate severity the face is enormously swollen, the eyes closed and the lips œdematous, the ears thickened, the scalp is swollen and the patient's features quite unrecognizable.

Blood Poisoning.—The lymphatic vessels and glands, especially the cervical, are almost always more or less affected, and poisoning of the blood as in pyemia not infrequently occurs. One attack of the disease, so far from affording any protection, generally leaves the patient particularly susceptible to the malady for a long time, perhaps for life. Delirium is present, the tongue becomes dry, the pulse feeble and there is marked tendency to death from toxemia. In the majority of cases, however, even with extensive lesions the constitutional disturbances, considering the height of the fever range, are slight.

Treatment.—Isolation must be carried out. A practitioner in attendance on a case of this disease should not attend a woman in confinement. The disease is self-limited, and a large majority of cases get well without any internal medication.

Diet.—The diet should be nutritious and light. Stimulants are not required, except in the old and feeble. For sleeplessness, restlessness and delirium chloral and the bromides may be given, or if these fail, opium; when the fever is high the patient may be bathed or sponged. Of the internal remedies the tincture of the perchloride of iron has been highly recommended.

Local Treatment.—For the local treatment, two per cent. solutions of carbolic acid, the corrosive sublimate solution 1 to 2,000. In the Polyclinic Hospital in Philadelphia the application of ichthyol ointment over the reddened area, and should there be a wound, washing it out with normal salt solution have proved very efficacious. To prevent spreading, paint the margin of the inflammation with tincture of iron.

SEPTICEMIA OR BLOOD POISON.

Definition.—It is a condition in which, with or without a local site of infection, there is a microbic invasion of the blood and tissues, but in which there are no foci of suppuration.

Symptoms.—Illustrative cases of the more usual form of septicemia are puerperal fever, following a retained placenta, infection by scarlet fever, or difficult labor involving lacerations and the poisoning by a dissecting wound. The symptoms set in from three hours to four days, usually twenty-four hours.

Initial Symptoms.—The usual initial symptom is a chill varying in severity; it may, however, be preceded by a headache and malaise and is always followed by a high fever. In bad cases the chill is repeated daily and the temperature rises high. I have known of one instance in which it went to 106.7 degrees Fahrenheit. The patient is restless, the tongue at first red and glazed becomes dry and leathery, the pulse at first full and bounding becomes weak and compressible with a rate of 130 or more. Prostration is marked.

The Fever.—The fever is subject to remissions which give rise to the inexperienced to delusive hope. The chill is followed by profuse sweating and further prostration, the mind early begins to wander and delirium of the low muttering kind is soon established. There is a tenderness over the abdomen in puerperal cases and in all a tendency to enlargement of the spleen with hypostatic congestion of the lungs and often bronchopneumonia will result.

Diagnosis.—This is usually easy, the resemblance of the more serious form to intermittent fever has been referred to. In this disease the remissions are not so total and the patient remains very ill.

Treatment.—In treatment all possible infecting foci should be removed by surgical methods; after this the strength should be supported by quinine, strychnine and stimulants. The food should be liquid and of the most nourishing kind. The fever should be reduced with cold sponging and quinine.

PYEMIA OR PUS BLOOD POISON.

Definition.—Pyemia is a general febrile affection due to sepsis, characterized by recurring chills and profuse sweats with remissions or intermissions in the fever, also by abscesses variously disseminated in the different tissues and organs of the body.

Causes.—The same essential cause lies at the bottom of pyemia as of septicemia, but associated with this disease are the important etiological factors, thrombosis and embolism. Fragments of a venous thrombus, due to a phlebitis at the seat of putrid inflammation, are broken off and carried in the circulation until a lodgment is effected. These fragments swarm with bacteria and the embolus excites intense inflammation, which goes on to abscess formation. The emboli may be multiple, and there will be as many abscesses as there are emboli. The seats of election are lungs, liver, spleen, kidneys, brain and joints and the various connective tissues in the order above given.

Other Causes.—Other causes are gunshot injuries of bone and compound fractures, gonorrhœa and prostatic abscesses.

Symptoms.—A rapidly rising fever, often so closely followed by a chill that its previous existence is often not suspected. The severity of the chill is proportionate to the intensity of the infection. The temperature during the chill reaches 103 degrees to 105 degrees Fahrenheit, and is followed by a sweat and fall in temperature, after which the latter rises again to a point even righer than was at first attained. The temperature may rise and fall several times, but as a rule each one goes higher than the preceding one.

Other Symptoms.—The other symptoms of fever are also present, thirst, loss of appetite and nausea. The strength of the patient rapidly wanes and he soon sinks into a condition of exhaustion and semi-consciousness from which he may be aroused to take medicine and nourishment.

Diagnosis is not usually difficult; a careful study of the case will show marked differences in history to typhoid fever and malarial fever. There are no rigors followed by sweats in typhoid, and finding the plasmodium malariæ in the blood of suspected patient will settle the case should it be malaria.

Treatment is like that of septicemia. Remove the foci of infection surgically, and after that the symptoms are to be combated and the strength supported to the utmost.

PART II OF BOOK IV

Treats of the constitutional diseases, their causes, diagnoses, prognoses and treatments.

CURATIVE MEDICINE

PART II.

THE CONSTITUTIONAL DISEASES

Meaning of Constitutional Diseases.—By constitutional or organic disease is generally meant a visible disorder of structure; that disease and disorder are, however, essentially the same thing, is clear from the circumstance that function and organism are united. The state of the organ will always influence the function, just as a power applied to any machinery will produce effects according to the nature of the machine and the materials acted upon. The power and function of the machine are dependent on its intrinsic mechanism, though set to work by an extrinsic influence. The mode of working is not visible in the vital organs, nor are the functions of life mechanical, except so far as they act in time and space.

ACUTE RHEUMATISM OR RHEUMATIC FEVER.

Symptoms.—Acute rheumatism is an inflammation of the joints, characterized by general fever, by pain, heat, redness and swelling of the joints affected, and by a tendency to leave one joint suddenly and fasten upon another. The affection sometimes commences by chills and fever, and general uneasiness; and these symptoms (rheumatic fever) may last for twenty-four hours or more before the local manifestations show themselves. More frequently the local symptoms make their appearance at the same time with the fever, and occasionally they are present some little time before it supervenes.

The Pain.—The pain in the joint or joints affected, commonly but little felt while the patient is perfectly quiet, becomes intense on the slightest motion, so that he is rendered completely helpless. The superficial joints become swollen and tense, they are hotter than natural, and the skin covering them is generally more or less reddened.

The Swelling.—The swelling is sometimes mainly caused by effusion within the capsular ligament of the joint itself, at others by the inflammation and thickening of the fibrous tissues external to the joint. The pulse is generally full, strong and moderately frequent, rarely rising over 100 beats in a minute; the skin is warm and copious sour perspirations are commonly present; the tongue is thickly coated, the bowels somewhat constipated and the appetite completely lost.

Freaks of Inflammation.—The inflammation at first affects one or two joints, rarely three; after a variable time it commonly leaves the joints first affected as suddenly as it attacked them, and fastens on some other articulation; often, however, new points are attacked without the disease leaving its original seat. As a rule the larger joints are the ones most liable to be attacked, the knees, elbows, ankles, wrists and hips; more rarely the smaller joints of the toes and fingers become affected.

Heart Attack.—Besides the articulations, acute rheumatism frequently attacks the heart, not by metastasis or transferrence of the inflammation from one part to another, but by seizing on the fibrous textures of the heart as in one of the series of textures liable to the disease. Sometimes the pericardium is attacked (pericarditis), sometimes the lining membrane of the heart's cavities (endocarditis). The younger the patient the more liable is the heart to be affected; so that when rheumatism occurs previous to the adult age the heart is attacked in a large majority of cases.

Rheumatism Hereditary.—The rheumatic constitution is frequently hereditary, and rheumatism is peculiarly a complaint of cold, damp seasons and climates.

Causes.—The cause of rheumatism has provoked more thought and research than any of the commoner diseases; at least one type of the disease is due to excess of fibrin in the blood. There is an exudation of this fibrinous material into the sheaths of nerves about tendons, especially where inserted into the bone, the fasciæ of muscles, the serous capsules of organs, their ligamentous attachments, in joints, heart valves, and so forth, wherever fibrous tissue is found normally. This fibrinous exudate organizes into bands, fungus, nodules, and so forth, of cicatricial tissue, obstructing circulation and movement of parts and modifying cell nutrition. The presence of this fibrinous exudate makes the muscles hard and stiff, so that they contract with difficulty and pain, yet appear large and strong. Impinging upon nerves it causes pain and perverted nerve action. Especially is this the case where the deposit occurs near the bony opening whence the nerves emerg

The Fibrous Exudation.—This fibrinous exudate is precisely like the membrane of diphtheria, of membranous dysmenorrhea, colitis and croup, the exudate in lobar pneumonia, and so forth. Its appearance in the muscles and other structures is also preceded by a similar weakening of the vaso-motor nerves. When the blood gets into this hyperplastic state it must get rid of the excess of fibrin-forming materials in some way, or it would finally solidify, organize like a clot, and the individual turn to stone. So nature sounds the alarm, and sacrifices a part to save the organism. But sometimes her warnings are not heeded.

A Chief Cause.—The chief exciting cause, we know, is the application of cold to the body when unusually heated. Cold is more liable to produce this effect when combined with moisture, whence a cold and humid atmosphere and wet or damp clothes are the most frequent sources to which rheumatism can be traced. Partial cold, as when parts of the body are subjected to currents of cold air, is very apt to give rise to rheumatism; when the body is predisposed a very transitory exposure of this kind will suffice to bring on an attack; if the current be sustained for any time, few will wholly escape some contingent suffering. Of the fact that rheumatism is so excited there can be no doubt. When it is reflected, however, that for every instance of rheumatism so induced, numbers continually endure as much or greater exposure to the alleged cause without any disease ensuing, too much importance should not be attached to it.

Diagnosis.—The only disease with which it is liable to be confounded is gout. Formerly discrimination in this respect was deemed of high importance, the prevailing theories of gout demanding a course of treatment very different from that to which rheumatism was subjected. In the present day a juster pathology of gout assimilates the treatment of both diseases sufficiently to render extreme accuracy of discrimination of very slight moment.

Prognosis.—The prognosis is dependent on the promptitude with which suitable treatment is resorted to. Generally speaking, there is little immediate danger to life, there being no inflammatory disease of equal intensity which so little deranges the vital functions. This, most probably, is owing to the disease expending its violence in the joints and other external parts, and being little prone to attack the viscera. The peculiar character of the inflammatory action, too, and the little liability which it has to pass into suppuration, or undergo the other changes consequent to phlegmonous inflammation, may account for the safety with which even the metastasis of rheumatism to internal parts is borne. It is certain that such metastasis is not attended with so much danger as the severity of the symptoms would seem to denote.

Management of Acute Rheumatism.—One of the most important points in the management of acute rheumatism is to watch the supervention of the morbid action in the fibro-serous tissues of the heart. It is not necessary to repeat here the symptoms of pericarditis and endocarditis, but the occurrence of dyspnœa, with more or less anxiety, jerking or feeble and rapid pulse and tumultous action of the heart ought to direct the attention of the practitioner to that viscus, and if he discovers by the physical signs and functional phenomena the existence of inflammatory action there, it must be treated as if the disease were unconnected with rheumatism, for no truth is better established than that, although acute rheumatism, seated in the fibrous and muscular tissues around the joints, is remarkable for its great and rapid change of location; chronic rheumatism loses this mobility when it fixes upon a serous membrane.

Treatment.—1. Acute rheumatism produces, we have seen, diseases of the heart; it is, therefore, incumbent on the practitioner to prevent the continuance of the rheumatic inflammation of the serous membrane of the heart. The ındications are to subdue fever and remove inflammation. The promptitude with which the local inflammation in its earliest stage yields to the treatment by which a plethoric state of constitution is corrected, and febrile action allayed, and the obstinacy of the local ailments, whenever the constitutional state is overlooked or inadequately treated, furnish the best proofs of the correctness of this pathology.

2. The treatment has been pursued in various ways—bleeding, mercurials, mercurials with purgatives, opium, sulphate of quinine and nitrate of ootassa in large doses have been at various times resorted to. Of these methods, tnose by large doses of sulphate of quinine and by nitrate of potassa nave seemed to have an influence in controlling and cutting short the disease, and the treatment by quinine appears to be successful in the acutest and most violent attacks; but they are both subject to inconvenience and dangers which counterbalance their advantages.

3. The treatment which is most generally relied on is the alkaline. Our aim being to liquefy and eliminate the fibrinous deposit. The iodides, ammonia preparations, jaborandi, hot vapor baths, massage, and counter-irritation have all been employed; overfeeding, especially with meats and highly concentrated foods, should be rigorously avoided. Persons having this fibrous diathesis should employ a resolvent treatment at intervals, for weeks at a time. Exercise must be systematic, and too

much cannot be said of the value of hot vapor baths, massage and joint movements.

4. If the heart shows signs of being affected, and embolism or phlebitis occur, use ammonia, carbonate and acetate with nitro-glycerine, warmth to and rubbing of extremities with mercury to move the bowels. The old custom of venesection and cups, in vigorous subjects, was very fair practice. It made the patient thirsty and so called for diluents to thin the viscid blood. The cups relieved engorged parts, and paved the way for a better circulation through them.

5. The fibrous diathesis varies from that of the uric acid, and the same treatment will not always relieve the rheumatic pains of both. In the former, there is a tendency to congestion of the brain, the liver and kidneys are apt to be sluggish. In the uric acid type of rheumatism irritability is contrasted with the torpor which characterizes the fibrous. Enlarged joints are common, and storms of disease sweep over the system. Muscular development is slight, and the powers of endurance small. In the fibrous diathesis the patient is well developed, tough and resisting.

As rheumatism is invariably accompanied by loss of appetite and embarrassed metabolism, it is naturally the result of accumulated secretions and imperfect excretion, hence it is best treated by freeing the bodily outlets and carefully measuring the supplies. While recognizing the necessity of salicylate treatment, we would advise that such be combined with mild cholagogues, diaphoretics and diuretics. The salicylate appears to exert a general action on all the excretions in the exact proportion in which such is needed.

6. If any organ requires but little correction, it receives no more, and on that account sufficient force is retained to exercise itself where it is more in demand. As a result, the beneficial effects of the salicylic acid treatment are utilized to their fullest extent without being followed by bad reactionary conditions.

Treatment.—Rest in bed and the parts kept warm. The affected parts should be wrapped in cotton. Give freely alkaline mineral waters. In the strong frequent doses of salicylic acid or the salicylates.

R.—Acid Salicylic	1½	drachms
Sodii Bicarb.	2	drachms
Tr. Card. Co.	6	drachms
Syrup	1½	ounces

Water q. s. to make four ounces.
Two teaspoonfuls every three or four hours.

Or,

R.—Sodii Salicylate .... 3 drachms
Syrup .... 2 ounces
Water of peppermint .... 2 ounces
Two teaspoonfuls every three or four hours until relieved.

Or five-grain doses of aspirin every three or four hours. The alkaline treatment can be used by giving the following:

R.—Potass. Bicarb. .... 1 drachm
Lemon juice .... 2 drachms
Water .... 1 ounce

After the acute symptoms and pain have subsided, Basham's Mixture in dessertspoonful doses three or four times a day. Oil of wintergreen applied to the affected joint will often relieve the pain.

MUSCULAR RHEUMATISM.

Of the minor painful maladies this is, perhaps, the most common in many parts of the country. It may attack any muscle, but its three most decided and painful phases are lumbago, stiff neck and pain in the side (pleurodynia), all of which yield to the same or analogous treatments.

Lumbago.—This affects the large muscles of the back and loins, sometimes extending to the lowest parts of the spine. The pain is severe and often of sudden occurrence, very much as if one had sprained his back.

Treatment.—Apply locally chloroform liniment on hot flannel. A porous plaster is often effective. Assume and hold a restful position. Take internally two grains each of quinine and phenacetin, with one twelfth of a grain of belladonna every three hours until relieved.

Stiff Neck.—This is also called cervical rheumatism. It affects the large muscle at the side of the head behind the ear, extending down to the collar or even the breast bone.

Treatment.—Apply locally chloroform liniment on hot flannel. Assume and keep a restful position. Take internally two grains each of quinine and phenacetin, with one-twelfth of a grain of belladonna every three hours until relieved.

Pain in the Side (Pleurodynia) arises from a rheumatic affection of the muscles concerned in breathing, especially the short, flat muscles between the ribs, called intercostal muscles. It is also called intercostal rheumatism. The pain produced resembles that of pleurisy, and sometimes excites alarm lest some more serious disease is present. A test of the lungs with the stethoscope will determine whether the condition is pleuritic or not. Absence of cough or fever, and soreness, upon touch, of the muscles on the side affected, also show that pleurisy is not present.

Treatment.—1. As in all cases of muscular rheumatism, put the affected muscles at rest as far as possibile. Of course this will be hard to do, because these muscles are engaged as helps in respiration, but the object may be aided by applying strips of adhesive plaster, overlapping each other, around the affected side, so as to compress it tightly.

2. Apply an ordinary porous plaster to the side affected.

3. Treat internally by taking every three hours, until relieved, a dose consisting of two grains each of quinine and phenacetin, with two grains of Dover's powder.

4. Fifteen drops of wine of colchicum, with a quarter of a grain of opium, used in very small but often repeated doses, is often beneficial in all the above forms of muscular rheumatism.

5. In all of the above forms of muscular rheumatism—lumbago, stiff neck and pleurodynia—where the suffering is intense, a hypodermic injection of a quarter of grain of morphia will afford prompt relief.

CHRONIC RHEUMATISM.

Character.—The distinctive characters of this malady are a febrile state of the general system, with more or less pain and swelling in certain tissues and joints. And in this, precisely as in acute rheumatism, the continuance of febrile action undermines the general health, while the local inflammation, however indolent, disorganizes the joints, occasioning eventual decrepitude. The pain and swelling of joints with progressive thickening of the ligaments and effusion in the several bursæ sufficiently evince the morbid actions from which such effects result. But coincident with these will generally be found a quickened pulse, some increased heat of skin and a furred tongue.

Symptoms.—Chronic rheumatism presents itself under two forms. In one of the joints are swollen and painful, the pain being aggravated by motion; there is no general fever and the appetite may be good and the digestion sound. The affection is exceedingly obstinate, attacking new joints without leaving those first affected; it frequently attacks the smaller joints, rendering them permanently swollen and deformed, while the immobility to which the joints are sometimes reduced may cause atrophy of the muscles connected with them.

Gout.—When the type is precise and definite it presents sharply-drawn distinctive characters which distinguish it from gout; but it must be admitted that there are many cases in which it exhibits so great a resemblance to chronic gout that it is almost impossible to establish an absolute distinction between the two diseases. Mobility is the primordial character of rheumatism; this character at once presents itself. In gout—on the other hand—mobility does not show itself until the malady has become inveterate, until the attacks, which at first were strictly local, have frequently recurred, or the progress of the regular manifestations has been interfered with.

Treatment.—1. In the treatment alkalies and diuretics are of service, also the iodide of potassa, while the different mineral waters are frequently of great service. Warm salt water baths, the use of flannel and stimulating liniments afford relief.

2. It would be vain to enumerate the various stimulants which have obtained character for the cure or relief of this disease. The principal are the different essential oils; various balsams and gum resins; sudorific decoctions; electricity. Any of these may benefit according as the general constitution is prepared for their operation, or as the special ailment may require. If there be no plethoric or febrile state present, their use will at least be harmless, if not beneficial; but should the case be such as to need depletory treatment and the operation of mercury, then must the use of such stimulants as are now named be watched with great caution. Warm bathing and active exercise are among the unexceptionable and most powerful means of relieving chronic rheumatism.

Local Treatment.—1. The local treatment as directed for the regular or acute rheumatism also requires to be assiduously employed. For this various liniments are useful; none are better than those containing oil of turpentine, oil of wintergreen, oil of sassafras, ammonia and laudanum, diluted with soap liniment, or where pain is considerable, chloroform or aconite liniment. Blisters may be applied in obstinate cases. Dry cupping to the back, leaving a number of cups on for twenty or thirty minutes at a time makes a more pervading favorable impression sometimes than might have been expected.

2. For rigidity of the joints and even for pain in them or in the muscles, pouring hot water continuously over the parts does great service.

The hot bath or vapor bath, or, as some prefer, the hot dry-air bath (130 degrees to 200 degrees) will be powerful for relief in many cases.

Electric Treatment.—Electricity also will aid in hastening the restoration of use to the stiffened parts.

SYPHILITIC RHEUMATISM.

This affects the long and flat bones chiefly, and mostly between the joints, not at them. Generally there is nodosity upon the bones affected, or some degree of periosteal inflammation at least. Our main reliance in this affection is the iodide of potassium.

ARTHRITIC RHEUMATISM.

This designation is applied to a form of subacute or chronic inflammation of one or more large joints of greater severity than ordinary chronic rheumatism. Effusion into the joints, with deformity and permanent lameness may occur. The treatment pursued in chronic rheumatism has proved beneficial.

GONORRHEAL RHEUMATISM.

A peculiar inflammation of one or more joints occasionally commencing in the course of gonorrhea or even of urethral inflammation from forced catheterism. The local affection may be severe, with suppuration in a few cases and anchylosis of the joint in many. It appears to be an ichoræmic affection; the result of absorption into the blood of morbid matter effused into the membrane of the urethra.

GOUT OR PODAGRA.

Character.—A painful disease affecting principally the fibrous tissues about the smaller joints and intimately connected with an excess of uric acid and its compounds in the blood. Various names have been given according to the part affected, as podagra when in the feet, chiragra when in the hands, and so forth, but all such and probably many cases of neuralgia, accompanied by oxalic deposits in the urine, are mere forms of one disease.

Symptoms.—A common attack of acute gout is generally preceded by uneasiness, indigestion, loss of appetite, nausea and vomiting, biliary derangement, dull pains or numbness in the parts affected, often with feverish symptoms; but in some cases, on the contrary, the disease comes on in the midst of apparent health and well-being, and occasionally at night during refreshing sleep. In most cases it makes itself known by an acute pain in the joint of the great toe.

Further Symptoms.—This is accompanied by feverish symptoms, urinary sediment, extreme tenderness, restlessness, involuntary muscular contractions, sleeplessness and perspiration; the affected joint is swollen, red and hot. This series of symptoms may last four or five days, to be followed after a day or two by three or four others, continuing in all from two to three weeks; the severity of the attack, its persistence, its seat and its metastases vary according to circumstances.

Chronic Gout.—When gout becomes chronic the attacks are more irregular, less severe, more frequent and sudden, leaving one joint for another after slight exposure to cold and moisture, excess at table or vivid emotions; in this form the continuance of the pain and the fear of injuring the gouty joints render its subjects cross, fretful and disagreeable.

Chalky Deposits.—Toward the end of the spell chalk-like deposits are thrown out about the joint in some, but not in all cases. The suffering with the gouty inflammation is often very intense.

Hereditary Gout.—Hereditary gout is sometimes podagra or foot-gout, but more often is of the hardening kind. Neuralgia, indigestion, palpitation and urticaria or eczema upon the skin are its most common manifestations. In such a system rheumatism and other affections are to a considerable degree modified by the "gouty tendency."

Causes.—High living with indolent habits generates gout. Even excess of animal food, with scanty exercise, has been known to produce it. But strong wines and malt liquors much increase the tendency. Weak wines do not seem to have the same effect.

Diagnosis.—Between gout and rheumatism there is great resemblance. In gout the small joints are chiefly affected; in rheumatism the larger joints. Repetition of attacks is much more frequent in gout; their duration is greater in rheumatism. In gout the heart is seldom attacked and spasmodically; in rheumatism the heart is often subject to inflammation. In gout the stomach is sometimes spasmodically affected with violent symptoms; in rheumatism, almost never. In gout, and not in rheumatism, uric acid is in excess in the blood. In pure gout, colchicum does good; in rheumatism, hardly ever.

Treatment.—1. There are few diseases which have more empirical remedies extolled for their cure than gout; almost every drastic purgative, diuretic, tonic and narcotic has been pressed into the service either for external or internal use. To say nothing here of soothing topical applications, colchicum has enjoyed, and deservedly, a great reputation in the treatment of gout and neuralgia between the attacks and in their chronic forms; it is most efficacious when it acts upon the skin and bowels. The acetate of potash and other alkalies are in favor both for their diuretic property and as alkalizing the acid in the blood and urine.

2. During the attack colchicum and the alkalies are the remedies. Wine of the root of colchicum may be given in ten- or twenty-drop doses several times daily. The stomach and bowels are sometimes irritated by large doses; but for a few days most patients will bear fifteen drops thrice daily. It should be stopped when relief has been obtained. Carbonate of potassium—ten to thirty grains at once with half-drachm doses of rochelle salts will be important in addition. Opiates or other anodynes may be craved by the patient during the extremity of his pain.

3. Gouty attacks affecting the stomach or heart spasmodically are usually sudden, violent and prostrating, requiring prompt stimulation, as brandy, laudanum, Hoffman's anodyne or chloroform. Small or moderate doses of one or another of these should be given at short intervals. Mustard plasters to the epigastrium or chest and back will be important, and the feet may be placed in hot mustard water for revulsion.

Diet.—Regulation of the diet is of primary importance. But it should not be too low, especially when the patient's habits have been those of free living. Nourishment must be full, while the digestive power is economized and positive stimulation avoided. Attention to hygienic rules and avoiding exposure to dampness, cold and fatigue of body or mind are absolutely necessary as aids in the treatment of this disease. To promote all this adequate exercise is the natural agent, the use of which cannot be superseded by any medicines however valuable or however lauded.

CANCER, OR MALIGNANT DISEASE.

Cancer is a disease the cause and method of spreading of which is not definitely known. It starts by the growth of cells in an organ or skin of the body which are exactly like normal body tissue, but differ from the cells which are normal for the organ in which it develops. These abnormal cells constituting cancer, renew themselves and encroach upon the normal cells of the organ involved, so that its function is interfered with and ultimately destroyed. Cancer of the stomach, liver, etc., grow until they encroach upon adjoining organs and practically eats its way into the vitals of the patient until removal or death occurs. Cancer can spread to other parts of the body by the poisonous cells, from the original seat of the growth, getting into the blood and lymphatic channels. As soon as the wall of a blood or lymph channel becomes eaten through these cells are washed to other organs, and wherever they happen to be checked start a secondary growth. This habit of cancer cells traveling by the former method and starting up secondary tumors resembling the primary growth is spoken of as "metastasis." Do you know that after thirty-five years of age one in every eight females and one in every eleven males die of cancer, that the death rate from cancer between the ages of fifty and sixty is not surpassed by any other disease as a cause of death in women, and only slightly by tuberculosis in men.

What are the early signs or danger signals of this scourge, which if recognized by the sufferer, may save his life?

According to Dr. Childe, the eminent English surgeon, the susceptible localities for cancer are:

(1) Cancer of the breast. Here the danger signal is a small lump or thickening of any kind. In women over forty years old, this lump is a cancer from the start in at least 90 per cent. of the cases. In a woman of any age, the finding of a lump in the breast should be immediately followed by its removal by operation.

(2) Cancer of the uterus (womb). The danger signal here is any irregular bleeding, especially after *menopause* (change of life), or the onset of a discharge in a woman who has been free from it previously, or the change in character of a previously present discharge, so that it becomes more profuse, more foul or more irritating.

(3) Cancer of the lip, mouth and tongue. The danger signal here is a little wart or sore that will not heal.

(4) Cancer of the skin. The danger signal here is any sore that will not promptly heal or any wart or mole which suddenly begins to grow rapidly.

(5) Cancer of the stomach and intestines. Here the danger signals are not so apparent as on the surface of the body. After forty years of age, the onset of obstinate indigestion, persistent colicky pains in the abdomen, persistent diarrhœa and especially the vomiting of blood or the pasage of blood in the stools. Loss of weight.

Prevention.—The cause of cancer is unknown, and whether contagious or not is unsettled. Therefore, we cannot prevent its spread by isolating the person in quarantine. If the disease were known to be due to a germ or parasite, insects, etc., then it could easily be cured, as other contagious diseases, by destroying the cause and preventing others from contracting the disease by coming in contact with sufferers from cancer. However, any sufferer from cancer in a family should be kept in a separate room, and all doors, windows, etc., screened to keep flies and mosquitoes out, and kill all insects seen that may alight upon the dressings or any exposed surface of the body. Disinfectants should be at hand for the nurse, attendant and physician to disinfect their hands after attending to the patient. All discharges, bedclothing, wearing apparel, dishes, etc., used by the patient should be disinfected with chloride of lime solution (one ounce to half a pail of water) as a precaution.

TREATMENT.—There is only one way of preventing the spread of this disease, and that is by immediately consulting your physician and informing him of a growth or mole, etc., or any distressing pain or symptoms which affect any portion of your body. *Do not wait. Cancer spreads slowly* and *treacherously* until it has gained a hold, and then it may be too late. When the surgeon sees your case, submit to an operation at once. If the stomach or womb, etc., are involved, you will be saved a slow and painful death. Complete and early removal of a cancer by operation is the safest cure. Even then it will return, but these cases are rare where the patient has acted promptly.

No Medicine Will Cure Cancer—Avoid Patent Medicines.—They are fakes; your money will be wasted, while your tumor will grow. There have been numerous cures recommended in the treatment of cancer where operations cannot be made. The best of these is the Radium Treatment. This is very expensive, but in time the government and our wealthy citizens will see that the poor can receive treatment according to their station in life with a nominal charge or fee. It has cured some cases, but others have succumbed.

Dr. Seelye, of Daytona, Florida, U. S. A., recommends the treatment of cancer (*epithelioma*) by direct sunlight, by concentrating the rays of the sun upon the growth, early, by means of a magnifying glass such as may be purchased under the name of a "reading glass" for half a dollar or less. He claims permanent cures in mild cases so treated.

Common Form of Cancer.—The most familiar and characteristic form of cancer is that which attacks the female breast or womb, usually past the middle period of life. It first appears as a local induration situated beneath the skin, in the glandular tissue of the organ, for the most part in the neighborhood of the nipple. It increases slowly in size, becomes adherent to the skin and involves more and more of the substance of the breast.

Cancer Pains.—In most cases sharp lancinating pains are experienced at this time, sometimes causing much distress. When the glandular substance of the breast has become fully affected, it is also found to be adherent to the walls of the chest, so that it can no longer be moved from side to side, and the skin over its whole surface is discolored. Smooth in texture, raised in irregular knobs or eminences and in spots red and tender.

The Ulceration.—The early hardness now yields to local softening, the skin gives way at some prominent point, and the ulcer thus formed shows no tendency to heal, but constantly enlarges and discharges a dark-colored and fetid exudation. Subsequently the morbid growth involves the subjacent muscles, the ribs and even the substance of the lungs. Internal cancer, however, is often developed as a secondary affection without being directly continuous with the external growth. The patient may be gradually exhausted by the pain, discharge and constitutional irritation dependent upon external cancer alone, or the fatal termination may be principally due to the secondary affection of the internal organs.

Course of Cancer.—The course of cancer is for the most part slow, requiring several years to pass through its successive stages. This is generally the case in cancer of the breast. In other forms, particularly where the morbid growth is softer and more vascular at the outset it often terminates fatally in a few months or even weeks.

Train of Cancerous Symptoms.—The cancerous humor possesses these characteristics:

1. The peculiar power of infiltrating every tissue as it encroaches upon it.

2. It spreads to the lymphatic glands of the neighborhood through the absorbents.

3. It affects the body generally through the vascular system, thus giving rise to secondary deposits, that is to say, to the development of similar growths in the viscera or remote parts, the lungs and liver being particularly prone to its attack.

4. It is liable to recur after removal.

The stroma is abundant, tough and resisting, giving a tuberoid circumscribed appearance to the mass when superficial. It is of great hardness, and when fully developed is firmly adherent to the adjacent parts.

Upon sections it presents a bluish-white, glistening appearance and yields a creamy, oily fluid known as cancer juice. When situated subcutaneously, as in the mamma, the tumor commonly assumes a dark purple or livid color, and is subject to darting, stinging or neuralgic pains. It is apt to ulcerate, when the sore will present hard and everted edges and the neighboring lymphatics will become indurated and enlarged. It is found most frequently in the mamma, liver, stomach and rectum. It is more frequent in women than in men. It is of slow growth, and rarely occurs before forty or forty-five years of age.

Causes.—The observations which we have made on the relative frequency of cancer as to age, sex-temperament and condition of life contain the greatest part of what we have to say on the predisposing causes of the disease. Among these have long been enumerated the frequent and direct operation of irritating substances; external injuries, especially blows; the abuse of stimulating potions; immoderate indulgence in venery; the depressing influence of moral afflictions; bad food, conjoined with the debilitating effects of cold and otherwise unhealthy habitations; the injurious influence of one or more of these predisposing causes on particular organs being determined or modified by the individual or accidental circumstances of the case.

Cancer May be Hereditary.—The frequent occurrence, however, of cancer in individuals in whom none of these predisposing causes seem to have coöperated in the production of the disease has led many pathologists to consider it as having an hereditary origin.

Transmission of Cancer Germ.—The germ of the disease, or cancerous virus, is transmitted from the parent to his offspring. The evidence on which this opinion rests is shown in the fact that the material element of the disease is contained in the blood, and is separated from this fluid after the manner of nutrition and secretion, either in the molecular structure or on the free surface of organs; and that, while the formation of the disease is thus going on, there may be no appreciable physical or physiological modification of the part in which it is observed. It is thus that we meet with carcinomatous tumors in the brain, which, from their bulk and other characters, must have existed long before the functional disturbance of the organ gave signs of their presence; and we have an equally striking example of the silent development of these tumors in the eye, until acting simply as a foreign body, they obstruct the rays of light and render vision more or less imperfect.

Cancer Pimple.—In persons, too, apparently in the enjoyment of the most perfect health, we often see the disease making its appearance in the form of a small pimple, proceeding more or less rapidly in its course. extending in breadth and depth and terminating ultimately in death, in spite of all the means which art has devised. In others, a similar pimple arises under similar or even unfavorable circumstances, proceeds like the former to ulceration, and although it may have been neglected, irritated and excited from time to time, disappears and leaves the patient in perfect health.

Diagnosis.—It is not until carcinoma has made some progress that we are sometimes able to recognize its presence in internal organs by means of a careful consideration of the local and general symptoms which we have enumerated. Little importance in general is to be attached to any one of them taken individually. But when the local signs, viz., the changes in the bulk, form and situation of organs, occasioned by the disease, its relative frequency in different organs and in particular portions of the same organ are taken in connection with the special and general modification of function which may be present in individual cases, the greatest possible assistance is afforded us in establishing the diagnosis. Thus it is more easy to detect cancer of the stomach than of the lungs, of the latter than of the brain; because of our being able to ascertain the presence of the greater number of the local signs of the disease in the first case, only a few of them in the second and none at all in the third.

Further Diagnosis.—And when the sense of sight can be applied with that of touch and hearing the diagnosis seldom presents much difficulty, as in the case of carcinoma of the os uteri and rectum. It is necessary to observe that too much reliance is not to be placed on the presence of these general symptoms which constitute the cancerous cachexia, for there are morbid conditions of the stomach and duodenum associated with the derangements of the biliary secretion which give rise to a state of debility and emaciation, accompanied with discoloration of the skin, which so closely resembles this cachexia that the one is not to be distinguished from the other.

Difficulty of Diagnosis.—The difficulty of establishing the diagnosis in such cases is likewise increased by the circumstance that the same chronic character prevails in both. It is hardly necessary to remark that the presence of carcinoma in an external part of the body is to be regarded as a diagnostic sign of great importance in all cases of a doubtful character in which functional derangement of an internal organ has existed for some time. In such a case we should regard the frequent occurrence of vomiting after meals as indicating the existence of carcinoma of the pylorus, even should no tumor be felt in this situation or dilatation of the stomach.

Abdominal Tumor.—If the presence of a tumor were detected in any part of the abdominal cavity we should not hestitate to say that it was of the same nature as the external affection, and the occurrence of paralysis, under the same circumstances, would justify us in attributing it to carcinoma of the brain or spinal cord.

Possibility of Cure.—In no disease is a fatal determination so universally admitted as in carcinoma. The possibility of the cure of cancer of the internal organs has never been supported by substantial evidence, and the examples are few indeed in which we are disposed to believe that the disease has been removed from an external part by surgical or other means, without its recurrence in the same or some other part of the body at some other future period.

Symptoms.—Changes in the color, temperature, circulation and nutrition of the affected organ cannot be detected by direct observation, and those of bulk consistence and form can be determined only in certain organs, and at a more or less advanced period of the disease, such as the stomach and intestines, liver, spleen, kidneys, ovaries and uterus, lungs and mesenteric glands, in all of which organs these changes may be recognized either by the touch, percussion or auscultation. But it is more particularly the change of bulk which is detected by these means, and which, as a local symptom of the presence of cancer, is that to which the greatest importance is to be attached. The increase of bulk which accompanies the presence of cancer is not perceptible until the disease has made some progress. It is most considerable in solid organs, such as the liver, kidney, ovaries and so forth, and is seldom very marked in hollow organs, such as the stomach or intestines.

Further Symptoms.—Considerable increase of bulk may, however, have taken place in the walls of the stomach and intestines without our being able to detect its presence, which happens when cancerous matter accumulates in the direction of the internal surface of these organs. In such cases an increase of bulk of a different kind is produced, viz., dilatation, in consequence of the obstacle presented by the carcinomatous matter to the passage of the food or feces. When dilatation of the stomach is thus produced, the obstacle is situated at the pylorus; when of the small intestines, it is, in the great majority of cases, situated at the termination of the duodenum or commencement of the jejunum and caput cecum coli;

and at the sigmoid flexure of the colon and rectum when the dilatation occupies the larger intestines.

Bulk of Stomach.—The increase of bulk which the stomach and intestines acquire in consequence of an obstacle of this kind is sometimes very great. In some cases of scirrhus pylorus the stomach has been found to occupy the greater part of the abdominal cavity, stretching down to the symphysis of the pubis and from one lumbar region to another; and the large intestines sometimes measure from four to six inches in diameter when similarly affected. We have seen the small intestines equal in size to the ordinary dimensions of the stomach. It is important to know that the extent of the dilatation is not to be taken as the measure of the extent of the disease. The greater the dilatation the greater we may infer is the obstacle by which it is occasioned, but this obstacle may consist in a slight scirrhus enlargement, which prevents the passage of the food or feces as effectually as when it is occasioned by one or more tumors of considerable size or great thickening occupying several inches in length of the whole circumference of the walls of the stomach and intestines.

Pain of Cancer.—The only modification of the sensibility which as a local symptom accompanies cancer is that of pain. There is, however, no symptom of carcinoma more deceptive than pain. Of all varieties of carcinoma it is that of scirrhus which is most frequently accompanied with pain, and it is also in this variety that the pain is most severe, acute and lancinating. Vomiting is an invariable consequence of carcinoma of the pylorus, accompanied with a diminution of bulk of the orifice of this part sufficient to interrupt or impede the exit of the chyme or indigested food.

Vomiting in Cancer.—Perhaps the most frequent cause of vomiting is the mechanical obstacle occasioned by the carcinomatous substance in the pyloric portion of the stomach. The quantity and quality of the matters vomited are variable. Both will be modified by the quantity and quality of the food and drink; the former by the capacity of the stomach and the absence or presence of irritation; the latter by the nature of the ingesta, the state of digestion and the stage and variety of the disease. It is only at the early stage of carcinoma, or at least before softening and ulceration have taken place, that the vomiting consists of a watery or mucous secretion. In the great majority of cases, and always toward the termination of the disease, the contents of the stomach ejected by vomiting contain a substance resembling the lees of wine, a mixture of chocolate or soot and water. The substance may appear in the form of little particles, patches or streaks, and indicates the effusion of the blood into the cavity of the stomach from hemorrhage, either in consequence of the softening of the carcinomatous matter or the sloughing of this substance and of the contiguous parts.

Cancer of Liver.—Carcinoma of the liver may occur without any appreciable derangement of the special function of the organ being observed. There is often no apparent alteration in the quantity or quality of the bile, even in the most extensive forms of cancer of the liver.

Cancer of Kidney.—There is no apparent modification of the secretion of urine in cancer of one of the kidneys, although the disease may be so extensive as to leave no trace of the natural structure of the organ.

Cancer of Uterus.—The much more frequent occurrence of cancer after than before the cessation of the menstrual discharge, prevents us from estimating accurately the influence which this disease exercises on the special function of the uterus and ovaries. Impregnation, however, has been known to have taken place in carcinoma of the os uteri, and of one of the ovaries.

Cancer of Spleen.—As regards the spleen, its cellular organization may be completely effaced by the presence of the carcinomatous matter, and consequently it is rendered incapable of receiving more blood than is necessary for the nutrition of its solid parts and the growth of the disease.

Cancer of Duodenum.—Cancer of the duodenal extremity of the pancreas, in consequence of the compression of the duct which passes in this direction, gives rise to an accumulation of the secretion of this organ, and great dilatation of the duct throughout its whole extent. Diminished or suspended absorption are the occasional consequences of cancer of the mesenteric and lymphatic glands.

Cancer of Brain.—The functional lesions which accompany cancer of the brain, cerebellum and spinal cord vary considerably with the seat of the disease relative to these organs individually, as well as to particular portions of them. But in neither of these respects does it give rise to any symptoms which can be regarded as pathognomonic of its presence. As a foreign body it gives rise sometimes to a degree of compression sufficient to produce partial or complete paralysis, loss of memory or difficulty of speech and derangement of the intellectual faculties.

Symptoms.—But these latter changes depend principally on the irritation and softening of the substance of the brain in contact with the carcinomatous mass. Even paralysis is more frequently produced by these subsequent changes than by compression.

The Spinal Cord.—Paralysis of the superior and inferior extremities of the muscles of respiration, and of the bladder and rectum take place in carcinoma of the spinal cord, the seat and extent of the paralysis depending on the portion of the spinal cord occupied by the disease.

General Symptoms.—The general symptoms of carcinoma do not make their appearance before the last stage of the disease. Their severity depends much on the nature of the organ and the extent to which it is affected, but it is principally the irritation produced by the presence of the cancerous substance during the period of softening, sloughing and ulceration that determines the gravity of these symptoms. It is in this, the last stage of the disease, that the circulation and innervation become deranged, and that fever and a diminution of the nutritive function are first observed. It is likewise at this period, but more frequently a few days or weeks before death, that the skin assumes a pale earthy or dull ochrey tint; the debility and emaciation make rapid progress, and all the functions of the economy become implicated in the deteriorating influence of the disease. It is this group of the general symptoms which constitute what is called the cancerous cachexia.

Fever Symptoms.—The febrile symptoms, as well as the diminution of nutrition in general, are greatest when the seat of cancer is the uterus or stomach, and least in those organs as the brain and lungs, in the former of which softening and in the latter compression may terminate in death before either of these symptoms has become conspicuous. General dropsy does not often occur and is never great. Ascites frequently accompanies carcinoma of the liver.

Cancerous Dropsy.—Dropsy of the inferior extremities occurs more frequently in cancer of the ovaries and uterus than of any other organ. It is the consequence of compression of the iliac veins, but it may also be occasioned by the extension of the inflammation which accompanies the ulcerative stage of the disease to these vessels. Compression of the vena cava by tumors in the liver, or by the enlarged mesenteric glands, may also give rise to the same state of the inferior extremities.

Colloid Cancer.—Colloid or alveolar carcinoma is characterized by the stroma being tolerably thick and so arranged as to divide the mass into a number of cystiform chambers, or alveoli, which are occupied by a jelly-like substance. Generally pale and transparent this may be firm as the white of a hard-boiled egg in the older cells, or of the consistency of half dissolved glue or currant jelly. In any form it is non-adherent to the walls of the cells, and may be readily removed. The disease assumes two forms, the circumscribed and infiltrated. The former is met with in subcutaneous tissue and in the bones of the extremities, constituting the osteo-sarcoma and spina ventosa. The latter is seen in the walls of the alimentary canal. It is of much slower growth than either of the above varieties, and rarely or never ulcerates or softens.

Black Pigment.—Melanosis is a form either of scirrhus or encephaloid, in which a deposit of black pigment has taken place.

Soft Cancer.—Encephaloid or soft carcinoma possesses a matrix less abundant and firm than in the preceding variety. So deficient is this that the mass is of jelly or brain-like consistency. Its cells are for the most part large, with a tendency to assume the caudate form. The growth may be circumscribed (forming tumors often of immense size), or it may occur in the tissues as an infiltration. It is elastic, occasionally fluctuating under pressure, as though pus was present. When opened it shows a whitish-yellow surface, dotted with pinkish spots during life. It is very vascular, giving a purplish-red tinge to the contiguous skin and possessing oftentimes a distinct fruit. Hemorrhage resulting from the spontaneous rupture of some of these vessels is not infrequent, forming apoplectic clots in the interior if confined, but constituting frightful loss of blood if rupturing the matrix. When ulcerated the surface of the tumor assumes a dark, sanguineous appearance, in which condition it is often described as *fungus hematodes.* From the first the peculiar cancerous cachexia is better marked in this than in any other kind of malignant growth. Its most frequent sites are the eye, cavities of face, articular ends of bones, the testicles, uterus and breast. The disease runs its course rapidly.

Skin Cancer.—Epithelioma or epithelial cancer differs from the above in having an imperfectly defined matrix which possesses a tendency to form concentric laminæ around the cellular elements. These are generally mixed up with altered epithelial cells of the parts, and are more constant in their outline than other cancerous growths. Epithelioma is found chiefly at the margin of the mouth and at the anus, though it is occasionally seen on the hands and feet.

Cancer of Bones.—Osteoid cancer is defined as a malignant tumor, usually commencing in the bones, consisting almost entirely of bone and followed by similar growths in the glands and viscera.

Membranous Cancer.—Villous cancer is the name given to cancer in a mucous membrane when covered with a villous or velvet-like growth.

A host of remedies have been proposed for the cure of cancer; the greater number of them have been tried in almost every form of the disease, but they have nearly all failed to justify the high praises bestowed on their curative virtues.

Remedies.—1. The remedies which retard or arrest the progress of cancer consist of those which exercise a direct or indirect influence on the nutritive function of the affected organ. Among the former are those which operate directly—the local abstraction of blood by means of leeches and compression hold the first rank. The first of these means should be employed for a considerable length of time, at intervals of one, two or three days, and the quantity of blood taken should be regulated chiefly by the strength of the patient. The diminution of bulk of the original tumor which follows this mode of treatment is sometimes very considerable.

2. In the great majority of cases the tumor is not entirely removed. It may be reduced from the size of a hen's egg to that of a nut, and in this state remain stationary for years without giving rise to pain or any inconvenience whatever. The alternate use of local bleeding and compression effect more rapidly the reduction of bulk just noticed than when either is employed separately.

3. Although compression and local bleeding are employed beneficially they are by no means to be altogether relied upon. In consequence of a modification of nutrition in general, and consequently of that of the affected organ, the beneficial effects of some general remedies in carcinoma of external organs are chiefly to be attributed. Some of these remedies appear to modify nutrition by effecting some unknown change in the composition of the blood, as aconitum, conium and arsenic; others, by acting on the capillary circulation and absorption, as mercury, in alterative doses, and various preparations of iodine.

4. The beneficial effects of tonics, as preparations of iron, the fixed and volatile alkalies, mineral waters and all other remedies which increase the vital energies, invigorate digestion and promote absorption and secretion, may also be referred to a favorable change induced in the nutritive function of the affected organ by the introduction of these remedies into the circulating system.

5. The salutary operation of these local and general remedies is much increased by a judicious combination of both, regulated according to the circumstances of individual cases.

Diet.—But while employing any of these remedies it is of the utmost importance to regulate the diet and regimen of the patient in such a manner that neither of them may interfere with the operation of the remedy employed.

Virtues of Conium.—For example, the curative virtues of conium depend greatly on the quantity of food consumed by the patient, that is to say, the operation of this remedy is more or less powerful when only a small quantity of food was allowed and hardly perceptible when the quantity was considerable.

The following has been our experience with the use of conium in this disease:

1. The patient takes a dose of the fid. extract of conium, morning and evening, two hours before each meal. The amount of the first dose is one drop, which is gradually increased to six drops each time. This dose is continued for about three weeks in order that the organs may become habituated to its operation, and is afterward increased to twelve drops each time, beyond which it is not necessary to carry the remedy, because of its influence being sufficient. The twelve-drop dose is continued from two to four weeks.

2. After each dose of conium, as well as at meals, the patient uses a glass of the decoction of sarsaparilla.

3. Only the third of the ordinary quantity of food is allowed, which ought to be very simple and divided into three small meals.

4. If the conium disagrees in one form it should be given in another or the aconitum may be used instead, but in lesser quantity than the conium. Toward the end of the treatment the dose of the conium is gradually diminished and the diet gradually increased.

Further Remedies.—The only class of remedies which can be expected to afford any essential benefit are those that are capable of inducing a new condition in the system by modifying the function of nutrition, such as the various preparations of iodine, combined with a thorough change of everything surrounding the individual. The cachexia is the real morbid condition and the cancerous affections in particular organs are but so many evidences of it, as tubercles in the lungs are mere expressions or indications of another form of cachexia, equally possessing the whole system. Hence it is that cancerous tumors on the external parts of the body are so apt to recur after they have been removed by the surgeon.

Removal of Tumors.—Still it must be admitted that in cases of scirrhus tumors, when they have been removed early, there has very frequently been no return of the disease. In such cases the cachexia has been less strongly marked and time, apparently, has not been permitted for the local mischief to increase the morbid disposition. It would seem, too, that the particular species of cancer influences the probability of recovery. There are a few examples of permanent recovery after the removal of encephaloid tumors.

Remedies for Cancerous Fevers.—The remedies best calculated to prevent, remove or mitigate the local and general effects of carcinoma of internal organs vary with the nature of these effects and the seat of the disease. The state of irritation and fever and pain, at whatever period of the disease they may occur, may be greatly moderated by the use of conium, aconitum, opium, hyoscyamus, the acetate or muriate of morphia, while at the same time the use of all kinds of stimuli is to be avoided, particularly if the digestive organs be the seat of the disease, and the patient himself kept as much as possible in a state of quiet of body and mind.

Treatment.—When cessation of pain and a return of strength and appetite take place, treatment is suspended for a month. It is then resumed for two consecutive months, then suspended for two months, and recommenced, continuing during a month. This plan is pursued for at least two years, which by pursuing the patient is not only greatly benefited, but frequently cured.

Ferruginous preparations must not be omitted when there is great anemia caused by profuse hemorrhage or imperfect nutrition.

Hemorrhages.—Hemorrhages are treated by rhatamy, sulphuric acid and ice. When they have been arrested, and when the pain is subdued, bitters, such as the decoction of cinchona, infusion of quassia, or of Columbo root, are given; sometimes also certain remedies which combine bitter with slightly purgative properties, such as rhubarb, are used; and finally the preparations of iron.

Classes of Remedies.—The only class of remedies that can be expected to afford any essential benefit are those that are capable of inducing a new condition in the system, by modifying the function of nutrition, such as the various preparations of iodine, combined with a thorough change of everything surrounding the individual. The cachexia is the real morbid condition, and the cancerous affections in particular organs are but so many evidences of it, as tubercles in the lungs are mere expressions or indications of another form of cachexia, equally possessing the whole system. Hence it is that cancerous tumors on the external parts of the body are so apt to recur after they have been removed by the surgeon. Still it must be admitted that in cases of cancerous tumors, when they have been removed early, there has been frequently no return of the disease. In such cases the cachexia has been less strongly marked, and time, apparently, has not been permitted for the local mischief to increase the morbid disposition.

Mitigation of Pain.—When the carcinoma or cancerous disease has arrived at that period when the cancerous cachexia announces the extensive and fatal termination of the disease, the efforts of the physician must be directed solely to the mitigation of the sufferings of the patient. If this symptom were removed, there are many cases in which carcinoma would run a much longer course, and give rise to comparatively little functional derangement.

Termination of Cancer.—With regard to the termination of cancerous affections of the hollow organs, it takes place frequently in the uterus and stomach, the rectum and urinary bladder, the transverse arch of the colon and jejunum, and the peritoneum. The perforation of the rectum, bladder and peritoneum is the consequence of the extension of the disease from the uterus; that of the transverse arch of the colon, the consequence of its extension from the stomach.

If the os uteri be the seat of the disease additional benefit may be derived from the use of leeches applied to this part, and also sedative injections. It is only in this latter situation that sloughing and ulceration can be detected, and local remedies applied to remove some of the disagreeable effects of the one, or retard the progress of the other. Antiseptic disinfectants are perhaps the best remedies we can employ in this case, as they not only destroy the disgusting odor which accompanies this stage of the disease but remove the putrid and irritating fluids which are then discharged. The retention of the contents of hollow organs from compression or obstruction is an occurrence to be guarded against by regulating the quantity and quality of food, for negligence in this respect may be followed by fatal consequences if the obstacle be situated in the intestines.

Further General Treatment.—The same general treatment is applicable to all forms of cancer. If the growth be well defined, as in carcinoma of the breast, of not very long standing and not involving neighboring lymphatic glands, it may be removed, but severe hemorrhage from a large encephaloid cancer or the complication of important structures in any variety having deep attachments will preclude any operative procedure. Even when extirpated under favorable conditions it is very apt to return, eventually to destroy the patient. The removal of epithelial growths by the knife, or their destruction by caustic applications before glandular evolvement has supervened, in many instances may effect a permanent cure. In the last few years the X-ray has been used in the treatment of cancer with marked benefit, especially the external variety. In fact, many cures are reported.

Care in Removing Cancerous Growths.—When a cancerous tumor has been removed all surrounding parts should be carefully examined, because it is not uncommon to find small cancerous tubercles in the connective tissue, fascia or muscular sheaths, which, if passed by unheeded, would soon increase and give rise to a recurrent growth.

COLLOID.

Characteristics.—This new growth, formerly called colloid cancer, gelatinous or gum cancer, is no longer considered to be malignant, in the sense of its having the power to infect other and distant portions of the system. Its great characteristic is the formation of a new growth in the large open meshes of which it exists a glue-like, gelatinous, transparent substance like half dissolved gum arabic. This matter is strikingly transparent. Greenish-yellow is its predominant hue. This jelly-like matter is exceedingly soft; a colloid mass is, however, firm and resisting; although not apt to be produced elsewhere, these growths may obtain an immense size and even prove fatal by the disturbances which they cause in the system. Fortunately they are quite rare in this country.

LUPUS OR NOLI ME TANGERE.

Character.—This is a spreading, tuberculosis inflammation of the skin, usually of the face, tending to destructive ulceration. Its name is supposed to be derived from a fancied resemblance which the sores left in the progress of the disease have to the bite of a wolf.

Symptoms.—1. The "lupus erythematosus" occurs chiefly upon the face, and is symmetrical; each patch has well-defined edges and a red, scaly surface with small horny points upon it, duo to accumulation in the dilated mouths of sebaceous ducts.

2. The "lupus vulgaris" has its origin in a skin tubercle, or tubercles, of a flat form, fleshy consistence and pink, shining appearance, and these at times ulcerate. This lupus ulceration, when once originated, progresses steadily, destroying every tissue it attacks, and when it reaches the nose, its favorite seat, it simulates cancer.

Treatment.—In the treatment of lupus, although the disease has probably a constitutional origin and requires tonic treatment, both by medicine and regimen, there is no disease that derives more benefit from local treatment. Quinine, with vegetable tonics; cod-liver oil and iodide of potassium are all useful in this respect. When the ulceration is superficial and the skin is not deeply infiltrated, the local application of cod-liver oil on lint and the covering up of the part with cotton to keep it warm has in some cases worked wonders.

ELEPHANTIASIS OR TRUE LEPROSY.

Symptoms.—This is a constitutional, hereditary affection, essentially chronic in its nature, showing itself mainly as shining tubercles of different sizes, of a dusky red or livid color, on the face, the ears and often on the legs, the skin being thickened, wrinkled, rough, unctuous, devoid of hair, and the perspiration from it highly offensive. After a time there is a circular margin enclosing the central red part free from scales and quite resembling the irregular scaliness of psoriasis.

When the local disease has reached its highest degree a remarkable constitutional affection appears. The patient then becomes very languid, asthmatic, particularly at night time; smothering fits seize him, he coughs violently and spasmodically, and spends the night in perfect sleeplessness, falling into excessive, colliquative, clammy sweats, which give an intolerably fetid odor. His voice becomes weaker and hoarser, the appetite for food and drink is preternaturally increased, and the temper becomes gloomy. Finally, various nervous symptoms arise—fainting, convulsions, paralysis of some parts—and death arrives, preceded by the highest degree of exhaustion.

Causes.—Its origin has been ascribed to want of cleanliness and to unwholesome diet, especially the constant use of bad fish, to long-continued exposure to the heat of a tropical sun, to dampness of situation or occupations requiring the frequent immersion of the limbs in cold water.

Where Occurs.—The disease occurs chiefly in warm climates—Arabia, China, India and some of the West India Islands.

Dry Leprosy.—In this the wasting of the disease is circumscribed, and limited to all the muscles of the hand. The skin is thick, reddened, and completely anesthetic; the fleshy masses have entirely disappeared, and the fingers assume the shape of claws. This disease rarely attacks women. It is accompanied with great torpor of mind and sluggishness of body. Mental depression amounting to extreme melancholy is the natural consequence of so hopeless a malady. Yet the general health, for a length of time, suffers infinitely less than could have been anticipated, the actions of the respiratory and digestive organs continue longer unaffected, and even the cutaneous functions are still tolerably performed, as is evidenced by abundant perspiration.

Progress of the Disease is very slow, and its termination, though it may be deferred for many years, is almost always fatal, the unfortunate patient being in the meantime dreadfully deformed and mutilated, and literally dying by inches. The patches spread slowly till the surface of the whole body may be at length inflicted, and its sensibility lost. There is neither pain nor itching, and usually no swelling. After a few months the internal functions become deranged, the pulse gets very slow and heavy, "as if moving through mud," the bowels grow costive, and there is much sluggishness of mind, and tendency to somnolency. The skin of the extremities becomes fissured and rough, and ulcers appear under the metatarsal or metacarpal joints—the integuments seeming to be simply absorbed—or sloughing off in successive layers of about half an inch in diameter, without any previous tumor, suppuration or pain. A serous discharge ensues and there is loss of sensation and a tendency to ulceration and death of the parts. In the advanced stage of the disease the eyes are fierce and staring, and the voice hoarse and nasal.

Character.—Leprosy is not a contagious disease, but is propagated by inheritance, depending on some specific taint transmitted from parents to children. The two forms of this horrible disorder are the tuberculated and the non-tuberculated or anesthetic.

Treatment.—The only hope of exterminating this dreadful disease appears to lie in the adoption of hygienic measures tending to improve the general condition, both physical and moral, of the leprous poor. Without this medical treatment is of little or no avail, but, with the aid of improved sanitary surroundings, tonics and alteratives, especially preparations of iron and iodine, have a very beneficial effect. Much may be hoped also from the systematic employment of baths, either saline or sulphureted, in this affection.

Leprosy Germ.—A bacteria claimed to be the cause of leprosy, and named the bacillus leprar, was discovered in Norway in 1874, and its existence in the tubercles of this disease has been confirmed, although its causative power has not yet been completely demonstrated.

For a long time, this disease was considered incurable, but it is claimed there have been many cures and much improvement in other cases by the use of Chaulmoogra Oil. This has been used at the Leper Colony on one of the Hawaiian Islands for a number of years. It is given internally and also used locally by those in charge, who apply the remedy according to the severity of the case. This should only be used under the directions of a doctor. This oil is obtained from the seeds of a tree found in India.

SCROFULA.

Causes.—A blood disease manifesting itself in a great variety of organs and characterized when fully developed by the presence of a peculiar unorganized matter termed scrofulous. The causes are chiefly hereditary transmission and deprivation of pure air. It is closely allied to pulmonary consumption.

Symptoms.—The scrofulous habit, when strongly marked, is easily recognized. The skin is usually delicate and irritable; the patient suffers very readily from chilblains, and in childhood is more liable than others to cutaneous diseases. The mucous membranes partake the delicacy and irritability of the skin. The edges of the eyelids are apt to be red and swollen; the eye is very liable to be attacked by inflammations; hemorrhages from the nose, cold in the head and enlarged tonsils are frequent. The muscles commonly want firmness, and the whole system is deficient in stamina.

Diagnosis.—Scrofula is eminently a disease of childhood, while consumption belongs to a later period, but neither is confined to any age. One of the forms in which scrofula most commonly and earliest shows itself is swelling of the lymphatic glands in various parts of the body, more particularly about the neck. These become enlarged and firmer, and after a time a deposition of the peculiar curd-like matter is found to have taken place in their interior. After a time suppuration occurs, the swellings become softer and the skin over them assumes a dusky red hue, gradually becomes thinner and finally bursts, giving outlet to an unhealthy pus mixed with the curd-like deposit of the disease. The ulcers left heal slowly and with difficulty, and unless great care is exercised produce deformed cicatrices.

Treatment.—1. In the constitutional treatment of these cases of strumous adenitis, nutritious food, suitable warm clothing, attention to cleanliness and residence in pure air are the most important requisites. Iodine in its different forms, especially the syrup of the iodide of iron, is given in doses of twenty-five drops thrice daily, and quinine and iron each in grain doses three times a day, with one-sixteenth of a grain of arsenic, or phosphites and hypophosphites of lime and magnesia, in tablespoon doses of the syrup, are frequently of great service. Also the iodide of ammonium in three-grain doses three times a day.

2. In endeavoring to produce a reduction of the swollen glands by causing an absorption of the contents, the tincture of iodine painted on with a camel's-hair brush, or small feather, so as to smart severely but not to raise a blister, and repeated daily for a week or so until the skin peels off is a valuable resource. A milder application of the same remedy is by the use of the ointment of iodine rubbed into the skin over the enlarged gland, night and morning, for weeks and even months if requisite.

3. Cod-liver oil is an anti-strumous remedy of great power, and is more readily taken by the young than by adults; generally sea bathing and sea air are mostly the best of remedies.

Ophthalmia.—Strumous ophthalmia occurs in children between the time of weaning and the end of the ninth or tenth year. Its chief symptoms are redness of the white of the eye, with the formation of little blisters or pustles, often ending in minute ulcers on the cornea or clear portion. The eyes water very freely, and the intolerance of light is excessive, so much so as almost to be indicative of the disease.

Treatment.—The management of these cases will tax the skill of both nurse and doctor to the fullest extent, although internal remedies are often also required, the nursing and outward applications are the most important. Great attention must be paid to cleanliness, and warm bathing of the eyes with anodyne fomentations are very serviceable. Applications of the wine of opium or of a solution of nitrate of silver, of a strength of from five to ten grains in an ounce of water, to be applied by a physician is often of very great benefit.

Diet.—Good diet is indispensable in strumous affections. Hence the invalid should have all the advantages of an abundance of good mutton and beef, vegetables and ripe fruits in season, raw eggs, milk and cream, tepid or cool baths and sea air.

PRESCRIPTION I.

R.—Cod-liver oil and hypophosphites .... 5 ounces
One or two tablespoonfuls three times a day.

PRESCRIPTION 2.

R.—Citrate of iron and quinine	....	10 grains
Cod-liver oil	....	1 ounce
Glycerine	....	1 "

Take a tablespoonful three times a day.

RICKETS.

Causes.—The cause of rickets seems to be anything which induces enfeebled assimilation of food and impaired nutrition of body. Hence this affection is sometimes met with in such weakly children of even wealthy parents as suffer from defective action of the vital forces. Like scrofula, it is, however, especially a disease of the poorer classes. Insufficient and especially improper food, the constant respiration of foul, impure air, residence in dark, damp, cold or filthy dwellings, these and similar circumstances readily serve, in all probability, to generate rickets.

Symptoms.—This disease rarely appears before the seventh month, and most commonly does not declare itself until the child first begins his attempt to walk. When a child is about to be affected with rickets he becomes dull and languid, the appetite is variable and capricious, the bowels are irregular, the stools unhealthy and usually pale. Constitutional disturbance now arises, and a febrile state is soon established; the limbs become emaciated; the belly tumid; the face full and the head disproportionately large; the forehead projecting, and the sutures of the cranium remaining open or perhaps expanding slightly. The extremities of the long bones which are least concealed by muscle, as those of the wrists and ankles, and the sternal ends of the ribs, particularly these last, are swelled out into knobs. The legs begin to bend outward at the knee, giving rise to the deformity of bow-legs, or less frequently the knees are thrown forward and the feet outward, making the child what is called knock-kneed, and usually crippling it more or less for life. The bones of the arms and the collar bones may also become very much curved and twisted, showing that the popular delusion as to the cause of bow-legs has little foundation in fact. The deformity of the chest is often very great, the back being flattened, the breast bone pushed forward and the natural curve of the ribs lessened. In such cases the child is said to be pigeon-breasted.

Diagnosis.—This, of course, must be difficult in the early stage, as the symptoms closely resemble scrofula at that time, but after the curvature of the bones commences there can no longer be any doubt, as such softening of the bones during childhood only occurs in rickets.

Treatment.—The medical treatment of rickets must be subordinate to the hygienic, since far more depends upon good food, proper clothing and pure air than on drug medication. Milk diluted with limewater, Liebig's food, and, if the infant is old enough, beef tea, extract of beef, raw meat, eggs, and so forth, should be given in abundance. The phosphates or hypophosphates of iron, lime, quinine and strychnia, as recommended when treating of scrofula, are very useful, and if the child is capable of digesting cod-liver oil it ought also to be administered. Should the diarrhœa be troublesome a chalk and soda mixture, containing a grain of each as a dose for a baby one year old, or a mixture containing a grain of bismuth in each dose for an infant of that age will probably be of essential service, and after the feverish symptoms are controlled the child, in suitable weather, should almost live in the open air, especially if a seaside atmosphere can be obtained.

Diet.—If the disease has occurred at a very early age it may be advisable to try the effect of changing the wet-nurse; and in general it will be proper to wean the child about the end of the ninth month, for protracted suckling is certainly one of the debilitating causes which dispose to rickets. While the child continues at the breast the diet of the nurse or mother ought to be carefully attended to, in order that the milk may prove nutritious and easy of digestion; or its powers may be assisted by allowing the infant, in addition, small quantities of gelatin, beef tea, or yolk of egg, provided the absence of febrile excitement will permit. After the child has been weaned the diet must be suited to the degree of constitutional irritation which exists; but one leading principle should be to support the strength as much as possible without quickening the circulation or oppressing the stomach.

CRETINISM.

Causes.—A condition of persons in whom partial or complete idiocy is combined with great bodily deformity of the whole body, due to bad water, lack of sunlight, and life in deep valleys like those of the Alps.

Symptoms.—There are three varieties, first, complete or incurable cretinism, which is characterized by idiocy, deaf-dumbness, deficiency of general sensibility and entire absence of reproductive power; second, semi-cretinism, which is a degree of the malady in which the mental faculties are limited to the impressions of the sense and the bodily wants The general sensibility is obtuse, the head is badly formed and drooping, the speech is rudimentary and the reproductive powers are feeble or absent; third, incomplete or curable cretinism, in which the mental faculties, though limited, are capable of development.

Treatment.—1. The first thing to be accomplished is the removal of the young cretin, as soon as possible after the disease exhibits itself, to a pure, bracing atmosphere.

2. The treatment requires an abundance of pure water for drinking, washing and bathing; warm and cold baths and douches; friction of the skin with brushes and stimulating liquids to rouse its action; warm clothing; mineral tonics; nourishing food; iodine, cod-liver oil and phosphates. The effort to develop the mind must follow the attempt to restore the body to a healthy condition.

DIABETES OR DIABETES MELLITUS.

Causes.—Twice as many men as women have this disease: It is most frequent among young and middle-aged adults; the mortality from it being greatest from fifteen to fifty-five. It is more common in cities and manufacturing districts than in the open country; occasionally it is hereditary. The exciting causes appear to be exposure to cold and wet; drinking cold water largely when heated; excessive use of saccharine food; intemperance; violent emotion; febrile diseases, and organic affections and injuries of the brain and spinal cord.

Symptoms.—In this remarkable disease there is an excessive discharge of urine containing grape-sugar, the saccharine principle of grapes and of honey called glucose, being produced in the body in great quantity and eliminated from the kidneys. The exhaustion, which results from the immense loss of fluid, sometimes amounting to several gallons daily, is often accompanied by other disturbances of the system due to the presence of sugar in the other secretions and in the blood and to the modifications of the nutrition thus effected; opacity of the crystalline lens of the eye—constituting diabetic cataract—is occasionally one of the modifications of structure; shrinking of the substance of the brain is another, and a peculiar form of inflammation of the lungs is another. It is a disease which commonly, after a longer or shorter course, proves fatal.

Diagnosis.—The detection of sugar in the urine, not temporarily, but for a considerable time, is of itself sufficient to make out the case.

Prognosis.—Recovery is not impossible in diabetes, but a large majority of cases end in death. Amelioration—keeping the disease in abeyance—is often an attainable end.

Treatment.—The most positive influence in diminishing the disease belongs to opium or codeina; but this does not appear to interfere with the progress of the disease. The alkalies, pepsin, iron, quinine, salicylate of soda, alum, iodine, nitric acid, turpentine and the inhalation of oxygen have all been employed.

Diet.—Since it is found that the amount of sugar discharged in the urine fluctuates very much in accordance with the starchy and saccharine materials which are eaten, it is the best for the diet of a diabetic patient to be freed, as far as possible, from substances which can be converted into glucose by the digestive organs. Hence the effort should be, in treating diabetes, to abstain from all starchy food as well as from every solid and liquid containing sugar. That meat and eggs may be taken, as a derangement of the liver is not found to be produced by them, and fish is a most important article with which to vary the monotony of the diet. Skimmed milk appears to answer a very good purpose in this disease.

The following prescription is of value in diabetes mellitus:

R.—Salicylate of soda	3	drachms
Fowler's solution	1	drachm
Glycerine	1	ounce
Water	1½	ounces

Mix and take a teaspoonful three times a day.

PURPURA OR LAND SCURVY.

Causes.—It chiefly occurs in individuals of delicate habit or enfeebled by their occupations or mode of life; by confined, low or damp habitations, scanty food, hard labor, grief, anxiety, fatigue and watching. On the other hand purpura frequently occurs where no causes of a debilitating or depressing nature can be supposed to have existed.

Varieties.—The two varieties which are distinguished are the simple and the hemorrhagic, in the latter of which the malady is accompanied by bleeding from some of the mucous membranes of the body.

Symptoms.—Various symptoms denoting general disorder of the system precede the appearance of the spots in purpura, generally for some weeks. In most instances languor, weariness on very slight exertion, faintness and gnawing pains in the stomach are complained of. The appetite is variable, generally poor, but sometimes there is an inordinate desire or craving for food. The tongue is yellowish and coated with a viscid fur, the countenance sallow or dingy, or the face may have a pale and bloated appearance with swelling beneath the eyelids. The purple spots usually appear upon the legs and afterward without any certain order on the thighs, arms and trunk of the body, and their formation is attended with great weakness and much depression of spirits. Deep-seated pains are felt about the region of the stomach as well as in the chest and loins. One of the most distressing and dangerous symptoms is when the patient becomes of a sallow complexion, waxy-colored and dingy, dropsical swellings of the feet and legs with deep and gangrenous sores appear, general dropsy often prevails and the sufferer dies exhausted.

Diagnosis.—The diseases with which purpura is most likely to be confounded are typhus fever attended with scurvy. The origin and course of the complaint, the period at which the petechiæ appear, the extent and variety of the accompanying hemorrhages will make its diagnosis clear.

Treatment.—1. In the treatment of this disease we are not to be guided by the name or external appearances, but by diligent attention to the symptoms and especially to the state of the functions and the habit and constitution of the patient. Where high excitement prevails with strength of pulse and vigor of constitution, and we have reason to suspect inflammation, purging, with a suitable antiphlogistic diet, are the appropriate remedies.

2. Where a quite opposite state exists all active depletion must be abstained from and the strength supported by beef-tea and other meat nutriment; at the same time tonics, such as quinine or Peruvian bark, the diluted mineral acids in five or ten-drop doses, iron and strychnine, must be administered.

The following offers a good treatment:

R.—Syrup of the superphosphate of iron.......... 1½ ounces
Liquor of peroxide of hydrogen .... 1½ "
Glycerine .... 1½ "
Water .... 1½ "
Take a tablespoonful three times a day.

Or,

R.—Oil of turpentine .... 1 drachm.
Fluid extract of digitalis .... 1 drachm
Mucilage gum-arabic .... 1½ ounces
Peppermint water .... 1 ounce
Make an emulsion. Take a teaspoonful every three hours.

SCORBUTUS OR SCURVY.

Character.—This is a disease allied to purpura, but attended with a spongy condition of the gums, and livid patches under the skin of considerable extent, which are harder than the surrounding structure. It has been stigmatized as the great plague of the ocean, and has been denominated sea scurvy to distinguish it from land scurvy or purpura.

Causes.—That the essential cause of scurvy is deprivation of fresh food, and, in almost all cases, of fresh vegetable food, is proved. Fresh meat will retard it in the absence of vegetables, but neither this or oranges and lemons will altogether prevent it through long periods. Additional promotive causes are severe cold, fatigue, exposure and mental anxiety or home-sickness.

Symptoms.—1. Languor, debility and lowness of spirits first occur; then swelling, sponginess and bleeding of the gums; the teeth loosen, and the breath is offensive. Palpitation of the heart and dyspnœa may be present. Spots (from subcutaneous extravasation of blood) appear on the limbs. Diarrhœa and dysentery often come on. Death may take place by a gradual exhaustion or by sudden syncope.

2. A remarkable peculiarity of scurvy is the readiness with which all parts of the body suffer from pressure, and the slightest possible blow may produce an extensive bruise, a small eruption like flea-bites is often to be seen on the legs, and about the same time the muscles of the legs and thighs are apt to become hard and painful, and in a day or two the skin over the painful part grows yellow and then purple. These purple spots may be as large as the palm of the hand at first, and are liable to extend until they cover half of the limb.

3. As the disease advances all the symptoms become aggravated. The loss of physical power increases, the purple spots have a tendency to ulcerate, and the resulting ulcers are especially distinguished by their putrid fungoid appearance, and their great tendency to bleed.

Diagnosis.—Purpura hemorrhagica is undoubtedly not identical with scurvy, although "purpuric" extravasations are common to both. Purpura does not depend, as scurvy does chiefly, upon a fault of diet; nor are the gums affected in purpura.

Treatment.—1. The great remedy for scurvy is lemon or lime juice; in seemingly desperate cases the most quick and sensible relief has been obtained from lemon juice, when no other remedy seemed to avail. When the acid operates violently upon the stomach and bowels of those who are much weakened, the addition of wine and sugar is strongly recommended.

2. A solution of nitrate of potash in vinegar has been most advantageously made use of in the proportion of one ounce of nitrate in one quart of vinegar, and a tablespoonful of this given two or three times a day.

3. Fresh vegetables alone will restore what is wanting. Potatoes, tomatoes, oranges and lemonade are the most generally available articles. If any medicine is useful as an adjuvant, it is the tincture of the chloride of iron in moderate doses. Sometimes citric acid does good. For the gums a wash of tannic acid or tincture of myrrh in diluted glycerine will be useful, or alum, brandy and water. Salt and whiskey rubbing of the skin will aid in dissipating the petechiæ.

Diet.—Medical men in charge of expeditions to a distance, for ordinary supplies should always insist on measures being taken to furnish enough fresh vegetables, or, next best, dessicated potatoes; after the latter onions, tomatoes, turnips, and so forth, and oranges and lemons rank. Wine is also decidedly though not infalliby anti-scorbutic.

The following is a good anti-scurvy remedy:

R.—Common salt	10 scruples
Chlorate of potash	½ ounce
Rochelle salts	5 scruples
Phosphate of soda	3 scruples
Lemon juice	6 ounces
Syrup of lemon	14 ounces
Water	7 pints

To be used as a drink several times a day.

ANEMIA.

Causes.—Poverty of blood. This is a special, morbid state, in which there is fullness of the surface of the body and deficiency of the red corpuscles of the blood. It is a common affection among women, and persons of both sexes who are ill-fed, or from any cause badly nourished, in crowded localities. It is occasioned by loss of blood, from disease or injury causing hemorrhage, from excessive suckling in a mother or wet-nurse, severe or protracted diarrhœa, or (more rarely) leucorrhea, typhoid or other forms of fever; the malarial influence, sustained for a considerable time; deficiency of food, light, warmth, or fresh air.

Symptoms.—The face, the hands, and the general surface are pallid and slightly waxen or icteroid in their hue. There are vertigo, faintishness, palpitation and an impaired action of the organs generally, especially of the stomach and bowels; digestion being deranged, with flatulency, constipation, and so forth.

Diagnosis.—This is very much aided by the detection of various murmurs, as the watery blood passes through the heart and larger veins. The jugular veins of the neck are often the seat of a well-marked venous hum in profound anemia.

Treatment.—1. In almost all cases it is essential to put the patient on nourishing diet, and especially where the anemia has been caused by imperfect nourishment; yet care must be taken in the very impressible condition of the system which exists in these cases, that undue excitement be not induced.

2. Our first effort should be to supply the materials for enriching the blood, and especially those which are necessary to construct the red corpuscles, a deficiency of which appears to be the essential element in this malady. Iron, which enters into their constitution more abundantly than of any other tissues of the body, is hence obviously called for, and should be administered in whatever form can best be assimilated. Where it is well tolerated there is probably no better preparation than tincture of the chloride of iron, in twenty-drop doses three times daily.

3. In cases where the tincture of the chloride of iron is not applicable, or is objected to by the patient, the powdered iron, called also iron reduced by hydrogen, in doses of a grain thrice daily, can almost always be borne, and is frequently of the greatest service. All the compounds of iron require, however, to be used for a long time, usually several weeks and often for several months, in order to cure the anemic condition.

4. The citrate of iron or the citrate of iron and quinine, in doses of from three to five grains, possesses one great advantage over many other preparations of this useful metal in the fact that while perfectly soluble they produce upon the organs of taste little of that styptic or ink-like impression which to many persons is so exceedingly disagreeable. The beef, wine and iron is also a most valuable remedial agent when properly prepared.

Diet.—The best food which the stomach can digest, and there is no doubt that the iron which exists in beef and mutton and gives much of its red color to the muscular fibres of the flesh, is in the most favorable state for assimilation into the human system, and often has a large share in the improvement which we are perhaps too ready to attribute to the chemical compounds prescribed.

R.—Corrosive sublimate	....	2 grains
Liquor of chloride of arsenic	....	1 drachm
Diluted hydrochloric acid	....	½ ounce
Tincture chloride of iron	....	½ ounce
Syrup	....	3 ounces
Water	....	2 ounces

Take a dessertspoonful in a wineglass of water after each meal.

BERI-BERI.

This is a very fatal but obscure disease occurring in Ceylon, the Malabar coast and outer ports of British India.

Causes.—The causes are very obscure. It is a disease of debility, arising from a want of stimulating and nourishing diet, impure air and exposure to a moist and marshy atmosphere while the frame is debilitated by residence in an unhealthy station.

Symptoms.—It commences with the symptoms of anemia and proceeds to the development of acute dropsy.

Diagnosis.—The paralytic symptoms, together with the dyspnœa and dropsical effusions are sufficient to distinguish it from other diseases. In no disease is internal congestion so strongly marked, doubtlessly due to the congestion of blood in the brain and spinal marrow.

Treatment.—1. Mercury here appears to be the sheet-anchor, but must be administered to produce ptyalism. Saline and antimonial medicines will be called for and the strength supported by cordial liquors. Stimulating liniments should be applied to the extremities and a tonic plan of treatment pursued.

2. In the more severe cases where the dyspnœa, vomiting, spasms and other symptoms are violent apply blisters to the breast, hot fomentations and hot baths, and exhibit the strongest cordials and antispasmodics.

R.—Muriate of pilocarpine	....	3 grains
Water	....	½ ounce

Inject 10 to 20 minims with hypodermic syringe.

GENERAL DROPSY.

Definition.—A morbid collection of fluid in one or more of the serous cavities within the body or in the areolar tissue beneath the skin and in other situations.

Causes.—A dropsical accumulation is to be distinguished from the effusion of liquid which takes place in certain inflammatory diseases, pleurisy, peritonitis, pericarditis, and so forth. In other diseases the effusion is due to inflammation, whereas in dropsy transudation takes place intact, the part where it occurs being inflamed.

Local Dropsy.—Dropsy may be local or general. It is local when the effusion of liquid is confined to a single serous cavity or to the areolar tissue within a limited space.

General Dropsy.—Dropsy is said to be general when effusion into the areolar tissue beneath the skin exists more or less over the whole body, accompanied with effusion into certain serous cavities, especially the pleural and peritoneal.

Symptoms.—The symptoms of dropsy vary somewhat, according to the primary disturbance which has been the original cause of the effusion. If the blood is deteriorated by an undue proportion of water or is charged with excrementitious materials, such as urea, which ought to be eliminated by the kidneys in the urine, or contains a large excess of white corpuscles, its circulation through the capillary vessels is much impeded. The dropsy in these cases often begins in the form of œdema or swelling about the feet and ankles. The reproductive organs often become enormously swollen and ascites or dropsy of the abdomen soon sets in. After a time the increasing ascites, by pressing up the diaphragm, interferes with the respiration, causing distressing dyspnœa, which is more urgent in proportion as the blood is watery from anemia. The urine is often scanty and apt to contain an excess of urates, but it is only markedly albuminous when, as frequently happens, the kidneys become secondarily implicated. Among the latter symptoms are palpitation of the heart, deficient perspiration, mental distress, thirst, constipation, daily increasing weakness, and so forth.

Symptoms of Cardiac Dropsy.—Disease of the mitral or aortic valves in the heart is the most common cause of cardiac dropsy. The injured valve, sooner or later, interferes so much with the circulation that serious disturbances become manifest. At first, perhaps, there is only shortness of breath on going up a steep flight of stairs, or other active exertion, with some palpitation and debility, but after a few weeks or months the feet and ankles may begin to swell, the skin putting on a peculiar white and glistening appearance. As the effusion extends upward rest in the recumbent posture becomes impossible, and even in the sitting position only unrefreshing snatches of slumber can be obtained. The heart's action grows daily more and more embarrassed, the lungs more or less congested and a frothy expectoration sometimes streaked with blood appears.

Further Symptoms.—In the variety of general dropsy, which proceeds from disease of the liver, serous effusion into the cavity of the abdomen is the most prominent symptom. Whether the original hepatic disorder is congestion or hypertrophy of the liver, cancer, contraction or chronic hepatic inflammation, the dropsical symptoms usually commence with exudation of fluid into the abdominal cavity from the surface of its lining membrance, the peritoneum. Dropsy of the feet and legs, however, subsequently sets in.

Acute General Dropsy.—Acute general dropsy from disease of the kidneys, or acute inflammatory dropsy may arise when the functions of the skin are suddenly suppressed, thus allowing certain morbid materials to accumulate in the blood and to set up inflammation in the secreting tubes of the kidneys. Typical examples of this form of dropsy are seen when, from exposure to cold, the action of the skin is checked during the stage of desquamation of scarlet fever, compelling the kidneys to remove the scarlatinal poison from the system when it seems to be particularly obnoxious to the renal tissues. In such cases the urine either gradually or all at once becomes scanty, dark brown in color, and on being tested by boiling is found to be loaded with albumen.

Diagnosis.—The diagnosis of dropsy is usually made with ease, by the fact that the indentation produced on firm pressure with the finger upon the enlarged foot remains for a minute or so before it is filled up by return of the watery fluid into the connective tissue. This evidence of the existence of dropsy is most conclusively obtained when the test is applied over some bone which naturally lies only a little way beneath the skin, as for example, the breast-bone or the shin-bone.

Treatment.—1. The treatment of dropsy, either local or general, involves measures indicated by the diseases which stand in a causative relation to the dropsy. Exclusive of these indications it is often an object of treatment to effect either removal or diminution of the dropsical accumulation. Remedies which produce watery evacuations from the bowels, and those which increase the secretion of urine are chiefly relied upon for this.

2. The liquid in serous cavities may be removed by a puncture or an incision, an operation called paracentesis, or, commonly, tapping. In some cases of dropsy of the chest paracentesis is resorted to. Tapping of the abdomen is often employed, and is in many cases useful, not only by relieving suffering but promoting recovery.

3. In cases of general œdema or anasarca, if the effusion be very large, great relief is sometimes obtained by minute punctures of the lower limbs, through which the serum drains away in abundance.

4. Where the acute general dropsy is dependent upon suppression of the action of the skin and kidneys, active purgation and the use of diuretics are to be employed. Jalap and cream of tartar (ten grains of the former with three drachms of the latter) every day or two will answer well for catharsis. A strong cathartic is croton-oil. The dose is a single drop, and this will operate in many instances most violently, producing within half an hour sickness, vomiting and profuse alvine evacuations.

Diuretics.—The diuretics most satisfactory are the infusion of juniper berries (a pint daily), acetate of potash, citrate of potash, squills and sweet spirits of nitre. Colchicum is perhaps the most powerful of remedies, and we have succeeded with it in conjunction with mercurials in acting upon the kidneys in hepatic disease when no other remedy had any effect. Tonics, anodynes, and so forth, may, in visceral dropsy, be of more importance than diuretics. Of course it is desirable to lessen the accumulation of fluid, but the effects of the remedies used must be carefully observed, and one symptom must not be allowed to overshadow all the rest.

Diet.—In general dropsy attention to the diet is very important and efforts should be made to restrict the patient to the smallest amount of fluid with which he can sustain life comfortably. With respect to the nicer question of food, dry articles of food should be selected. It must be varied with the nature of the dropsy and the symptoms with which it is attended, and whoever understands the meaning of a phlogistic (inflammatory) and antiphlogistic (opposed to inflammation) regimen will know how to apply either of these, or to vary from one to the other, as circumstances may require.

For general dropsy:

R.—Powdered jalap .... 20 grains
Cream of tartar .... 3 drachms
Powdered ginger .... 5 grains
To be taken at one dose before breakfast, two or three times a week.

Dropsy of kidneys:

R.—Tincture digitalis .... 1 drachm
Infusion of buchu .... 4 ounces
Water .... 4 ounces
Take a teaspoonful every three hours.

Heart dropsy:

R.—Strychina Sulph. .... $\frac{2}{5}$ grains
Bascham's Mixture .... 4 ounces
Two teaspoonfuls 3 times a day.

BRIGHT'S DISEASE.

Albuminuria, dependent upon structural change in the kidneys, o. to speak more correctly, disease of the kidney, characterized by albumen and dropsy.

Causes.—It is a glandular disease of the cortical part of the kidney which gives occasion to the secretion of urine, which contains albumen and is of less specific gravity than natural, and which destroys by inducing other diseases. It is one-third more common in males than in females. It mostly occurs between the ages of forty-five and sixty-five. Acute Bright's disease is most often produced by cold and dampness, next by scarlet fever, pregnancy, or violent intemperance. The chronic form is greatly promoted by exposure to cold and wet, and is caused moreover by abuse of spirituous liquors. Other predisposing causes are gout, constitutional syphilis and affection of the bladder and urethra.

Acute Bright's Disease.—After exposure to cold, or a drunken fit, or scarlet fever, the patient is seized with chilliness, headache, nausea, vomiting, pain in the back and limbs, checking of perspiration and oppression in breathing. Fever follows and the face, trunk and limbs become puffy with anasarca. Effusion may also occur in the pleura or peritoneum. The urine is scanty, heavy and dark in color from the presence of blood and very albuminous. The disposition to void it occurs more frequently than in health. The deposit from it, under the microscope, shows blood-corpuscles, loose renal epithelium, tube-casts and shapeless masses of fibrin. After one, two or three weeks, or even a longer period, the attack proceeds to one of three terminations: recovery, death or lapse into the chronic state. Death results through uremia, secondary pneumonia, pleurisy, peritonitis, hydrocephalus or ascites. Probably two-thirds or more of the cases in the acute form recover.

Treatment.—Cupping the loins, hot water or hot air or "blanket bath," active purging, as with cream of tartar and jalap, or citrate of magnesium and diaphoretics, as citrate of potash or liquor ammonia acetatis.

Diet.—Should be liquid and simply nutritious.

Chronic Bright's Disease.—This approaches so slowly as seldom to be detected until after the lapse of months or years. Gradual loss of strength, pallor or puffiness of the face, shortness of breath and frequent disposition to urinate are early signs of it. But they are not always present; the denouement of the disease may be by a convulsion, œdema of the lungs, dimness of vision, or some violent local inflammation.

Symptoms.—Albuminous urine, deposits of tube-casts and renal epithelium, dryness of skin, frequent micturition, especially at night; general dropsy, or local effusions into the cavities, indigestion, anemia, uremic effects (headache, dizziness of sight, convulsions, coma, vomiting, diarrhœa), enlargement of the heart and secondary inflammations, bronchitis is especially common. The progress of the case is usually interrupted by exacerbations and intervals; each fresh attack leaving the patient manifestly worse than before.

Diagnosis.—The presence of albumen in the urine, with dropsy, not of sudden origin or brief duration, is indicative of this affection. The microscope will show also free renal epithelium and tubular casts in the urine; in advanced cases the casts are sprinkled with oil-dots.

Treatment.—1. Iron will do more good than any other medicine, unless it be cod-liver oil in persons of strong stomach. They may be very well combined. The tincture of the chloride of iron is as good as any other chalybeate as a general rule. With some the citrate of iron in solution, or a carbonate, or the iodide, will agree more readily. As an astringent the ammonio-ferric alum is claimed to possess the power of checking the waste of albumen through the kidneys.

2. For the dropsy warm baths and hydrogogue cathartics are useful. Of the latter cream of tartar and jalap, two or three drachms of the bitartrate with ten or twenty grains of jalap two or three times a week, are the favorites. If serious dropsical accumulations threaten life, elaterium (one-sixth or one-fourth grain every four hours, in pill, until it acts) may be given, or the pill of squills, powdered digitalis, etc.

3. If the warm baths do not agree or fail to produce diaphoresis try the hot-air bath, at 130 degrees to 150 degrees Fahrenheit. This rarely fails to produce free perspiration. For weaker invalids the vapor bath is available. Of diuretics, acetate of potassium, spirits of nitrous ether, and compound spirit of juniper will be least likely to disappoint.

4. But all will not unfrequently fail. We have as a last resource for the relief of great œdema the use of incisions with a lancet or needle in the swollen legs and feet. Care should be taken that erysipelas does not fol-

low, by repeated warm sponging of the limbs and washing them with diluted glycerine.

Diet.—Nourishing diet, of which milk may generally be part, is of the utmost consequence. Regimen or hygienic management is of the utmost importance. Avoidance of exposure to cold, wet or great fatigue; the reform of intemperance, if it has existed, or all other excesses, will be indespensable. Clothing should be sufficiently warm, with flannel next to the skin. Bathing frequently at such temperature as is borne without either chill or relaxation, and the bowels should be kept regularly open.

The following are approved remedies:

R.—Chloride of soda and gold .... 3 grains
Corrosive sublimate .... 3 grains
Extract of gentian sufficient to make 60 pills.
Take one three times a day.

R.—Iodide of soda .... 15 grains
Phosphate of soda .... ½ drachm
Common salt .... 3 drachms
Water sufficient to make solution.
Divide into three equal parts, and take one part every eight hours.

URÆMIC POISONING (URÆMIA).

Uræmic poisoning (uræmia) is also known as acute uræmia, uræmia convulsions, uræmic intoxication and uræmic coma, according to attending conditions. It may be described as a group of nervous phenomena which sometimes develop during the course of acute or chronic Bright's disease, being due to the retention in the blood of what is supposed to be *urea.* An attack of acute uræmia is always serious. The outcome depends upon the amount of poison retained, the length of time it has been in the system and the condition of the organs of elimination. If there be any suspicion of an uræmic condition the urine should be frequently examined.

Causes.—Suppression of urine due to Bright's disease, cancerous kidney, the puerperal or lying-in state, operations on the uterus, bladder, rectum, etc., or any condition causing the failure of the kidneys to properly perform their functions.

Symptoms.—Usually before the attack there is a decrease in urinary secretions, although in rare instances, during or immediately prior to the appearance of the uræmic phenomena, the normal flow of urine may largely exceed the normal amount. Commonly the onset is with headache, dizziness of vision, vertigo, deafness, dilated and sluggish pupils, dark, unnatural color of face. There is generally a chill or chilliness followed by fever, but there may be cool skin from the onset. The condition may develop slowly and gradually or it may come on suddenly by convulsive seizure followed by coma. In the latter case it is sometimes mistaken for apoplexy, but these differences are to be noted: (a) In uræmia the patient has usually been suffering from dropsy, while this is not common in apoplexy; (b) in uræmia coma is generally preceded by the symptoms above discribed, while in apoplexy coma is usually immediate; (c) the breathing in uræmic coma causes a sharp, hissing sound, while in apoplexy there is snoring; (d) greater or less paralysis always occurs with apoplexy while in uræmia there is no paralysis.

Treatment.—During an attack elimination should be procured by a drop or two of croton oil in a little sweet oil, or a quarter grain of elaterin, or the following enema may be used:

Epsom Salts	2 ounces
Glycerine	1 ounce
Hot Water	4 ounces

Free sweating should be encouraged by the use of hot packs, vapor or hot-air baths and the administration of Jaborandi. To relieve the convulsions give inhalations of chloroform, rectum injections of chloral and venesection.

PART III OF BOOK IV

Describes the nervous diseases and their causes, symptoms, diagnoses, treatments and effects.

ILLUSTRATIONS

CURATIVE MEDICINE

PART III

NERVOUS DISEASES

Division of Nerves.—1. Motor nerves or those in which irritation produces muscular contraction.

2. Sensitive nerves, or nerves of common sensibility, in which irritation is followed by an agreeable or painful feeling, according to the nature or degree of the stimulation.

3. Nerves of special sense in which irritation excites the peculiar sensations of light, sound, taste, etc. Many sensitive nerves arise from nervous centres in such close proximity to motor nerves that a stimulus applied to the former will react upon the latter and produce not only a direct sensation, but what is technically called a reflex action. It is a remarkable fact that whatever part of a sensitive nerve be irritated, whether it be the centre, the middle, or the extremity, the same sensation will be produced.

Nature of Nervous Force.—We can judge of the nature of the nervous force only by its effects. The muscular contraction caused by the irritation of a nerve is due to the development of a peculiar vital force in the nerve structure, which is unlike any of the known physical forces. It bears certain analogies to electricity.

1. The identity of their effects on muscular fibre.
2. The rapidity of their action without producing any appreciable effect on the parts between the point of irritation and the point affected.
3. The extreme sensibility of nerves to the electric current.
4. The phenomena of electrical fishes.

SOFTENING OF THE BRAIN (Ramollissement).

Peculiarity.—It is the consequence of chronic or acute inflammation, or it may occur from obliteration of the arteries.

Softening of the mucous membrane of the digestive organs is of much more frequent occurrence than softening of the brain.

Causes.—Two causes appear to coöperate in producing softening of the brain. The first is of a mechanical, the second of a physiological nature, serosity, or pus, when in considerable quantity, appear to effect, mechanically, a diminution of the cohesion of the tissue in which they are contained. The pressure which they exercise arrests the circulation, and it would appear absorption also; for if this function were performed we should have an excavation or ulcer formed instead of a mass of soft, pulpy tissue. The circulation being thus arrested nutrition ceases to be accomplished and the molecules of the tissues are disunited and detached. If while these changes are going on, or at some subsequent period, the functions of absorption be resumed, the softened tissue is partially or wholly absorbed and solutions of continuity of various extent are formed. The physiological cause, therefore, of softening is referable to a change in the vital properties of the affected tissue.

Degree of Softening.—The degree of softening of the cerebral substance may vary from a slight diminution of the natural consistence of the part to that of cream or even of thin milk. The first stage of softening of this substance is often so slight that it is hardly perceptible to the touch, and may, even when considerable, if not accompanied by some peculiarity of color, be altogether overlooked.

Physical Characters.—The color of inflammatory softening of the cerebral substance presents considerable variety, dependent on the quantity of blood contained in the affected part. Redness and vascularity are, in general, greater in the first than in the second stage, but the degree and extent of either greatly depend on the quantity of blood in the cerebral vascular system. When the redness which accompanies softening arises from the presence of effused blood it may always be regarded as evidence that the softening is of recent occurrence.

Other Evidences of Softening.—But there are other modifications of color which accompany softening of the cerebral substance. They indicate that the disease has existed for a considerable time, several weeks, or two or three months. The principal modifications of color consist of brown, yellow and orange, either separately or combined, and occupy either the softened substance, the part of the brain contiguous to it, or both at the same time. They are not observed unless the softening has been accompanied by effusion and originate in changes taking place in the effused blood.

When Softening May Occur.—Softening may occur in the brain and medullary substances at the same time. It may also occupy several portions of the brain at the same time, as the septum lucidum, fornix and walls of the lateral ventricles, the corpora striata and thalami, one or more lobes, a portion of one or both hemispheres, the brain and cerebellum, and is rarely met with in the latter organ without its being present in the former. Circumstances which give great variety and complexity to the functional derangement by which it is accompanied.

Symptoms.—As the symptoms of the first period of inflammatory softening of the brain must necessarily be those of inflammation of this organ, it would be superfluous to describe them here. It may, however, be observed that the severity of these symptoms does not always indicate a corresponding condition as to the extent of the softening which they precede, nor do they present any one character which can be regarded as a sign that the inflammation on which they depend will terminate in softening. When, however, they are taken in conjunction with those of the second period, they are frequently of great value as they afford us the means of establishing our diagnosis in cases where it would be otherwise impossible.

Symptoms of Second Period.—The symptoms of the second period of inflammatory softening of the brain are of an entirely opposite character to those of the first period. Those of the first depending on the presence of irritation, or a morbid stimulus, are characterized by a state of excitement; whereas those of the second being the consequence of the softening or disorganization of the cerebral substance, are necessarily marked by a state of prostration, collapse or paralysis. They are announced by the gradual or sudden diminution of the intellectual powers, by the occurrence of stupor or coma, by paralysis, difficulty or loss of speech and diminution of the sensibility of the skin, eye and ear. The relative frequency, degree and extent of these symptoms, as well as the order of their occurrence, present considerable variety. Thus, the derangement of the intellectual faculties, such as their diminution, suspension or abolition, is always present at the commencement of the second period, that is so soon as the softening of the cerebral substance has taken place. In some cases the derangement which they manifest is at first slight, increases gradually or rapidly and terminates in their entire abolition. In others these faculties are, from the commencement, gravely compromised and give no signs whatever of their existence.

Peculiar Symptoms.—It is not rare to meet with cases in which their derangement is marked by remissions and exacerbations, or the occurrence of lucid intervals succeeded by profound stupor. The delirium which accompanies the first period of inflammatory softening either disappears or diminishes greatly in intensity when the second period is announced by the derangement of the intellectual faculties to which we have alluded. It diminishes with the diminution of these faculties and ceases when their suspension or abolition is indicated by the presence of coma and complete paralysis.

Loss of Memory.—An imperfect state or the entire loss of memory and speech are necessary consequences of these latter conditions of the intellectual faculties. But the absence of any derangement of these faculties is not necessarily unaccompanied by derangement of memory and speech, particularly the latter, for a patient may recover the consciousness of his existence, perceive and comprehend what is passing around him, and yet be incapable of expressing himself in words on account of paralysis of the muscles by means of which the act of speech is accomplished. The diminution, suspension or abolition of the intellectual functions are always accompanied with paralysis of the muscles of voluntary motion, and the degree of the paralysis is, generally, in the direct ratio of the extent of the derangement manifested by these functions.

Brain Paralysis.—The paralysis is rarely complete at the commencement. It is generally progressive with occasional alternations of increase and decrease before it becomes ultimately complete. The situation and extent of the paralysis present considerable variety and in many cases seem to correspond with the situation and extent of the softening, in the same manner as in apoplexy. The paralysis occupies one or both extremities of the same side when the softening is limited to one of the hemispheres of the brain, and paraplegia or universal paralysis is produced when both hemispheres, the pons varolii, etc., are the seat of this lesion. Paralysis occurs more frequently in the superior than in the inferior extremities; the seat of the lesion of the former being in the corpus striatum, and of the latter, the optic thalamus of the opposite side of the brain.

Paralysis of Face Muscles.—Paralysis of the muscles of the face, of the eye, of the tongue and of deglutition, depends likewise in the situation of the softening. Paralysis of the bladder and rectum is a frequent occurrence of softening of the brain, and gives rise, in the first place, to an accumulation of the contents of these organs, and afterward to their involuntary escape, more particularly of the urine, from the distension of the bladder and the subsequent dilatation of its sphincter. It is under similar circumstances of the brain that the organs of hearing and of sight, which in the first inflammatory period of softening are highly susceptible, are rendered obtuse to a degree that a strong light or loud sounds impressed on the eye and ear pass unperceived.

Permanent Muscular Contraction.—One of the most constant symptoms of inflammatory softening of the brain is a state of permanent contraction of the flexor muscles of the extremities.

The last symptom which we shall notice is that of pain. This does not depend on the state of softening of the cerebral substance. It is the consequence of irritation or morbid excitement of the brain, the disorganization of which has not yet taken place. It is generally most severe when it occurs as a precursory symptom, but it frequently accompanies the first period of the disease, and presents remission and exacerbations, variable in duration and degree.

Treatment.—There are no successful cases recorded of softening from obliteration of the arteries, and in the few cases of the inflammatory forms of the disease, which have terminated favorably, it is more than probable that the softening was very limited in extent and affected the superficial or less important parts of the brain. As regards the state of softening, which, in point of fact, consists in a solution of continuity of the cerebral substance, it must be obvious that we possess no remedial agent capable of obviating such a change. The diseased state, therefore, of which we are treating, is incurable; that is to say, the solution of continuity of which it consists will remain, even though the patient should recover. The essential part of the treatment of softening of the brain relates, consequently, to the local morbid conditions which immediately precede this change, viz.: the diseased state of the arteries on the one hand and inflammation of the brain on the other. This state of the arteries, like the softening to which it gives rise, is, so far as we yet know, beyond the control of remedial agents. When, therefore, it is ascertained that the softening is the consequence of this state of the arteries, the only hope that can be indulged is partial relief, and the prolongation of life for a short period beyond that at which the disease would have proved fatal had it been allowed to run its natural course.

Staying Treatment.—It is possible that the attack may be delayed by judicious treatment, employed when the first symptoms of cerebral derangement are perceived, such as pain in a particular part of the head, confusion of ideas, giddiness or unusual drowsiness and listlessness, together with a prickling sensation or numbness in the muscles of the extremities, face or tongue.

THE BRAIN.

FIGURE No. 1.

1,1,1,1. Motor track delineated from the front columns of the spinal marrow to the hemispheric ganglion.
2. Pyramidal body.
3. Eminences in the medulla oblongata.
4. Variolus bridge.
5. Legs of the brain.
6. Streaked body.
7. Hemispheric ganglion.
8. Cerebellum.
9. Olfactory nerve.
10. Optic nerve.
11. Fourth pair of nerves.
12. Sensory root of the fifth pair.
13. The seventh and eighth pairs of nerves.
14. Front suture.
15. Mammillary elevation.
16. Corpora geniculatum.

FIGURE No. 2.

1, 1. Section of the callous body.
2. Transparent partition.
3. Front column of the vault.
4. Section of front suture.
5. Central substance of the chamber.
6. Sylvius' aqueduct.
7. Pineal gland.
8. Medullar band which extends from the pineal gland to the front suture.
9. Section of the legs of the brain.
10. One of the white bodies, or mammillary bodies.
11. Gray excrescence.
12. Section of the intricacy of the optic nerves.
13. Optic nerve beyond the intricacy.
14. Olfactory nerve.
15. Front surface of the hemisphere.
16. Fissure between the back and middle lobes of the brain.

FIGURE No. 3.

1. Front extremity of the fissure of the brain.
2. Back extremity.
3. Front lobes of the brain.
4. Middle lobe.
5. The sylvius fissure.
6. Back lobe.
7. Infundibulus point.
8. Its body.
9. White or mammillary bodies.
10. Ash-colored matter.
11. Legs of the brain.
12. Variolus' bridge.
13. Upper end of the medulla oblongata.
14. Back prolongation of the variolus bridge.
15. Middle of the cerebellum.
16. Front part.
17. Back part.
18. Upper part of the spinal marrow.
19. Middle fissure of medulla oblongata.
20. Pyramidal body.
21. Rectiform body.
22. Oval body.
23. Olfactory nerve.
24. Its bulb.
25. Its external root.
26. Its middle root.
27. Its internal root.
28. Optic nerve beyond the intricacy.
29. The same before the intricacy.
30. Motor of the eye or third pair.
31. Pathetic nerves or fourth pair.
32. Trigeminus or fourth pair.
33. External motor or sixth pair.
34. Facial nerve.
35. Auditive nerve.
36,37,38. Eighth pair.

FIGURE No. 4.

1. Vertical section of the head.
2. Frontal cavity.
3. Greater *falce* of the brain.
4. Its origin from the rooster's comb.
5. Its union along the sagital suture.
6. Under or concave edge.
7. Counteraction to the cerebellum store.
8. Cerebellum store.
9. Union to temporal bone.
10. Free edge of same.
11. Tortuous elevations of the front right lobe of the brain.
12. Front extremity of the callous body.
13. Transparent partition.
14. Section of the front suture.
15. Front parts of the vault.
16. The middle of same.
17. Back end.
18. Inner side of the bed.
19. Section of streaked bodies.
20. Side walls of the third ventricle.
21. The dura mater, turned upside down.
22. Section of the internal carotid artery.

FIGURE No. 5.

1. Front lobe of the brain.
2. Back lobe.
3. Middle lobe.

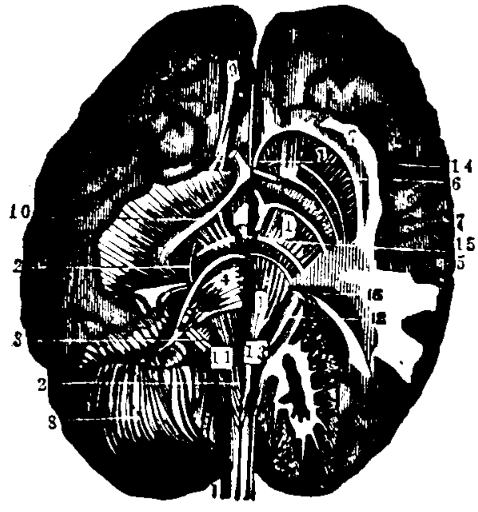


Fig. 1.—View of the course of the front columns of the spinal marrow terminating in the hemispheric ganglious of the brain

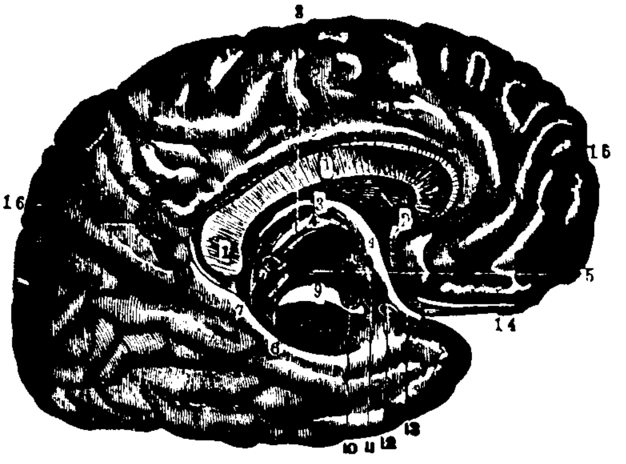


Fig. 2.—Middle vertical section of the callous body. The inner left side of the brain is also seen.

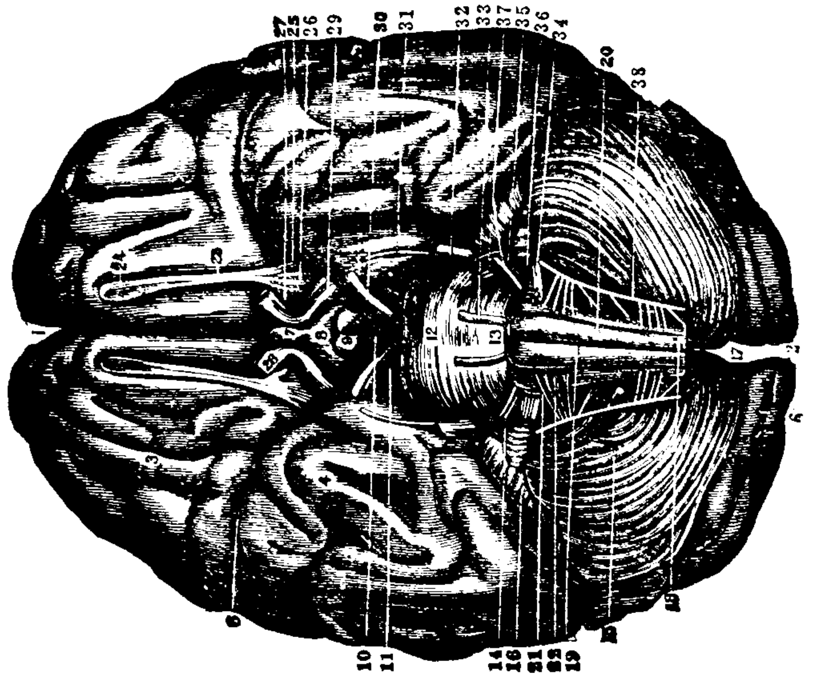


Fig. 3.—View of the base of the brain and cerebellum, together with the nerves.

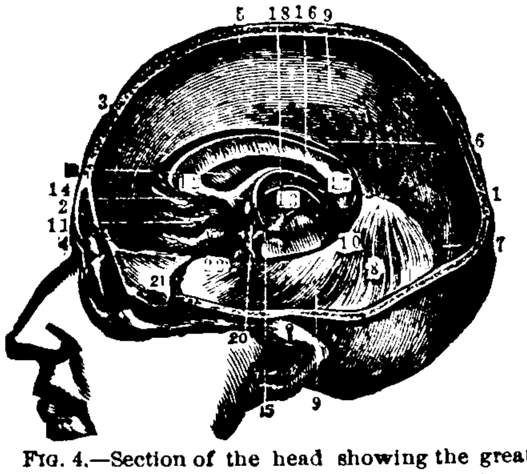


Fig. 4.—Section of the head showing the greater scythe, the horizontal apophysis of the diameter between the brain and the cerebellum and other parts found under the middle line of the head.

Fig. 5.—View of the appearance of the tortuous elevations of one side of the brain, seen from above.

THE BRAIN.

For an explanation of the illustrations see text on opposite page

Further Treatment.—Bleeding from the temples, cupping in the nape of the neck, or small general bleedings, repeated from time to time as circumstances may require, may, by diminishing the quantity of the blood, facilitate the circulation of this fluid through the brain. But, perhaps, the greater advantage would be derived by keeping the bowels freely open without inducing excitement or debility, chiefly by means of the neutral salts. The compound aloetic pill will be advantageously employed in those cases in which the disease occurs after the cessation of the catamenia, or suppression of a hemorrhoidal discharge. A diminution of the circulating fluids, as well as their equalization, will be effected likewise by promoting all the secretions, particularly those of the urine and bile.

Diet.—The food and drink of the patient should be particularly attended to. His diet should consist of those kinds of food which are most easily digested, and which afford the greatest quantity of nourishment in the smallest bulk. Ardent spirits, strong wines, fermented liquors, even strong coffee or tea and all stimulants should be avoided as more or less injurious.

Treatment of Second Period.—The treatment of the second period, or that of softening from inflammation, is the same in principle as that of the former, in so far as it regards the state of excitement with which this morbid change is generally accompanied. But if the paralysis be fairly established and, notwithstanding the depletory and sedative measures which have been employed, continues to increase, neither our own observation nor the recorded experience of others would recommend a steady perseverance in the means, the debilitating effects of which have not been sufficient to overcome the inflammatory excitement of the first period. Bleeding and active purgatives should now be laid aside; blisters or sinapism should be applied to the inferior extremities, the nape of the neck and superior part of the spine; the head should be kept cool by the constant application of evaporating lotions; the bowels evacuated once or twice a day by means of a mild aperient, or by injections, the secretion of urine and the cutaneous perspiration should also be promoted by remedies of the least stimulating qualities. The retention of the urine is a complication which must be sedulously watched, that this fluid may be removed before it accumulates to a degree to prove injurious; stimuli or tonics should now be employed with a view to support the strength of the patient, but they ought never to be employed to such an extent as to produce excitement, as the powers of life are already greatly exhausted by the stimulus of the disease.

BRAIN FEVER.

(*Cerebral Macula.*)

Difficult Diagnosis.—Under this term we propose to include the pathology, symptoms and treatment of the inflammatory affections of the brain and of its membranes. We adopt this plan, not merely because of the intimate relation subsisting between these structures, but because when we trace the history of a number of acute affections of the encephalon and examine the lesions of structure presented after death, we shall frequently find that the substance of the organ, as well as the investing membranes, has been involved in the disease. Hence arises the difficulty of establishing the diagnosis between inflammation of the parenchyma of the brain and that of its membranes.

Symptoms.—When either the arachnoid or pia mater, which closely invest the brain, are extensively inflamed, the functions of this organ become inevitably disturbed by sympathetic irritation, without its parenchyma necessarily partaking of the inflammation, or if the inflammation extends to the parenchyma it is mostly confined to the superficial layer of cortical substance. Hence meningitis, besides headache and intense fever, we have an increase of the general sensibility, preternatural acuteness of the external senses, violent delirium and convulsions, and, finally, collapse, coma and death. Extensive and acute inflammation of the hemispheres of the brain will be characterized by a nearly similar train of symptoms.

Two Classes of Inflammation.—We shall proceed to consider inflammation of the encephalon under two divisions, viz.: 1. Inflammation of the membranes of the brain (meningitis); 2. Inflammation of the substance of the brain (cerebritis).

Inflammation of Brain Membrane.—An examination of the structure of the brain and of the peculiarities of the circulation in it and upon it would lead us to the inference that if the meninges be the seat of inflammation, the contiguous cerebral substance must participate in some degree in the irritative influence. In other organs the vessels, after entering them by trunks and branches of various sizes, branch out and ramify in their interior until they become capillary in their spongy and areolar tissue. But in the brain a different arrangement takes place, the vessels, after entering at the base of the skull, communicate freely with one another and then branch out upon the surface of the brain, ramifying in an extended web of cellular tissue (pia mater); in this way they become reduced to so great a degree of tenuity before they enter the substance of the organ that it may be said to be surrounded by a vascular atmosphere from which its supplies are derived. Hence it is, that as the meninges and the contiguous cerebral substance are supplied from the same source, each will more or less become affected by any inflammatory action set up in the other.

Sympathetic Symptoms.—Cerebral irritations are divisible into two great classes, symptomatic and idiopathic. Symptomatic irritation is for the most part connected with and dependent as a morbid condition of the chylopoetic viscera. We frequently observe that for weeks previous to the occurrence of pain or any disturbance in the head the digestive functions have been impaired, the bowels confined or irregular and the stools unnatural. In many of these cases, when the headache, retching, irregular fever and even coma have set in, speedy and permanent relief has followed the use of purgatives, and the other means usually resorted to for correcting disordered functions. An irritative influence is in such cases propagated from the digestive organs to the brain by reason of the close sympathetic connection which subsists between them in health and in disease, and that irritation, if kept up for a while, will pass into positive inflammation, marked by its usual consequences. The irritation of worms and of teething may also induce similar results, more particularly in those constitutionally predisposed. We frequently observe these cerebral affections to spring up during the course of other diseases, of which they may be considered as complications, viz.: continued fever, scarlatina, measles, whooping-cough, and they not infrequently follow accidents or injuries.

Varying Symptoms.—This affection presents a train of symptoms which varies in different ages and in different temperaments. Its most marked and ordinary character at its outset is an increased sensibility to all sorts of impressions, the ordinary external influences producing inordinate effects. Thus, a child is restless and sleepless, seldom even dozing, or if he does doze from time to time starting and waking up; he attends to every sound, the eyes are suffused, the retina is so sensitive to light that he winks or turns away if his face is directed to a window or to a light; the pupil is generally contracted but not invariably so. The head is often moved about or from side to side, so are the limbs; the temper is peevish and nothing seems to soothe this irritable condition but motion up and down the room in the arms of the nurse or attendant.

Bowel Symptoms.—The state of the bowels varies much in different instances, they may be confined or relaxed, but the stools do not present any unnatural appearance.

Increased Animation.—There is a minor degree of this state which is marked by increased animation and liveliness, which with ordinary observers may pass for an increase of health and vigor, though an attentive observer will readily perceive that the countenance wants that disengaged air which exists in health, and on making a closer examination he will find that the eyes frequently close and wink and the countenance assumes an expression as of frowning; the hand, too, is frequently raised toward the head, and the fingers are fixedly closed.

Indifference.—We occasionally observe a state the very opposite of this, a state characterized by want of animation, accompanied by plaintive moaning at times, and an indifference to surrounding objects. Though the patient does not sleep, yet his state is not that of waking, and if roused, betrays fretfulness and peevishness. These may be considered as so many indications of an incipient irritation, which in some constitutions may arise independently of any assignable agency, but which in many cases is referrable to an irritation propagated to the brain from the peripheral extremities of the nerves during dentition, or by worms in the alimentary canal, or by vitiated secretions, or a torpid liver.

Fever Symptoms.—The symptoms above indicated are by some denominated fever, some epithet being usually added for the purpose of indicating its source, or its nature; hence the terms gastric, irritative and hydrocephalic fever.

Morbid Excitement.—The most expressive term which we can employ is that of "sensitive erethism," or morbid excitement. It is distinct from inflammation of the brain, of which it is frequently the precursor, and according to individual peculiarities, or other modifying circumstances, it may end in cerebritis, meningitis or that modification of the latter called hydrocephalus, and this termination is but too often unexpected by the practitioner, whose attention has perhaps been directed to secondary indications and minor effects, while the erethismal state of the brain has crept on unheeded. The condition here indicated cannot be supposed to exist unaccompanied by an increased flow of blood through the cerebral vessels, or in other words, an increase in their degree of tension; and as the tension may vary from a slight degree of fullness to the greatest of which the vessels are susceptible, such a state of local determination of blood will soon end in inflammation if not subdued by proper means.

Further Symptoms.—The actual inflammatory attack is generally ushered in by headache more or less violent (the pain being referred to the temples, the vortex or forehead, sometimes to the occiput and base of the skull), by intolerance of light, heavy and suffused eye, with quick pulse, are also attendants; so, in many instances, is vomiting. In those who have suffered much from mental disquiet spasmodic twitchings are sometimes perceived, not unlike those which arise from slight electric sparks. In children and very young persons it frequently commences with a sudden and long-continued convulsion without any previous warning. After a while the convulsive movements cease, a remission takes place, and the patient appears free from complaint for one or more days, when a second attack occurs which may terminate in coma or death.

Changes in Membrane.—After having been the subject of inflammation the membranes present various changes dependent either on the duration and intensity of the attack or on the frequency of its recurrence; but all of them are referrable to the following heads, viz.: simple redness of the arachnoid; thickening and opacity with increased firmness; serous effusion beneath or upon it or into the ventricles; puriform or sero-purulent exudations; false membranes; increased vascularity and thickening of the pia mater. We also find lesions consisting of granulations scattered in the meninges over the surface of the brain and in the sylvan fissure, which have been shown by the microscope to be of a tubercular nature.

CHRONIC MENINGITIS.

The Delirium.—Meningitis is in many instances so slow in its progress as to assume the chronic form. We have then delirium and progressive paralysis as constant attendants. The delirium is at first partial, it is a monomania with weakness of intellect, but, after a time it passes on to maniacal excitement and finally subsides into confirmed idiocy. The paralysis in those cases does not exhibit a total privation of sensation and motion in any particular part of the body; it is at first slight, but gradually increases and extends to the whole muscular system, rendering the gait feeble and vacillating and ultimately destroying the power of motion. It is remarkable that the diminution of sensation is not proportioned to that of motion. Spasmodic movements with contraction and rigidity of the limbs sooner or later set in, and, finally, epileptic attacks, which terminate in fatal apoplexy.

The Paralysis.—The paralysis which occurs presents this remarkable feature, that it seems to shift about from one hour to the other, one day, for instance, the right leg is found to be drawn up with greater energy than the left, when the sole of the right foot is tickled, but on repeating the examination a few days afterward it is the left leg which now feels and moves better than the right. It would seem from this as if the paralysis has shifted from one side to the other, but such is not the case, the limb which was first palsied is still so, but the illusion arises from the circumstance that the palsy has not increased in degree in the first limb, while the second limb has become involved to a great degree. Motor power has not returned in the former, but has been more gravely impaired in the latter.

After-Death Facts.—The lesions which are found after death subsequently account for these facts. When the right limbs alone were paralyzed the brain is found to be disorganized on the left side; but when the paralysis apparently shifted from one side to the other both hemispheres are found diseased, but more deeply and more extensively on the opposite side to that of the limbs which were most palsied. This apparent mobility of paralytic symptoms more frequently occurs in meningitis than in any other complaint.

Causes.—Meningitis is a frequent consequence of injuries of the head, of fractures, concussion or even wounds of the scalp. It not infrequently happens that a wound of the head heals rapidly and that the patient returns to his usual occupation thinking himself quite well, but after ten or fourteen days he begins to feel pain in the situation of the wound which gradually increases in intensity, and in a very short time all the symptoms of cerebral inflammation become manifest. A child may suffer serious injury from a fall, and as all mention of the accident is suppressed by his immediate attendant, it escapes the notice of others and no ill effects follow perhaps for a week or two; the child then, however, loses appetite, becomes restless and irritable, febrile excitement, delirium and convulsions succeed and too often are the precursors of a fatal termination.

INFLAMMATION OF BRAIN SUBSTANCE (Cerebritis).

Symptoms.—The most usual premonitory symptoms are a general uneasiness and restlessness with a tendency to congestion in the head; a sense of weight and fullness; occasional attacks of pain in the head, or of temporary apoplexy or epilepsy; flushing of the face and increased heat of the head; drowsiness and vertigo; preternatural acuteness of the external senses; intolerance of light and optical illusions; contraction of the pupils, strabismus or imperfection of sight; tinnitus aurium or various other noises in the ear; confusion of thought; failure of the memory; mental excitement or depression, or some striking alteration in the habitual character and pursuits of the individual.

Additional Symptoms.—In some cases there is little appearance of indisposition throughout the day, but the symptoms are aggravated at night; the sleep is uneasy or disturbed by alarming dreams, and in children there is often grinding of the teeth. Pains in the limbs and frequent cramps, general lassitude and muscular debility are often felt, alternating with fits of shivering and feverishness; the digestive functions are disordered; there is a general loss of appetite; often obstinate vomiting; the bowels are either irritable or torpid, the secretions being always unhealthy.

Symptoms Following Inflammation.—The above symptoms precede either general or partial inflammation of the brain. Those which follow indicate more especially the invasion of partial and chronic inflammation, a long-continued, fixed and deep-seated pain in one part of the head; pain, numbness, weakness, a sensation of creeping and tingling in one extremity or in one-half of the body, or confined to one portion of the extremity; there may be numbness and loss of power in one finger only or in one set of muscles. Sometimes the speech is affected so as to produce a degree of hesitation, stuttering or indistinctness of pronunciation, drowsiness, languor, depression of spirits are observed, also more particularly in the chronic form of cerebritis. Some of these premonitory symptoms may have been present for weeks, for months, or even for a year, or for a longer period.

General Cerebritis.—General cerebritis is always acute. Its symptoms are divisible into two periods, viz.: 1. The period of irritation or excitement. 2. The period of collapse.

Symptoms.—The symptoms which characterize the period of excitement are intense pain extending over the greater part of the head; great excitement of the cerebral functions; violent delirium; preternatural acuteness, of both the external and internal senses; intolerance of light; brightness, redness, wildness or protrusion of the eyes; contraction of the pupils; tinnitus aurium; flushing of the face; throbbing of the temporal arteries; paroxysms of general convulsion; rigidity of some of the muscles on one or both sides of the body in the interval of the paroxysms. There are also severe shooting pains in the extremities, greatly increased by extending them; twitching of the muscles of the face; rolling of the eyes; quick, suspicious and irregular breathing; rapid, full and hard pulse; subsultus tendinum; red and dry tongue, either tremulous when protruded or in violent motion, pushing out the cheek or forcibly thrust out of the mouth; great thirst; occasionally severe vomiting, especially in children; scanty and high-colored urine. The paroxysms of convulsion are always attended with an exacerbation of the symptoms. The respiration is hurried, and the pulse rises suddenly, forty or fifty beats in a minute. When the convulsions subside the pulse and respiration become comparatively slow and feeble.

Further Symptoms.—The symptoms just enumerated may last from twelve to forty-eight hours or more, when they are succeeded by others of an opposite character, which constitute the second period or that of collapse. The headache is now no longer complained of; delirium gradually passes into stupor or coma; the preternatural acuteness of the senses is succeeded by obtuseness and insensibility; the convulsions subside into general muscular relaxation and more or less complete paralysis succeeds. The pupils become dilated and motionless; the eyes sunk, pale and dim; there is sometimes strabismus or deafness; the pulse is rapid, small, unequal or intermittent; there are frequent rigors, the skin afterward feeling cold and covered with a clammy sweat; the face is pale, sunk and cadaverous; the respiration is slow or irregular and stertorous. When the patient lies senseless on his back and swallows with difficulty, the fatal issue is not far distant. There may be several alternate paroxysms of excitement and collapse until the patient finally sinks into a state of coma which soon ends in death.

Diagnosis.—When the inflammation occupies at the onset a large portion of the brain, it is generally complicated with meningitis and characterized by disturbance in all the vital functions.

Course of the Disease.—When, however, a smaller portion of the brain is engaged in inflammation the course of the disease is seldom so rapid; its invasion is more gradual and preceded by symptoms of irritation in some of the organs of voluntary motion, sensation or intelligence. Convulsive rigidity and retraction of the muscles are sometimes observed in connection with meningitis; but it may be generally distinguished from spasmodic paralysis by several well-marked signs. There is no actual paralysis, and when the convulsive retraction intermits the patient fully recovers the power of voluntary motion in the same manner as after the paroxysms of spasmodic rigidity in tetanus. This convulsive rigidity is scarcely ever limited to one region or to one side of the body as in partial cerebritis, but affects a variety of parts at the same time on both sides.

Treatment.—The inflammatory nature of the more acute forms of cerebritis and arachnitis is so obvious that their treatment has always been conducted in correct principles. Until very lately, however, the inflammatory character of partial and chronic cerebritis was either entirely overlooked or imperfectly understood, that though active treatment was sometimes adopted at the beginning of the disease it was soon laid aside, and remedies of an opposite description substituted. These affections were in fact generally set down as nervous, mistaken for rheumatism, neuralgia, nervous dyspepsia and debility or nervous palsy, and treated by tonics, electricity and stimulants; the fatal termination of the disease being thus accelerated.

Preventive Treatment.—Cerebritis and arachnitis are so formidable that their prevention is of no less, if not greater importance, than their treatment. It is extremely important to have recourse to active measures on the very first appearance of any of the premonitory symptoms, however trifling; as we may thus succeed in effectually removing that state of congestion and irritation of the brain, which is the precursor of inflammation. The means of accomplishing this are the careful and timely removal of all the exciting causes; of every source of irritation, both bodily and mental; regulation of the diet; avoiding all excesses; relaxation from study; change of air; general and local blood letting, counter-irritation, with occasional purgatives.

Vigilance Required.—Great vigilance is particularly required in the cerebral affections of infants and children who frequently suffer without complaining. A predisposition to affection of the brain may often be suspected by some slight cast or rolling of the eyes; by dilatation of the pupils, or occasional startings or attacks of spasmodic croupy breathing during sleep; there may be every other appearance of perfect health with these symptoms, which are often only evanescent.

Relieving Congestion.—When it is necessary to relieve the brain from habitual congestion by occasional topical bleeding, the method of taking blood from parts as remote from the disease as possible seems to us preferable to that of abstracting blood from the head itself. When the vessels of a part are partially emptied of their blood, if they have been much weakened by long-continued over-distension or previous disease, so as to have lost their elasticity, there will be an immediate flow of fresh blood to the part; this will take place on mere hydrostatic principles.

Uses of Bleeding.—No fact is better established than that the loss of an exceedingly small quantity of blood from certain parts of the body is sufficient to relieve distressing symptoms of congestion and oppression in others most remote from them; as, for instance, a very slight discharge of blood (one or two ounces) from the hemorrhoidal veins being sufficient instantly to remove vertigo, flushing, earache or oppressed breathing; the same is the case in a still more striking manner with the catamenia, although some account must be taken of the influence of uterine irritation over the system. We prefer, therefore, in cases of habitual congestion in the brain, taking blood occasionally from the feet or legs, by opening a vein or applying leeches and letting them bleed in a foot-bath; or the application of leeches to the arms whenever practicable. We have found this the surest method of affording permanent relief, and by repeating it at certain intervals the tendency to cerebral congestion may be completely overcome. We have pursued this plan in lunatics with the very best results.

Cooling the Head.—The insertion of an issue is often advisable as a preventive in people of a plethoric habit. The head should be kept cool by the frequent use of cold ablutions, the hair cut short, the head and shoulders raised at night; tight bandages round the neck must be avoided; the daily use of the cold shower bath is often very beneficial, but a reaction takes place in the head unless it be used with the feet immersed in hot water. The feet, legs and lower parts of the body ought to be carefully kept warm and dry.

Further Treatment.—In the treatment of cerebritis, when fully developed, attention must be paid to its two periods of excitement and collapse. The remedies chiefly to be relied upon are blood letting, general and topical purgatives, cold applications to the head and counter-irritation.

Treatment of More Acute Cases.—In the more acute cases the patient must be freely bled from a large orifice. If the symptoms continue unabated the bleeding must, however, be repeated several times, at intervals of a few hours, and this practice must be carried during the first period of the disease to the utmost limit of the patient's strength. It often happens that very little impression is made on the disease by the first bleeding and no amendment takes place until after the second. The symptoms often abate after bleeding, but a fresh exacerbation may take place in the course of a few hours. Topical bleeding, by cupping or leeches, is, under such circumstances, highly beneficial.

Head Treatment.—The head must be shaved, and pounded ice mixed with cold water and vinegar may be applied to the scalp. A very effectual method of applying cold is by making the patient hold his head over a basin and pouring a stream of cold water on it from a certain height; this often removes the heat and flushing and calms the excitement; it should be repeated as often as the heat and flushing return. The application of cold to the body is always followed by a reaction, and the temporary relief refrigerants afford will be succeeded by an increase of the inflammatory symptoms and their use become decidedly injurious unless their depressing action be kept up by a steady and repeated application.

Other Remedies.—The remedies next to bleeding and cold, and often not less efficacious, are active purgatives, which must be administered at short intervals until copious evacuations be procured. In some cases no marked amendment has taken place until the bowels have been freely moved; they are sometimes exceedingly torpid, for reasons which have already been assigned, and large doses of cathartics may be required. Combinations of calomel, jalap, scammony, followed by any of the purgative mineral waters, are the purgatives on which the most reliance can be placed. Croton oil is sometimes a valuable remedy, from the facility of its administration and certainty of its effects. Mercury may be given freely as a purgative.

Use of an Emetic.—We have sometimes found tartar emetic of great service when there was no irritability of stomach to prevent its being tolerated; the power of tartar emetic in controlling the action of the heart and subsiding the inflammatory diathesis is now fully established; a solution in the proportion of one grain to the ounce and a tablespoonful given every hour or two, suspending it should vomiting occur, has often been attended with great benefit. The remedy is in general well tolerated, owing to the torpor of the stomach; violent vomiting should, however, be prevented, as it would obviously be extremely injurious.

Treatment of Second Stages.—In the second stage of acute cerebritis, that of collapse and coma, general blood letting is to be used most sparingly; decided advantage, however, has resulted from a moderate bleeding even at a late period. In this stage topical bleeding is more generally indicated. There are periods of exacerbation in the symptoms which should be watched and overcome by these means, which may be persevered in as long as there is any hardness and resistance in the pulse. We have seen a patient instantly recover from a state of profound coma by the abstraction of a very small quantity of blood with the cupping glass. In this stage we may have recourse to counter-irritation with advantage;

blisters may be applied between the shoulders, to the occiput or to the neck or legs. There is an objection to their being applied to the whole head, that it prevents the subsequent application of cold. We have, however, in desperate cases, seen a decided amendment follow the application of a large cap blister. Particular attention should be paid to the abdominal region, and especially that of the bladder, which ought to be examined morning and evening in order to detect retention of urine, and we must take care not to be led into error by an incontinence of urine from the over-distension of the bladder; this must be obviated by drawing off the urine with the catheter twice a day.

Treatment of Chronic Forms.—In the more chronic forms of cerebritis, unattended with fever or much general excitement, the same activity of treatment is of course not admissible. We must still, however, pursue the antiphlogistic plan, modifying it according to the urgency of the symptoms. During the period of irritation, with cephalgia, vertigo, or rigid spasm of the extremities, moderate bleeding, general and topical, purgatives and counter-irritation are the only remedies from which any advantage is to be expected; they must be repeated at longer or shorter intervals, according as the strength of the patient and the continuance of the symptoms may seem to indicate. A great deal is to be accomplished in all chronic inflammations by persevering in a moderate course of antiphlogistic treatment. We must watch carefully any signs of amendment, remembering that there is a great tendency to collapse, and that the natural course of the complaint is characterized by irregular remissions and exacerbations.

When to Cease Active Treatment.—When the period of irritation is over, and is followed by a remission of all signs of excitement, by a complete paralysis of the muscles, and by other evident signs belonging to the period of softening and suppuration, the strength of the patient must no longer be reduced by active treatment. In all inflammatory diseases, when the stage of excitement and disorganization is over, a process of reparation commences, which requires for its completion a certain degree of power in the constitution. If at this period we persevere in lowering the general strength, we deprive the constitution of its natural resources and interfere with its healing operations.

When the Excitement Turns.—It becomes, therefore, an object of considerable importance to watch the moment when the tide of excitement is on the turn, and when the powers of the constitution are verging to a state of collapse, in order that we may abstain from an injurious interference, husband the patient's strength and even support it if required.

This precaution is particularly necessary in old people and young children.

Convalescence.—After convalescence has been established the patient will still require to be closely watched for some time before his recovery can be considered fully confirmed; he must be kept perfectly quiet, free from every species of excitement and the regimen duly regulated. When the brain has once suffered from inflammation it is slow in recovering its tone, and the most trifling cause, such as a slight mental exertion or emotion, a full meal, and so forth, has been in many cases sufficient to occasion a relapse.

Suppressed Menstruation.—When cerebritis has occurred after suppressed evacuations or the metastasis of other diseases, we should endeavor to procure their return. If menstruation is suppressed, leeches should be applied to the pubis or inguinal regions, and the frequent use of hot pediluvia recommended. If cutaneous eruptions or rheumatic gouty pains in the joints previously existed, blisters or rubefacients are to be applied to the parts originally affected.

Summary of Symptoms of Brain Congestion.—The following summary gives a connected view of the various morbid conditions of the brain, which are the effects of congestion and inflammation, together with their symptoms:

Cerebral Congestion.—Cerebral congestion, over-distension of vessels; vertigo, tinnitus aurium, confusion of sight, cephalgia, if the pressure in the vessels be carried to a sufficient extent to intercept the circulation; simple apoplexy, seldom fatal, recovery rapid.

Permanent Cerebral Congestion.—If the cerebral congestion be permanent, or returns frequently; drowsiness, oppressed intellect; the vessels become weakened and on a sudden increase of congestion are ruptured; extravasation of blood, sanguineous apoplexy; destruction of cerebral substance and compression; loss of consciousness, permanent or temporary; sudden and complete paralysis without spasmodic affection of the muscles.

General Congestion.—General congestion, followed by inflammation of a considerable portion of the brain; deep injection; partial sanguineous infiltration; dotted and ecchymosed striated appearance of the cerebral substance; general cerebritis (combined usually with arachnitis). Period of high excitement of all the cerebral functions, with general convulsions, followed by a period of collapse and coma.

Partial Congestion.—Partial congestion and inflammation of the brain; 1st period, the same deep injection and sanguineous infiltration, more circumscribed; partial cerebritis. Partial symptoms of irritation in the organs of motion and sense; weakness, pain, numbness, spasmodic paralysis, confined to one side or a few regions of the body. 2d period, infiltration of pus in the cerebral substance; softening; abscess; complete paralysis; relaxation and flaccidity of the muscles; loss of feeling; abolition of some of the external senses or intellectual faculties; death, either gradual or sudden, by the extension of the inflammation or by pressure.

Cerebral Inflammation.—After sanguineous apoplexy and sudden and complete paralysis, inflammation of the cerebral substance surrounding the coagulum; consecutive cerebritis, the paralyzed limbs affected with pains, convulsive motion, spasmodic rigidity.

Slow Congestion.—Slow and gradual congestion with very slight irritation; long, continued state of low inflammation, ending sometimes in softening, sometimes in induration, or else in an infiltration of serous fluids and white softening. Various forms of chronic cerebritis, sense and motion very gradually weakened and impaired without pains or spasmodic rigidity in the muscles.

DROPSY OF BRAIN.

(*Hydrocephalus.*)

Causes.—Water in the head; dropsy of the brain. This is almost always an affection of early life. Sometimes it is congenital. It is mostly a passive dropsical effusion; certain cases show signs of a chronic or subacute inflammatory condition of the arachnoid membrane of the brain.

Symptoms.—Languor, strabismus, convulsions, loss of appetite and increase in the size of the head. This last may be enormous.

Treatment.—Moderate purging every few days, or once a week, sustaining the strength by nourishing food, and, if it be borne, cod-liver oil; diuretics; shaving the head and rubbing it nightly with mercurial ointment; occasionally blistering the back of the neck, in a child. Pneumatic aspiration may perhaps prove useful in hydrocephalus. To remove the fluid gradually and safely mild stimulating baths have a very beneficial influence.

INFLAMMATION OF THE SPINAL MARROW, MYELITIS, SPINAL MENINGITIS.

Symptoms.—The symptoms of this uncommon affection are: constant and severe pain in the back increased by motion; spasmodic contractions or rigidity of the muscles followed by paralysis, fever, constipation of the bowels and retention of urine. In myelitis proper, as distinguished from spinal arachnitis, there is no pain or muscular rigidity but only paralysis of motion and sensation.

Treatment.—Cupping or leeching along the spine, followed by a blister and active purgation with saline cathartics, constitute the essential parts of the treatment of simple inflammation of the spinal cord or of its membranes.

APOPLEXY.

Causes.—These have been divided into external or obvious, and internal or such as can only be discovered after death. The external causes or those acting mechanically by evoking pressure on the brain; such are fracture of the skull with depression of a portion of bone, or blood extravasated immediately beneath the fractured bone without depression. The reality of this cause is shown by the effect of direct pressure made upon the surface of the brain by the point of the finger in cases where a portion of the skull has been removed by the trepan, or on the fontanelle or opening between the cranial bones in the head of infants. Causes tending to increase the arterial action of the brain, either by direct application to the head itself, or indirectly through the medium of other organs. Causes which operate by impeding the return of blood from the brain, as stooping; the application of a tight ligature round the neck so as to compress the internal jugular veins; tumors of any kind so situated in the neck or chest as to interrupt the return of blood from the brain to the heart; diseases of the heart or lungs impeding the transmission of the blood through the pulmonary vessels; or a voluntary suspension of breathing after a full inspiration; or in blowing wind instruments, or in making great muscular efforts of any kind. The internal causes are those that are only discoverable after death, viz.: extravasation of blood in the substance of the brain or in the ventricles, or serous accumulations in any of the cavities or between its membranes.

Symptoms.—We have two forms of genuine apoplectic seizure: congestive and hemorrhagic. In the first the premonitory symptoms are, carotids, distension of the temporal arteries and jugular veins; constipation, languor, dullness, drowsiness, dimness of sight, vertigo, headache. The attack is marked by sudden stupor; with slow and sometimes snoring respiration, full and slow pulse, dusky or turgid appearance of the face. The total loss of perception may be brief, its partial absence or deficiency continuing for some time. Slight convulsive movements are not uncommon. Paralysis of the muscles occurs only for a short time after the attack, if recovered from.

Hemorrhagic Apoplexy.—In hemorrhagic apoplexy generally no clear premonition is given, the attack being very sudden; a stroke, literally unconsciousness is complete for some seconds, minutes or hours. After this, general or local paralysis, most often hemiplegia (paralysis of one side of the body) is left; the mental powers also, in many cases, being impaired at least temporarily, during the coma; the breathing is commonly stertorous and the pulse slow and somewhat full, the head hot and the face more or less dark or flushed. But the fullness of the blood-vessels and heat of the head are much less, as a rule, than in congestive apoplexy.

The younger the patient and the more vigorous his antecedent health the more probable is the existence of the congestive form; and, also, the better the prospect of recovery from hemorrhage within the cranium, if only the effects of pressure be exerted at the time.

Treatment.—1. If, in a person under fifty, not before of broken constitution, we find the head hot, face turgid and flushed, the arteries and veins of the neck and temples full, the pulse also strong, and the heart's impulse so (or the heart's action vigorous though the pulse at the wrist be oppressed) blood may be taken, carefully, from the arm or by cups or leeches applied to the back of the neck.

2. Older and more doubtful cases may be treated tentatively with cups alone, aided by mustard plasters to the legs, back and epigastrum in turn; with laxative injections into the rectum during the attack and saline purgatives afterward. The head should be kept raised and cooled with wet cloths until its temperature becomes normal. If the hair be thick, it should be cut very short or shaved off entirely and an ice-cap placed thereon over the whole surface. When, however, there is reason, as usually is the case in really old or broken-down patients, to believe the structural degeneration, arterial or that of ramollissement, is the source of the attack, loss of blood will be out of place. Iodide of potassium for some time will aid absorption.

LOSS OF SPEECH.

(*Aphasia.*)

Symptoms.—Loss of speech may occur as one of the symptoms of disease of the brain, either functional and transient, or organic and irre-

THE NERVES

FIGURE No. 1.

1. Plexus or bunch of nerves in the carotid region.
2. Sixth external motor nerve.
3. First branch of the 5th ophthalmic nerve.
4. A branch on the nose partition, which goes to the incisive *foramen.*
5. Concurrent branch of the *Vidian* nerve, dividing itself into carotid and petrosas branches.
6. Back branches of the palate.
7. Lingual nerve joined by the tympanum cord.
8. Hard part of the 7th pair or facial nerve.
9. Upper cervical ganglions.
10. Middle cervical ganglions.
11. Lower cervical ganglions.
12. Roots of the great splenic nerve.
13. Lesser splenic nerve.
14. Renal plexus.
15. Solar plexus.
16. Mesenteric plexus.
17. Lumbar ganglions.
18. Sacrum ganglions.
19. Vesical plexus.
20. Rectum plexus.
21. Lumbar plexus.
22. The rectum.
23. The bladder.
24. The pubis.
25. Crest of the ileum.
26. The kidney.
27. The aorta.
28. The diaphragm.
29. The heart.
30. The larynx.
31. The submaxillar gland.
32. The incisive teeth.
33. The nasal partition.
34. Globe of the eye.

35, 36. Cavity of the cranium.

FIGURE No. 2.

1. Section of the bone of the forehead.
2. Section of the occipital bone.
3. Muscles in the back of the neck.
4. Integuments on the skin.
5. Frontal cavity.
6. Middle spongy bone.
7. Lower spongy bone.
8. Middle passage of the nose.
9. Lower passage of the nose.
10. Thickness of the roof of the mouth and depth of the nose.
11. Opening of the eustachian tube. The catheter is at the nose and is going through the tube.
12. Cartilage of the nasal division.
13. *Genio-gloso* muscle.
14. Veil of the palate.

FIGURE No. 4.

1,1. The cubital nerve.

2,2. The ramus profundis dorsalis (deep-seated nerve of back of arm).

3. Extreme of the cutaneous nerve of the arm.
4. Branch of the radial nerve.

5,5. Back view of the digital nerves, or of the fingers.

6. Back branch of the cubital nerve.

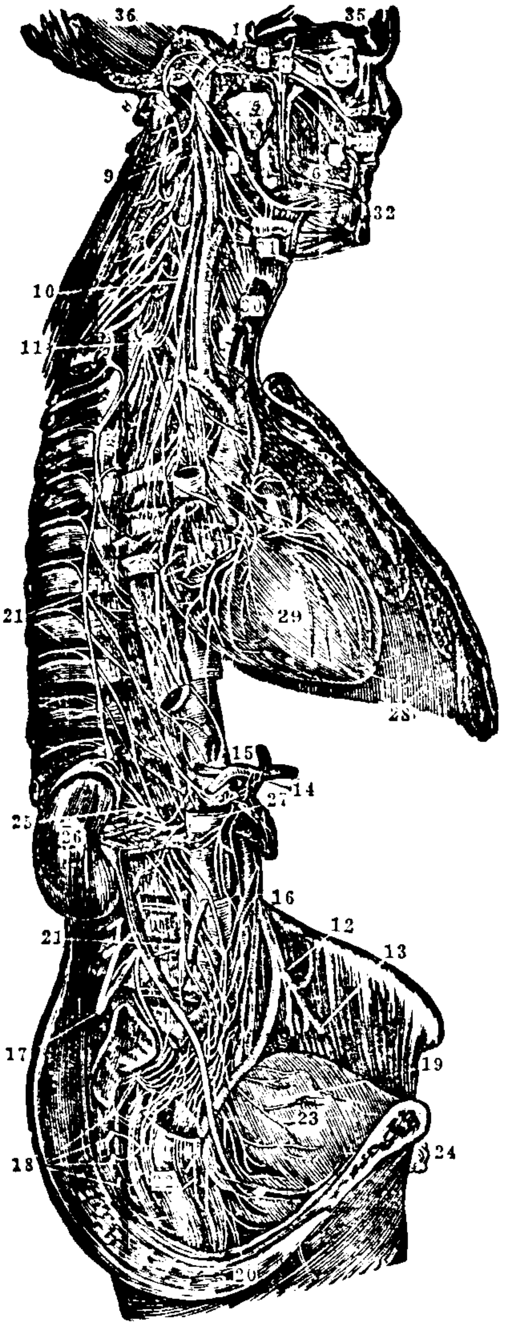


Fig 1.—The great sympathetic nerve

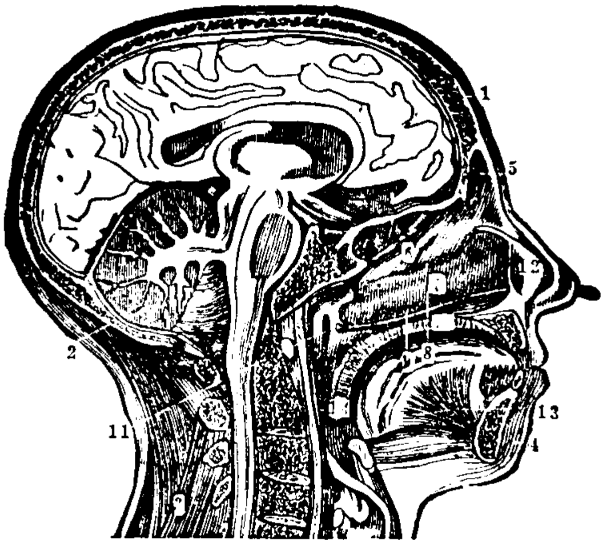


Fig. 2.—Vertical middle section of head and neck showing the opening through the eustachian tube, and its relations with the pharynx.

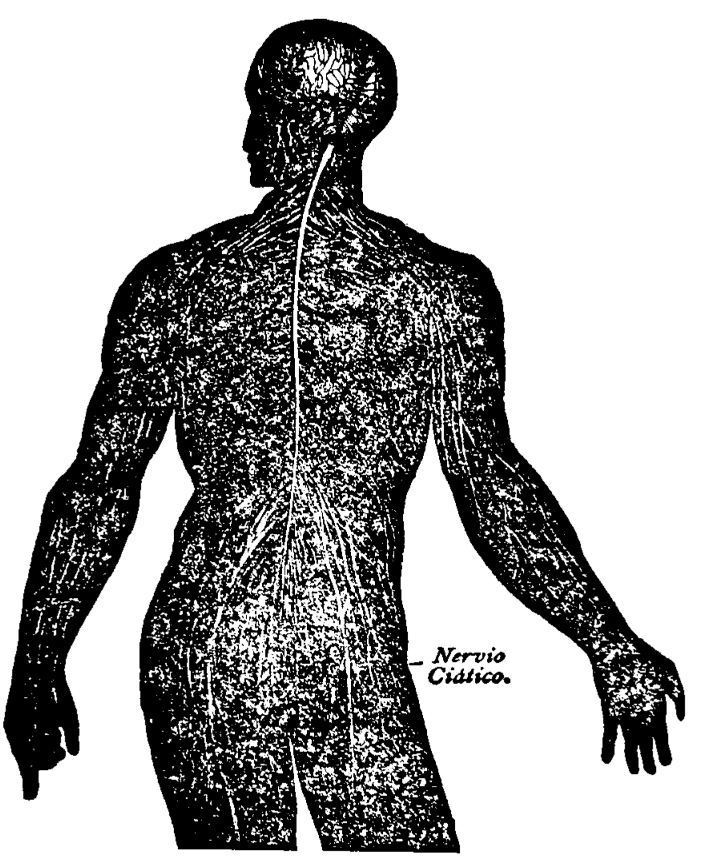


Fig. 3.—View of the nervous system in man, showing the nervous centres (the brain and the spinal near row) whence start the other nerves which provide the whole body.

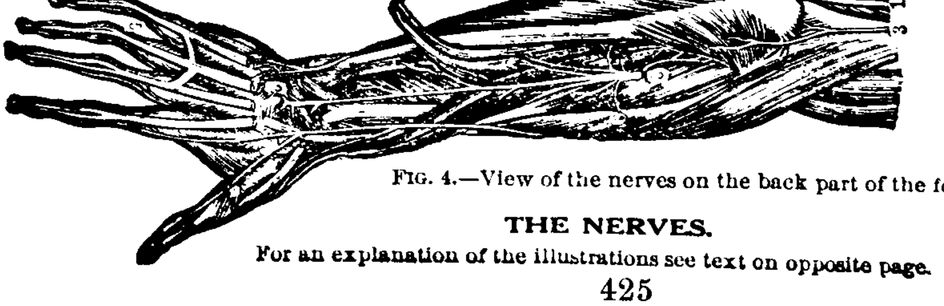


Fig. 4.—View of the nerves on the back part of the forearm and hand.

THE NERVES.

For an explanation of the illustrations see text on opposite page.

movable. Such a loss of language is termed aphasia, not articulation, as in aphonia, but expression is, in this affection, wanting. The power to unite words from memory, to convey meaning, is lost; but, in some cases, at least, they may be copied correctly.

Causes.—Hemiplegia of the right side has in a number of examples coincided with aphasia, and, several times, also, autopsy has shown softening or other lesion of the left anterior portion of the cerebrum. Valvular lesion of the heart sometimes accompanies this disease.

Treatment.—Cases of aphasia are very rare. There is no special measure of treatment except that of general principles, and treat untoward ones as they arise.

SUN STROKE.

Symptoms.—This is a disease occurring in persons exposed to excessive heat and characterized by vertigo, sometimes with violent pain in the head, gradual increase of listlessness and torpidity and a desire to lie down. The feverish symptoms may culminate in more or less sudden and complete insensibility.

Treatment.—The most obvious demand in regard to treatment is to abstract the excessive heat from the body as rapidly as possible, and this can be most speedily accomplished by cold sponging, rubbing the head, neck and chest with ice or by the cold pack. Light should be excluded from the patient as far as possible, and if the pulse is feeble stimulants should be given by the mouth or by injection. If prompt improvement does not occur the hair should be cut short and a blister applied to the nape of the neck.

Heat Exhaustion.—In heat exhaustion the patient is generally found with a cool skin, a feeble pulse and pallid face, without disturbance of the intellect. In such a condition stimulants, dry heat of hot-water bags or bottles, mustard plasters to the stomach and perfect rest and quiet are indicated.

HYPERTROPHY AND ATROPHY OF THE BRAIN.

Meaning.—Hypertrophy means an actual enlargement or overgrowth of the brain structure generally, while atrophy signifies a general wasting of the substance of the brain

Causes.—The brain is sometimes the seat of morbid growths, including cancers, fibroid and bony tumors, tubercular deposit in large masses, and casts containing parasites. All these affections are, fortunately, very seldom met with.

Treatment.—The treatment in such cases is, of course, to cut out the tumor and the affected portion of the nerve with as little delay as possible, whenever it can be accomplished.

PARALYSIS OR PALSY.

Causes.—Palsy is one of the most common and most distressing misfortunes which mankind is obliged to suffer. Yet its various forms are rather symptoms of deep-seated disease than disease themselves. Thus palsy of a limb is very frequently a symptom of structural disease of the brain or spinal cord, but it occasionally occurs from a diseased nerve trunk itself. It may affect a whole limb or only part of one, and is sometimes limited to a group of muscles in a particular region.

Symptoms.—The following conditions give rise to paralysis of motion:

1. Disease or injury to a nerve in some part of its course, destroying its power of transmitting the force, which is expressed by a contraction of the muscle to which the nerve is distributed.

2. A disease of some portion of those central parts of the nervous system, whence the nerve takes its origin, or with which it may be connected directly or indirectly.

Varieties of Palsy.—There are many varieties of palsy, among the most important of which are the following:

According to its nature it may be motor (acinesia), and sensory paralysis (anesthesia).

Facial Palsy.—This is an affection of the portio dura of the seventh pair of cephalic nerves, the motor nerve of the face. It occurs at any age, usually from rheumatoid inflammation of the sheath of the nerve at its escape through the cranium, through the stylo-mastoid foramen.

Symptoms.—One side of the face is without change of expression, and the eye on that side is not closed (in severe cases) from the paralysis effecting the orbicularis palpebra muscle. The tongue is not affected in the movements. The facial motor nerve is not often involved in the much more serious cases of cerebral palsy.

Diagnosis.—Absence of disturbance or of incompleteness of control over the tongue, while the power over the eyelid is partly or wholly lost with the absence of severe cerebral symptoms, will, especially in a young person, make the diagnosis easy as well as important.

Treatment.—The treatment of this form of local palsy may be by repeated small blisters behind the ear, followed, when convalescence has begun, by some warm covering (cotton wadding, flannel or silk) to protect the part from cold.

Writer's Cramp.—Pressure upon a nerve may cause its paralysis, generally temporary. A man has been known to have his hand rendered powerless for three weeks by sleeping all night with his arm bent under his head. Friction, the endermic application of strychnia and galvanism may be used in such a case. Writer's cramp or scrivener's palsy, is the result of exhaustion of certain muscles from over-use. Its cure is rest.

Hemiplegia.—This means half palsy and is a paralysis in which one lateral half or side of the body is stricken with powerlessness so accurately that it is customary to define the condition by the terms right and left.

Causes.—Brain lesion is most often the cause of this affection; either an apoplectic clot, a tumor or softening.

Symptoms.—In severe cases the arm and leg may be equally motionless, but if there is any difference between them the leg is generally the limb less affected, the last to be attacked, and the first to recover some of its powers. Suddenly, almost always, but not always with loss of consciousness, the patient loses the power of motion and more or less sensation on one side. In complete cases the parts involved are the arm and leg, the muscles of mastication and half the tongue.

Treatment.—1. Essentially the same principles are applicable to this as have been mentioned in connection with apoplexy. The younger the patient the more vigorous his or her previous health, and the fuller the circulation the more appropriate may be the general or local abstraction of blood to diminish pressure upon the brain. Where softening is apprehended bleeding should be exceptional and cautious. Rest, regulation of the bowels, and counter-irritation of dry cups to the upper part of the spine, and afterward a blister, with friction, as with brandy and red pepper, or whiskey and hot water, or salt and spirits, to the affected limbs.

2. In the hysterical form, if it lasts long, electricity may be applied locally with safety and advantage. In any curable case passive exercise of the weak limbs will be very useful.

Paraplegia.—Paraplegia is that form of palsy in which one-half of the body below the chest and including the lower limbs is stricken with the disease.

Causes.—Spinal disease or injury is its source, with or without cerebral implication or complication. It may come suddenly or gradually; generally its beginning, at least, is sudden.

Symptoms.—When the spine is affected, as well as in the reflex form, numbness in the feet and pain in the back are apt to be early signs. The power of motion is lessened or lost in the lower limbs. The muscles may be either relaxed or contracted. The lesion of the spinal marrow, if progressive, is productive of loss of power over the bladder and bowels. Bed-sores with deep ulceration and sloughing may occur in protracted cases.

Treatment.—When myelitis is believed to exist, at an early stage, local depletion to a moderate extent may be advised. In many cases counter-irritation by repeated sinapisms, or stimulating liniments will be proper. While inflammation or active irritation of the spinal cord is made apparent by the symptoms (pain, cramps, muscular twitching or rigidity), strychnia is not suitable. After these have subsided it may be given, not more at first than the thirtieth of a grain twice daily. If it produce jerking movements of the hands or feet, or nervous restlessness, or any marked uneasiness it should be suspended. Electricity may be used with similar caution in a secondary stage of paraplegia.

Hysterical Paralysis.—In females this is among the many forms of functional disorder which that strange but not yet clearly defined disorder, hysteria, may produce.

Diagnosis.—The affected limb, in walking, is dragged after the other, as if a dead weight; while in cerebral hemiplegia the palsied leg and foot are brought round in a curve, the body being bent toward the sound side at the time.

Treatment.—Tonics, good nourishment and change of air are most required in all hysterical cases. For the paralysis itself electricity is useful. Mild shocks for a few minutes twice a day may be given with advantage.

Reflex Paralysis—Causes.—Worms, dysentery, diarrhœa, uterine irritation, teething and external injuries are all thought to induce reflex paralysis in certain instances. Diphtheritic and scarlatinal palsies have been placed in the same category. The simplest and clearest cases are those of wounds.

Treatment.—In true reflex paralysis the removal of the irritant cause produces instant relief. When the nature of the case does not admit of such prompt relief, if the diagnosis be clear, the same indication remains, to address our remedial measures to the seat or source of peripheral irritation. Palliate, if we cannot cure the trouble there, and we will obtain palliation, if not relief, of the reflex disability. Electricity has proved signally useful in the subsequent treatment.

Diphtheritic Paralysis.—After the termination of an attack of diphtheria, commonly within three weeks, the muscles used in swallowing and speaking, less often those of the upper and lower limbs and the sense of sight may be partially paralyzed. Loss of sensibility usually accompanies the loss of motor power. This condition of things may last for weeks or even months, but is generally recovered from.

Causes.—The immediate cause of the paralysis of the peripheral lesion of the nervous terminations is the toxemic influence upon those centres of the morbid poison of diphtheria.

Treatment.—Passive exercise, stimulating friction and electricity, change of air and sea-bathing are suitable measures for this affection.

Syphilitic Paralysis.—The most unequivocal instances of this nature are accounted for by periostitis within the cranium, involving the dura mater, or by nodular exostosis pressing upon the brain. The most remarkable fact connected with such cases is the prompt curative effect upon it of iodide of potassium.

Lead Palsy.—Considerable time of exposure to the influence of lead is generally necessary to cause this. So commonly does it first affect the extensor muscles of the forearm that the cognomen of "wrist drop" is often applied to it. When it lasts for some weeks the muscles waste away.

Symptoms.—A blue line is observed to form along the edge of the gums. Pain precedes the palsy and attends recovery of power. Mostly, though after a long time, lead palsy is recovered from.

Treatment.—Iodide of potassium appears to act as an eliminant of the lead accumulated in the system. Ergot is also useful. Earadic electricity has been found decidedly beneficial used in moderate strength for a few minutes two or three times a day.

Mercurial Palsy.—This is occasionally met with in those who work in metal. Mostly tremor is a predominant symptom. Early withdrawal from the influence of the cause and the continued use of the iodide of potassium are the principal measures of treatment.

Paralysis Agitans, called also shaking palsy, is described as a more or less constant involuntary and uncontrollable shaking of the hands, arms, head or, progressively, of the whole body. Slight or moderate degrees of such tremor are common enough from general nervous debility. Extreme cases evince the wreck of the cerebro-spinal system and are, therefore, incurable. In other cases the treatment is upon general principles.

Progressive Muscular Atrophy.—This is still another uncommon and incurable form of paralysis due to a gradual decay and wasting of the muscles, but commencing sometimes with an apparent enlargement or hypertrophy of these organs.

Locomotor Ataxia.—This results from a disease called sclerosis, or hardening of certain motor-centres in the brain and spinal cord, or syphilis.

Symptoms.—Rheumatoid pains precede loss of power, occasional strabismus (cross-eye) and incontinence of urine may occur. Then there is an awkward, unsteady gait; the sensibility of the feet becomes blunted, and walking is insecure. If the patient shuts his eyes he falls down, and even with them open he reels as if drunk. The duration of this progressive disease varies from six months to ten or twenty years.

Treatment.—Hygienic management, general tonics, electricity and very careful use of strychnia.

Infantile Paralysis.—This is a variety developed in very young children and occasionally present from time of birth. As a rule this palsy arises from disease of the spinal cord and its membranes.

Symptoms.—It comes on with acute symptoms of fever and convulsions, ending in paralysis of one or more limbs. In some cases the child gradually recovers from the effects of the malady, but in many the impairment is permanent and the limb, ceasing to develop in proportion to the rest of the body, appears in the adult as if shrunken and withered, constituting a lamentable and hopeless deformity.

Treatment.—Much can be done towards preventing complete loss of power by persevering and systematic movements, application of galvanism and exercise as suggested in the article on hemiplegia.

Scrivener's Palsy.—Called also writer's cramp. It is the result of long continued and unnatural excitement of the nerves controlling the fingers and hand in writing.

Symptoms.—The earliest indication is a painful sense of fatigue and weakness which comes on shortly after commencing to write. Sooner or later this begins to be accompanied by involuntary spasms of the muscles employed in holding the pen and the handwriting grows unsteady, scrawly and almost illegible. At first the spasms and irregular movements can be more or less controlled by voluntary effort, but they gradually become worse and worse, until at last the use of the pen is an impossibility.

Treatment.—Rest from writing, tonics and electricity accomplish a cure in some instances, but the prospect of recovery is small, and it is, therefore, very important to avoid the disease by moderation in writing, or by the use of the ingenious typewriter.

Wasting Palsy.—A few of the muscles of one limb, or the voluntary muscles of the whole body may lose their power and then waste away to almost nothing. Insidious in its approach the affection may last from six months to several years. It may end in recovery. The shoulder and ball of the thumb are frequent points of commencement for the palsy and atrophy.

LOCK-JAW.

(*Tetanus.*)

Description.—When a patient is the subject of an uncontrollable spasmodic contraction of the muscles of the lower jaw, he is said to have "trismus" or lock-jaw; and when the same condition attacks other or all the voluntary muscles of the body he is said to have "tetanus."

Causes.—1. Tetanus includes trismus and generally begins with it, though trismus may be a local affection. It is found in children as a result of dentition, and in adults as a consequence of diseases involving the teeth, gums or jaws. It is a spasmodic affection produced by reflected irritation set up by a local disease, is rarely associated with any constitutional disturbance and is, for the most part, cured on removal of the cause.

2. Tetanus is likewise generally associated with some local source of irritation, some wound or injury, it is then called "traumatic;" when an external or visible cause can be made out, it is denominated "idiopathic;" when rapid in its course it is called acute; when slow, chronic. The acute form is usually the result of an accident and generally fatal. The chronic is for the most part idiopathic and more curable.

Symptoms.—There are no general or local premonitory symptoms by which the onset of this affection can be recognized, and the earliest indications of its approach are generally a difficulty in opening the mouth, with stiffness in the muscles of the lower jaw; yet these symptoms may be so slight as to pass unheeded, or to be misinterpreted, when, however, some rigidity of the muscles of the neck, throat or abdomen can be made out and the first indications of the "tetanic grin" recognized.

3. As the disease progresses the muscular system of the body gen

erally will be more or less affected, and, in different cases, different groups of muscles will be involved. Those of the back are most frequently attacked and their contraction may be so powerful as to cause an arching backward of the frame. The muscles of respiration are, as a rule, affected only in acute cases, and the chief danger to life consists in the severity of the spasms which attack them. When severe the first spasm may be fatal and may occur at an early or at a remote period of the affection. When the jaw is unlocked by a spasm of the depressor muscles, the tongue is sometimes suddenly shot out from between the teeth and often wounded.

4. As the disease advances the jaws become completely fixed and deglution is then impossible. The spasms of the muscles of the frame become more intense and frequent and the powers of the patient rapidly decline. The pulse which was rapid becomes more feeble, while the expression of the countenance betokens agony of the body and despair of the mind. The slightest manipulation or movement of the patient sets up a fresh spasm, and any emotion may do the same. The skin becomes bathed with a cold sweat, and, if death is not caused by suffocation, exhaustion soons puts an end to suffering.

Treatment.—Among the specific remedies which have been greatly trusted the Calabar bean stands foremost and may be given in full doses, such as half a grain of the extract in two or three hours. Camphor is also recommended in doses of from five to ten grains. The bromide of ammonium or potassium has been administered with advantage. It was hoped that a valuable drug for this disease had been found in chloroform, but experience has not justified the expectation. The hydrate of chloral has now taken its place and been of some service. Indian hemp in doses of a grain every hour, aconite and belladonna in quantities of one-fourth of a grain have also been recommended. Ice applied in bags along the spine has apparently been of great value. The administration of remedies by subcutaneous injection, in these cases, promises to be a valuable adjunct to practice enabling us rapidly to introduce into the system drugs which act antagonistically to tetanic spasm. Tetanus antitoxine should be administered early.

HYDROPHOBIA, OR RABIES.

Meaning the "dread of water," which is more correctly termed "rabies" is a disease contracted from a rabid animal, generally from its bite through the saliva or mucus.

Stages of the Disease.—In the dog there are three well-marked stages of the complaint. The first is the melancholic, characterized by melancholy, depression, sullenness and fidgetiness; the second, the furious, by excitement or rabid fury, and the last, the paralytic, by general muscular debility and actual paralysis.

Symptoms.—1. In man the disease may show itself at any period from six weeks to a year after the inoculation. A month or more after the bite of a mad dog, or other rabid animal, the wound having healed, irritation is felt in it, nervous restlessness also exists which increases (in most cases) to violent, angry delirium. Then difficulty of swallowing occurs from a spasm of the muscles of inspiration (gasping) taking place at the moment of deglutition, making the patient choke.

2. The same spasmodic gasping is brought on by any sudden impression, as of sound, a flash of light or even a current of air passing over the face. Insomnia exists; the patient grows prostrate and must die for want of food and drink, even if the affection of the cerebro-spinal axis were not itself fatal.

3. There is intense thirst, but the characteristic dread of water, not as a fluid, however, but as connected with the difficulty of drinking. The sight of water is frequently sufficient to bring on shuddering, yet it is when the patient carries water to his lips that he is seized with the typical terrors.

4. A rabid man is always rational and tries to drink, but the attempt excites terror and the expression of his inability. His eyes become fixed, features contracted and his countenance expressive of the deepest anxiety, his limbs shake, and the whole body shivers. The paroxysm lasts a few seconds, then subsides, but only to be renewed on the slightest breath of air touching the body. During the calm sudden terror of an unknown kind haunts the mind and imaginary calling of friends often exists.

Symptoms of Last Stage.—In the third and last stage the longing for drink becomes intense, with an increasing inability to take it; the voice becomes hoarse and the mouth full of frothy fluid. The patient tries to get rid of this by spitting, and then becomes frightened at its results. Convulsive seizures increase in frequency and intensity, the spasm of the respiratory muscles threatening life; at last a fatal spasm takes place and death by asphyxia ensues.

Treatment.—There is not satisfactory evidence that a case of genuine rabies canina or hydrophobia has ever been cured. If we cannot cure, what can or should we do? We may certainly promote easy death by allaying the wretched sufferings of the patient by nitrous oxide, ether, or chloroform. Hypodermic injection of atropia or morphia might, perhaps, more effectually quiet the suffering and even afford more possibility of cure than inhalation of anesthetics. In all cases of bites from dogs or animals, however, in which the faintest suspicion of rabies exists, free cauterization with lunar caustic should be performed. Mental stimulants, in the way of inspiring hope and removing fear, must be duly administered and such general treatment as may be needed. No drug has yet been discovered that has the least influence on the disease, either in preventing or curing it.

What is known as the "Pasteur cure for hydrophobia" is in great favor among some medical men. It is rather a preventive agent or treatment and no doubt possesses great value.

FITS OR INFANTILE CONVULSIONS.

Causes.—The exciting causes are numerous, constipation of the bowels, indigestion, worms, irritation of the gums in teething and excitement of the brain, as by fright, are about the most frequent. Many acute and chronic diseases of infancy (scarlet fever, meningitis, whooping-cough, and so forth) have convulsions among their occasional symptoms or complications.

Symptoms.—Premonition of a fit is often observed in the child's fretfulness, or restlessness, or gritting of the teeth in sleep. When a fit comes on the muscles of the face twitch, the body becomes rigid at first, then in a state of twitching motion, the head and neck are drawn backward, the limbs violently flexed and extended; sometimes these movements are confined to certain muscles, or are limited to one side.

Treatment.—1. The treatment of a child during the convulsion is, of course, to be directed first toward relaxing the spasm, and immediately after that is accomplished to removing the cause of the trouble, which, in two cases out of three, will prove to be irritation of the gums or bowels. To shorten the paroxysm the child should at once be placed in a warm bath and a cloth wrung out of cold water applied to its head.

2. If the gums are swollen, or have been tender and irritated at the time of teething, lance them freely, dividing the tense gum down to the coming tooth. If the bowels have not been moved give at once an enema of castor oil, soap and glycerine, or some other laxative material, with warm water. If there is reason to suppose that the intestinal worms,

which most children harbor, are causing disturbance, active vermifuges such as a grain of santonine before dinner and supper for a child two years old, followed by two grains of calomel at bed-time, ought to be employed.

3. Cupping the back of the neck, in some cases where time is allowed by a protracted fit, may be resorted to, especially dry cups. Full doses of bromide of potassium, asafetida and valerian are often very useful in diminishing the excitability of the nervous system, which is especially great during the age of childhood.

PRESCRIPTION NO. 1.

R.—Bromide of ammonia	40 grains
Bromide of potash	½ drachm
Syrup	1 ounce
Water	1 ounce

Half a teaspoonful for a child 2 years old, every three or four hours.

PRESCRIPTION NO. 2.

R.—Bromide Soda	3 drachms
Bromide potash	3 drachms
Liq. potass. ars.	1½ drachms
Peppermint water	3 ounces
Infus. gentian co.	5 ounces

Tablespoonful three times a day for an older child.

FALLING SICKNESS OR EPILEPSY.

Periodical convulsions with unconsciousness during the attack.

Causes.—Hereditary transmission of this disease is common. Intemperance, venereal excess and self-abuse, blows on the head and fright are among the most frequent exciting causes.

Symptoms.—Premonition occurs in a minority of cases before an attack; headache, dizziness, terror, spectral illusions, a creeping or blowing sensation, like that of a current of air or stream of water, beginning in a hand or foot and extending toward the trunk. Then, often with a scream, the patient falls down and is violently convulsed. Foaming at the mouth, grinding of the teeth and biting of the tongue are common; the face is flushed, the eyeballs roll, the pupils are unaffected by light, sometimes vomiting, or involuntary urination or defecation takes place; the respiration may be very laborious. The fit lasts on an average from five to ten minutes. The interval between the attacks may be from several months down to a few days. In old cases there may be two or three paroxysms daily. They vary much, even in the same individual. The condition after the attack is also various, generally drowsiness or deep sleep follows it, or headache, debility or delirium, sometimes maniacal frenzy.

Treatment.—1. During the paroxysm, when habitual, little can be done. Place the patient so that he cannot strike his head or limbs against anything hard, loosen the clothing about the neck to form free respiration and circulation and insure fresh air about the patient, protect the tongue from being bitten, if possible, by placing a cork or piece of India rubber between the teeth. Care must be taken that such an object does not pass into the throat and choke the patient, which can be prevented by tying a strong string to it.

2. To break up the recurrence of the fits is the problem for which a vast number of remedies have been tried in vain. Bromide of potash, valerianate of zinc, belladonna, arsenic and digitalis have all been employed. Strangely enough this disease is very apt to improve temporarily under any new treatment, no matter how absurd, which takes a strong hold on the patient's imagination.

3. Self-management is very important to the epileptic. Temperance with nutritious diet is necessary; regularity of the evacuation of the bowels is imperative; abundant exercise in the open air, short of exhaustion, does good; systematic gymnastics have even cured some cases.

PRESCRIPTION.

R.—Bromide of potash	3	drachms
Bromide of soda	3	drachms
Bromide of ammonia	3	drachms
Iodide of potash	1½	drachms
Iodide of ammonia	1½	drachms
Tincture of columbæ	1½	ounces
Water	6½	ounces

Take two teaspoonfuls before each meal and three teaspoonfuls at bed-time.

SPASMODIC CROUP OR SPASM OF THE GLOTTIS.

Causes.—This is the most important of several varieties of simple spasm in different parts of the body, among which ordinary croup is a familiar example. It consists in a spasm of the muscles of the glottis or opening into the windpipe, by which a crowing or croupy cough is produced, with hard or stridulous breathing.

Symptoms.—This disease especially occurs in young children, where it is due to some reflex irritation, such as that of teething, reflected from the nerve centres which control the muscles of the glottis. It may generally be distinguished from the alarming malady, true croup, by its coming on suddenly without fever, marked heat of skin or quickened pulse.

Treatment.—To relax the spasm sprinkling of a little cold water in the face, or tickling the fauces with the finger or with a feather, so as to produce vomiting, frequently answers the purpose. Should it fail the child should be immediately placed in a warm bath. After an attack the gums should be carefully examined and freely lanced if found swollen, every attention being paid to the general health. Much needless alarm would be spared to anxious parents and nurses if it were generally understood that there is no likelihood of this disease leading on to the fatal malady, true croup, which may always be excluded from consideration if the child is free from fever, coughs loudly and has no huskiness of the voice. Give syrup of ipecac frequently until vomiting takes place.

CHOREA OR ST. VITUS' DANCE.

Causes.—From six to sixteen, in both sexes, especially often, however, in girls, chorea occurs. Nervous debility is almost always present before the attack. Fright is a frequent cause, overfatigue or mental excitement, blows or falls may produce it. Rheumatic fever is sometimes followed by it.

Symptoms.—Incessant and irregular movements of the voluntary muscles over which the will has but partial control. Walking in severe cases is difficult or unsafe; the hands cannot be regulated enough to write or work; speech may be affected; the muscles of the face often twitch grotesquely. The pupil is, in some cases, unnaturally dilated; palpitation of the heart may occur, and also constipation and indigestion. The urine is of great density; the countenance assumes a blank and foolish expression, and the mind itself may in time grow seriously enfeebled.

Treatment.—Good diet, salt bathing and systematic gymnastic exercises will suffice for mild cases. Where marked anemia exists iron (citrate, phosphate or hypophosphate, tincture of chloride, syrup of iodide) is important. Obstinate cases may be treated with Fowler's solution of arsenic, in small doses, gradually increased. Cod-liver oil should be given if great debility exists. In chronic cases the tonics before mentioned with the addition of the hypophosphites should be resorted to, and change of climate is very likely to be of service.

HYSTERIA.

From its occurrence nearly always in females and from a supposition of its originating in some affection of the womb, this name has been given to a variable disorder, of which the main characteristic is morbid excitability of the whole nervous system.

Symptoms.—1. A "fit of hysterics" is a paroxysm whose nature may vary from mere uncontrollable laughter or crying to a severe epiliptiform convulsion. This last, however, differs from epilepsy in that being less complete loss of consciousness and in its curability.

2. Simulation of other diseases, indeed the assumption of severe functional disorders of different organs, is a common trait of hysteria. There may be hysterical amaurosis; hysterical insanity is not uncommon; nor is hysterical paralysis or coma rare. Retention of urine, cough, aphonia, and so forth, are often thus produced.

Catalepsy.—Catalepsy or trance is a condition allied to hysteria in some respects, in which the whole frame lies prostrate and helpless, or that a limb, lifted up, falls back as if it were relaxed and dead while yet the consciousness of the person affected may be retained without the sensitiveness to physical pain. This curious state of existence is not well understood, and in our present ignorance of its nature the chief importance lies in its being distinguished from death early enough to prevent that most horrible of all human misfortunes, being buried alive.

Hypochondriasis.—This is a very obstinate affection, often hereditary, and occurring more frequently in men than in women. During the attack there is apparently great depression of mind without mental disease. The patient imagines he is afflicted with maladies of the most varied kinds; is tormented with ideas of impending miseries and dangers; thinks he suffers from swellings or contortions of the body, which may be purely creations of fancy. This disorder in the male corresponds very nearly to hysteria in the female and like it can only be cured by attention to the general health. Tonics, exercise and cheerful occupation are the best remedies.

Treatment of Hysteria.—Much skill and care will often be required in the management of hysteria, as each one has peculiarities of its own

Generaly a tonic regimen is demanded. Iron and cod-liver oil are most often the appropriate remedies. Bromide of potassium is sometimes quite useful. For a paroxysm of "hysterics" asafetida is universally safe and reliable in pills of three grains each. Sinapisms and pediluvia are also proper. Menstruation is often irregular in hysterical women; it should be regulated as far as possible. Exercise in the open air, as a rule, is very important for such persons. Mental and emotional excitement should be avoided; but tranquil, even engrossing, occupations will be beneficial. For hysterical paralysis electricity is promptly useful. Cold bathing, especially the shower-baths or sea-bathing, when followed by reaction, will do good.

NEURALGIA.

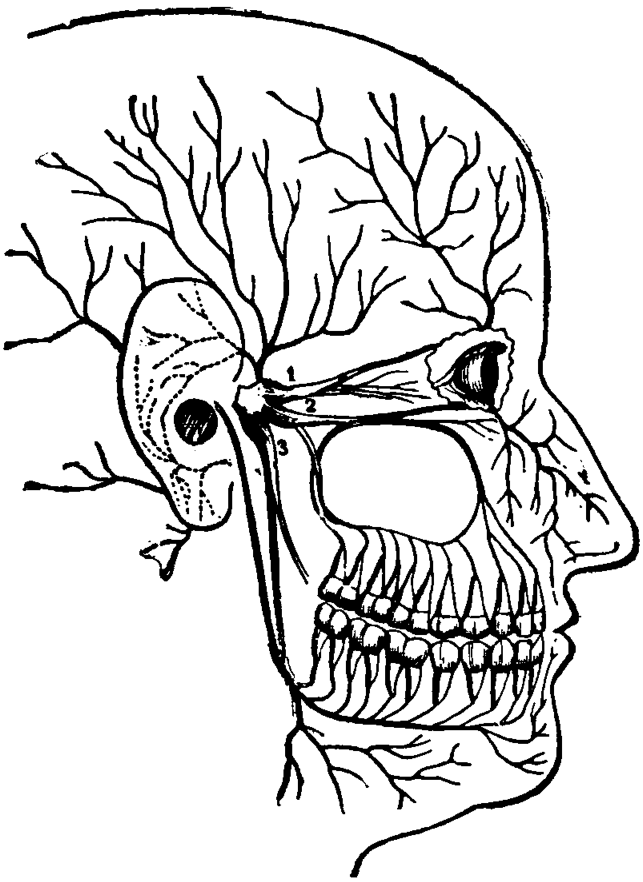
Meaning.—Pain, without inflammation or other disorder, except that of the nerve or nerve-control involved; literally nerve pain. This may affect any of the sensitive nerves. It is also sometimes referred to parts which have, in health, no sensibility; as the heart, stomach, and so forth. Different names are given according to its site. Thus, tic douleureux is facial neuralgia; hemicrania, that affecting one side of the head; sciatica, that of the hip; gastrodynia, neuralgic pain in the stomach; pleurodynia, in the side. Angina pectoris is, chiefly, a neuralgic affection of the heart.

Symptoms.—The pain is generally acute, shooting or darting, with tenderness of the part upon pressure. There is, however, no heat or swelling, or throbbing of the blood-vessels in pure neuralgia. Complicated cases occur in which inflammation and neuralgia exist together, and inflammation of the fibrous neurilemma may be the immediate cause of the neuralgic pain.

Causes.—Neuralgia is always dependent upon debility arising from one cause or another, as, for instance, anemia, mental anxiety, gout, rheumatism, syphilis and dyspepsia. In fact, a great German authority upon nervous diseases declares, with as much truth as poetry, that "neuralgia is the prayer of the nerves for iron in the blood."

Next to the sciatic nerve no other is so often the seat of neuralgic pain as the trifacial, and this is, perhaps, partly owing to the fact that the superficial branches are spread out over a large surface upon the side of the face and more exposed to cold and changes of the weather than any other part of the body where the epidermis is equally delicate. Terminal branches of the trifacial come out through the bones of the head at points over the eye, beneath the eye and at the side of the chin—as shown in the marginal illustration. These, then, are the tender points, where all the branches of this nerve are involved in the neuralgia, and it is from these points that the darting bony pains seem to radiate.

Hemicrania or Migraine.—This is a combination of neuralgic symptoms with ordinary headache occurring in paroxysms, and usually limited to one side of the head or brow. It is apt to commence in childhood and go on to advanced age, occurring in both sexes, but more often in women than in men. In women the attacks are especially apt to appear just before the menstrual period or during its course.



Distribution of Nerves on the Side of the Face.

Causes.—The headache is probably due to excitement of the sensitive filaments of the trifacial nerve—distributed to the dura mater—and also to the sympathetic fibres accompanying the blood-vessels, which connect the nervous supply of the brain with that of the stomach so intimately.

Symptoms.—As generally manifested it increases rapidly soon after waking in the morning, with chilliness, loss of appetite, sliminess of the mouth, sickness of the stomach, vomiting of a little greenish fluid, and at last the headache becomes so intense as to be almost unbearable.

Sciatica.—This is often associated with both rheumatism and gout, but is also frequently brought on by catching cold. Occasionally it is due to accumulations in the bowels, or to diseases of the bones through which the nerve makes its exit. The painful points are usually found back of the trochanter or most projecting point of the thigh bone, at certain spots in the thigh about the knee and ankle joints.

Intercostal Neuralgia.—This, like intercostal rheumatism, resembles the pain of pleurisy and of pneumonia, and has often given rise to unfounded anxiety as to the existence of these more dangerous diseases. It may be at once distinguished by careful examination of the lungs.

Neuralgias of the arms, neck, shoulder, and so forth, are unhappily common and sometimes very intractable.

Pathology.—At least three sources of pain are possible. 1st. Local disease affecting a nerve. 2d. A morbid state of a sensorial nerve centre. 3d. A morbid condition of the blood. Neuralgia always fixed or returning in the same spot, is likely, although not certain, to depend upon a fault in the nerve itself, as neuroma (tumor of a nerve). Radiating pain must at least involve part of a nerve centre. Flying pains, never long seated in one part of the body, are due to a defect or morbid poison (as that of gout or malaria) in the blood.

Treatment of Neuralgia.—1. This must, of course, depend upon the cause or nature of the case. Tic douleureux often depends upon decay of the teeth; if so, they must be attended to. Other purely local neuralgias require local treatment. Laudanum or paregoric, applied by saturating a cloth and laying it upon the part covered by oiled silk to prevent evaporation, is an efficient local anodyne. So is chloroform, similarly applied; it is very pungent, burning like mustard. Sinapisms will sometimes relieve promptly.

2. Mere warmth, as of flannel steeped in hot water, will do in some instances. Rubbing for a few moments with saturated tincture of aconite root until the skin tingles, or the application of ointment of veratria, twenty grains to the ounce of vaseline, may be used in severe cases. In the most obstinate ones a blister may be applied, dressed, after removal of the cuticle, with two grains of the acetate of morphia, diluted with ten grains of gum arabic. Carbolic acid is a powerful local anesthetic, though (unless diluted with oil or glycerine) very irritating to the skin; or, most prompt usually of all, solution of morphia may be hypodermically injected.

3. Of anodynes internally used, belladonna has, for neuralgia, the greatest reputation. It will not quell suffering so directly as opium or morphia, but it will more entirely do away with the neuralgic state. For this, however, iron, especially in combination with quinine or strychnia, is the most effective medicine. Cases of neuralgia which will not be benefited by iron are decidedly exceptional

4. In some instances application of the galvanic current will remove the pain of neuralgia as if by magic, and when relief can thus be secured it is far preferable, as the distressing sickness, headache and constipation, which so often result from opium and other narcotics, may thus be avoided.

Auxiliary Treatment.—The hygienic treatment is almost equally important with the medicinal, and a thorough examination of the habits of life pursued by the patient will almost always lead to the discovery of some violation of sanitary law, which must be corrected before a hoped-for cure can be realized.

PRESCRIPTION 1.

R.—Menthol	20 grains
Ext. Belladonna	5 grains
Chloral	5 grains
Vaseline	3 drachms

Apply the ointment to face where pain is seated.

PRESCRIPTION 2.

R.—Citrate of caffeine	10 grains
Phenacetine	½ drachm

Make ten capsules. Take one every 2 or 3 hours.

PRESCRIPTION 3.

Tablets acetanilide and sodium bromide. One as needed every three or four hours.

DELIRIUM TREMENS.

Causes may arise under two different conditions or circumstances. Where stimulants are suddenly withdrawn from one accustomed to them; and, while their use in excess is continued.

Symptoms.—Sleeplessness, debility, tremors, horror, hallucinations, often with loss of digestive power. The insomnia is a cardinal symptom; if the patient sleeps a whole night he recovers. Debility varies in degree in different cases; in a first attack it is not always great, tremor is nearly always present. The illusions of the patient are wonderfully real, and usually dreadful. He is pursued by demons or beset by moral enemies; he cannot bear to be alone, especially in the dark. Sometimes, however, the visions are indifferent, or even amusing.

Treatment.—If the patient be not much prostrated, give only ale or porter, a bottle or two in the day, with hop tea *ad libitum* and a grain of opium every three or four hours. Very weak patients, accustomed to spirits, might have a tablespoonful of whiskey or brandy every two, three or four hours, according to their condition. Hydrate of chloral sometimes answers as well as, or better than, opium. Bromide of potash with tincture of hyoscyanus repeated every three to four hours.

Diet.—Beef tea and mutton broth, and so forth, seasoned with red pepper, are preferred as diet. In an obstinate case sleep may follow the raising of a blister upon the back of the neck. Substituting valerian for opium, or combining the fluid extract or tincture of valerian with morphia solution answers well in some cases. Injection of laudanum into the rectum is occasionally resorted to. Success in treatment has been obtained from the use of chloroform in doses of one or two drachms. The corrugated stomach of a spirit drinker will probably bear the pungency of chloroform better than anetheis. The large majority of first attacks of mania-a-potu are curable. Third and fourth attacks are often fatal, or are followed by permanent insanity.

PRESCRIPTION 1.

R.—Indian hemp .... 10 grains
Divide into 12 pills. Take one every two or three hours until drowsy.

PRESCRIPTION 2.

R.—Hyoscyamus .... 1 grain
Alcohol .... 1 drachm
Water .... 1 drachm
Inject 5 to 10 minims with hypodermic syringe.

INSANITY OR MADNESS.

Causes.—1. This consists chiefly in a particular organization of the brain and nervous system, rendering those individuals so constituted liable to become insane when exposed to the influence of certain agencies, which in other persons either give rise to a different train of morbid phenomena, or are, perhaps, devoid of any injurious effects.

2. Among the agents which give rise to madness there is none more influential than intemperance, or the frequent use of ardent spirits. That the predisposition to madness, when it has once arisen, is frequently transmitted, is a fact too well established to admit of doubt.

3. The exciting causes of insanity may be divided into moral or psychical and physical. The principal psychical are grief, fright, anxiety, care, or an excited state of any passion; the emotions aroused by disappointment, excessive or prolonged employment of the intellectual faculties, and so forth. Anything which will produce a hyperemia of a por-

tion or the whole of the brain by which the nutrition and consequently the normal function is interfered with.

4. The principal physical causes are drunkenness and the use of narcotic or poisonous drugs, want of food, want of sleep and over-exertion; other nervous diseases such as epilepsy, chorea and hysteria; severe injuries to the head, particularly from blows, causing fracture of the skull or concussion of the brain, sunstroke and tumors in the brain. Acute febrile diseases as typhoid, typhus and malarial fevers, and it may occur during the course of pneumonia in the form of acute mania. The poison of Asiatic cholera may so interfere with the nutrition of the brain as to produce not only transient delirium but mania, which may continue several days or weeks. Acute rheumatism is sometimes a cause, chronic constitutional diseases are frequent causes, and among the most formidable of these is constitutional syphilis. Diseases of the genital organs sometimes exert an important influence in producing insanity.

Symptoms.—1. The earliest symptoms of coming insanity are depressed manner, unusual excitement, anger and rashness.

2. An important symptom in all forms of insanity is impairment of the faculty of attention. The inconsistency of the beliefs of the insane is one of the earliest noticeable symptoms, and they are classed as "delusions" and "hallucinations." A delusion is a false belief in regard to some fact which generally concerns the patient, and which is so strongly rooted that all attempts to reason him out of it are futile. A hallucination is a false perception of one of the senses; the patient may fancy that he sees a spirit or a person who does not exist.

Melancholia.—This may be acute or chronic, and is marked by extreme depression of both mind and body. The first stages of melancholia are generally preceded by a condition called hypochondriasis, which may be considered as the mildest form of insanity. There is a feeling of bodily illness at this time more than at any other, or in any other form of insanity.

Treatment.—1. The treatment of a case of chronic or subacute melancholia will vary with its history and symptoms. An asylum is not indispensable if the patient's means are sufficient to provide him with proper care. He may be benefited by travel and change of scene; but when his condition will not admit of this a proper place, either a private house or an asylum, should be selected, and an attempt made by therapeutical and hygienic measures to restore the cerebral defect by sleep and nourishment of the body.

2. There are three conditions which require constant attention: want of sleep, rejection of food and constipation. To remedy the first chloral is most beneficial. The practical aim is to produce sleep, regularity of the evacuations by laxative medicines and to sustain the strength with nourishing food and wine.

Mania.—There are two varieties, the acute and chronic. In the acute form the excitement is extreme, and follows closely upon the delusion or derangement of ideas. In the chronic form the delusion or derangement is confirmed but less obtrusive, while the excitement is subdued or comes on at long intervals. Mania has generally a sort of stage of incubation, during which sleeplessness is one of the most important and earliest symptoms. In another class of patients the primary symptoms are those of gloom and despondency, out of which the maniacal excitement appears to develop. In both varieties there is generally a marked departure from the individual's usual state of physical health. The different forms of mania in which the disposition to commit murder, suicide or arson, or to steal, is quite uncontrollable, are well known. When a single tendency of this kind is very prominent the case is usually denominated one of monomania.

Treatment.—The treatment consists on regulating the bodily functions, giving food freely, combined with plenty of drink, also wine, and in the judicious use of chloral. Rest is of the highest importance, and baths of warm water are of great benefit, the head to be kept cool during the operation. Purgatives at the outset of the attack may be of use, as aiding to arrest it.

PRESCRIPTION.

R.—Fluid extract of conium	1½	drachms
Fluid extract of hyoscyamus	1½	drachms
Hydrate of chloral	2½	drachms
Syrup of orange peel	3	ounces

Take a teaspoonful every two or three hours, as occasion requires,

Dementia.—Dementia is literally a want of mind, and the word indicates a condition in which there is feebleness of intellectual grasp, or attention, imbecility of word and act and general deficiency of mental power. It is one of the common terminations of both mania and melancholia, and if long continued, its outward signs are a vacant and puzzled look, a lack-lustre eye, a weak smile and a meaningless laugh. This kind of insanity is almost a natural termination of extreme old age and is then called senile dementia. Not infrequently the subjects of it become paralytic.

Imbecility.—Imbecility is a condition in which the mind is from birth unfitted for the active and thoughtful duties of life, and in which the person affected is said to be half-witted, or wanting in general intelectual capacity. This condition of deficient mental development may be associated with moderately good physical health in early life, but there seems to be usually some taint in the system, so that the family of imbeciles is, as a rule, short-lived, the members dying early of consumption, diabetes, or of some degeneration of the brain and spinal cord.

Idiocy.—Idiocy is a still lower grade of mental weakness, in which the intellectual faculties are below the standard necessary for reasonable life. In the true idiot the head is of a reduced size and the appetites and propensities are very little, or not at all, controlled by reason. Many idiots are deaf and dumb, but most of them retain their sight. The sad condition of these poor creatures may be often ameliorated by systematic training, but complete cure after puberty is hopeless.

Treatment of Insanity.—The treatment of insanity is generally best carried out in asylums for the purpose. To quiet a patient temporarily, or on his way to a suitable institution, bromide of potassium in quantities of thirty grains, or chloral in fifteen-grain doses every two or three hours, morphia by hypodermic injection, or otherwise, and even chloroform by inhalation may be necessary.

NEURASTHENIA.

Neurasthenia, sometimes referred to as spinal irritation, nervous exhaustion, etc., is a functional condition of the nervous system, causing a lessened desire to perform or attend to the various duties of life.

Causes.—Heredity is sometimes a factor; it may be an outcome of various chronic diseases; nervous temperament; overwork; sexual excesses; alcoholism; excessive use of tobacco, etc.

Symptoms.—Neurasthenia may affect any organ of the body. One of the earliest manifestations is a weakness of the mental faculties in not being able to concentrate the thoughts, endeavoring to do so bringing on headache, fear, feelings of weakness and depression, palpitation of the heart, coldness of the hands and feet and chilliness, often followed by flashes of heat. In males genito-urinary disorders frequently occur with dread of impotence. In females painful menstruation, ovarian irritation and irritable uterus are frequently present. Care should be taken in diagnosing to distinguish between neurasthenia, or true nervous exhaustion, and nervous debility accompanying some organic disease.

TREATMENT.—Sight must not be lost of the fact that the patient is a sick individual and should have rest, quiet and good food. Pleasant companionship and relief from responsibility are essential and where possible travel is especially recommended, care being taken, however, that the patient does not become fatigued. Among the internal remedies of value are arsenic, strychnia, the valerianates, Pil. Carm-Allen and the hypophosphites.

Neuritis.—Simple neuritis, an inflammation of the nerve trunk, characterized by pain (often severe), impaired sensation and atrophy. Among the principal causes may be included wounds, injuries and compression of the nerves, exposure to cold or wet, rheumatism, syphilis. The affected nerve is red and swollen; the fibres have undergone some granular change. The inflammation may extend upward or downward. In long standing cases the diseased nerves are found to be made up largely of connective tissue replacing the degenerated structure. The most decided symptom is pain, with tenderness along the course of the nerve trunk, of a burning, tingling, tearing and often intense character, increased by pressure or motion. Sometimes contractions and muscular cramps occur, followed by impaired motion. The prognosis is favorable with proper treatment.

Treatment.—The affected part should be placed at rest. If the disease is severe, blister along the course of the nerve. Internally full doses of iodide of potassium. Sodium salicylate and phenacetine are often useful. Locally, sedative lotions. Leadwater and laudanum, oil of teaberry. Various liniments often relieve the intense pain. Syphilitic cases, iodide of potassium does the most good. If due to rheumatism, the salicylates and alkalies are indicated. If anemia is present, iron and hypophosphites is indicated.

PART IV OF BOOK IV

Treats of the structure and diseases of the eye, eai and nose.

ILLUSTRATIONS

CURATIVE MEDICINE

PART IV

DISEASES OF THE EYE, EAR AND NOSE

Importance of Subject.—The diseases of the eye are so important, and serious injury or loss of the organs of vision is such a terrible misfortune, that they demand a careful consideration. For the better comprehension of this group it will be needful, however, to give some preliminary explanation in regard to the eye, and also the ear and nose, with their appendages.

Wonders of the Eye.—The eye is probably the most wonderfully ingenious and complex organ of the human body, and being proportionately delicate, requires to be guarded with the greatest care. Few catastrophes are more grievous than that of total blindness, and most people would rather lose all the other senses than be deprived of sight.

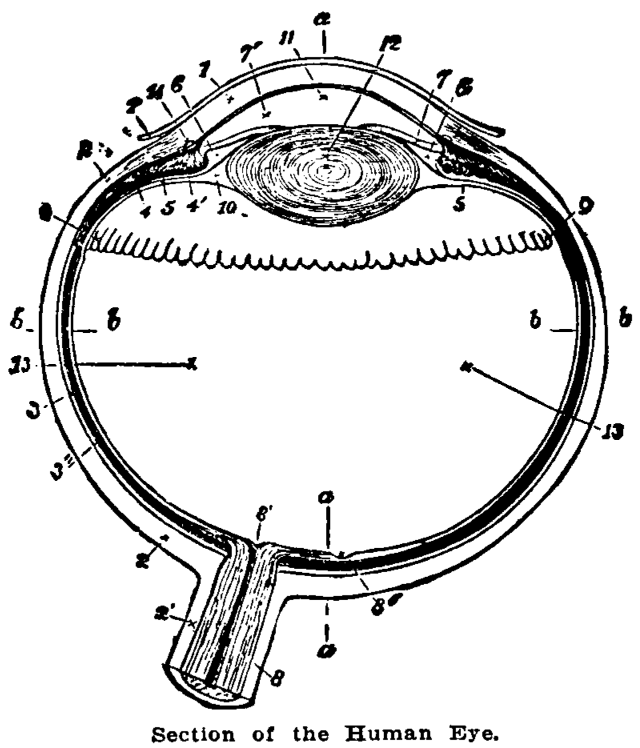
Structure of the Eye.—The intricate structure of the eye may perhaps be best comprehended if we remember that its general plan is that of a photographer's camera, the convex glass in the front of which corresponds with the crystalline lens of the eye, a picture of external objects being formed upon the artist's ground-glass plate in the one case, and upon the retina at the back part of the eyeball in the other.

The Retina.—Now, the retina is simply the expanded optic nerve, which has the peculiar power of perceiving lights or colors, and the chief difference between the eye and the camera is, that in the former temporary impressions only are perceived by the brain, through the optic nerve and retina, and in the latter instrument these temporary impressions are intended to be rendered permanent on the sensitive plate or paper, as a photographic picture.

The Eye Socket.—The eye is carefully protected from accidental injury by being embedded in a deep cavity or socket in the solid bones of the face and head, which guard it jealously from attack on either side and at the back. This socket is much larger than the eye itself, and the bony cavity is filled up behind and at the sides of the eyeball with an admirable cushion and packing of soft fat.

The Cornea.—The eye itself, as can be readily seen in that of a pig or sheep from a butcher's shop, is a white ball almost exactly round, except where the clear circle projects a little in front. This clear part, called the cornea (1), is as transparent as glass, and set in the space made for it in the white part of the eyeball, very much as a watch crystal is set in its frame. The white portion of the ball, called the sclerotic coat (2), is a tough membrane, very strong and dense, which gives shape to the organ of vision, and protects the extremely delicate structures within. The cornea and sclerotic coat each average about one-twentieth of an inch in thickness.

The Iris.—Inside of the cornea is a circular curtain, with a round hole in the middle, called the iris (7), so named because it varies so much in color, being frequently blue in blonde individuals, and brown or black in brunettes.



Section of the Human Eye.

The Pupil.—The round hole in the centre of the iris is called the pupil, and is the black spot seen on looking into a person's eye. This spot varies in size according to the amount of light, being larger in the shade and smaller in bright sunshine. In human beings it always remains round, unless the iris is diseased, but in the cat, for example, it changes its shape, becoming a narrow slit in a strong light.

Use of the Iris.—This closing up of that curious curtain, the iris, is a beautiful provision for shutting off an excessive amount of light, which would otherwise pass through the pupil in too great quantity, and irritate the sensitive parts of the organ of vision within.

The Sclerotic Coat.—The sclerotic coat is lined on its inside with a thin layer of black membrane, called the choroid coat (3), which seems to have almost exactly the same object as the black lining of the photographer's camera, namely, to absorb any extra rays of light, and so prevent the picture from being indistinct.

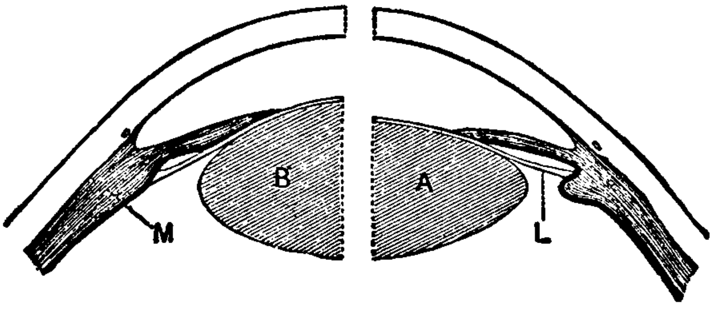
Structure of Retina.—Inside of the choroid coat, and immediately in contact with it, lies the retina, a third hollow ball, made up of an expansion of the optic nerve, which enters the eye at the back (8), through openings in the sclerotic and choroid coats. The retina is made up of several layers, the outermost of which is formed by the terminations of the nerve-fibres in what are called the rods and cones of vision. These rods and cones are so wonderfully sensitive that through them we can perceive the differences of color and outline in the images of objects formed within the eye. They therefore correspond to the sensitive plate in the camera of a photographer.

Other Portions of the Eye.—The remaining portions of the eye are chiefly useful in forming this image of which we take cognizance, and act upon the light exactly as the lenses of an opera-glass or of a camera do, except that they are provided with a more convenient way of changing the focus as may be required. The first of these which the light reaches, after it penetrates the cornea, is the crystalline lens (12).

Crystalline Lens.—This lens can be readily seen by squeezing it out of the eye of a pig or sheep after death, is very much like a large dew-drop or rounded diamond, in size, shape and general appearance, and is solid enough to bear gentle handling. It has the form of a small, thick magnifying glass or lens, and if held over the letters of a printed book, is at once seen to have the same power of making objects seen through it look larger.

Position of Crystalline Lens.—The crystalline lens is placed in the eyeball a little behind the iris, and is large enough to extend out beyond the edge of the pupil, unless that opening in the curtain is wider than usual. If it were not so perfectly transparent we could see the crystalline lens every time we looked a person straight in the eyes, as is shown in cases of cataract, a disease where the lens becomes first milky and then opaque, so that its position can easily be recognized, and the edge of the iris seen to move over it, as the pupil expands and contracts under the influence of varying degrees of light.

Arrangement of Focus.—Every one who has looked much through a telescope or opera glass, knows that a different arrangement of focus is needed to show a near and distant object clearly, and that this altered focus is obtained by adjusting the relating positions of the component lenses. In the living eye, nature contrives to obtain this necessary effect of two or more lenses with a single one, by making that one (the crystalline) soft enough to change its shape a little, as shown in the diagram, and then providing a muscle called the ciliary muscle (M), through the action of which the lens may become more convex, that is, rounded (as at B), and so enable us to see near objects more distinctly. *It is the mechanical effort required to keep this little muscle constantly on the stretch that causes the eyes to feel so tired after long application over reading small print or doing fine work of any kind.* Hence, avoidance of too prolonged a strain of this nature is an important part of the hygienic care of the sight, on account of such a tendency as exists to exhaust the power of this muscle.



Flexible Crystalline Lens.

The Aqueous Humor.—The space between the crystalline lens and the cornea is filled by the aqueous humor (11), a watery fluid bathing the front and back of the iris, which, floating thus in a clear, transparent fluid, has an opportunity to move with entire freedom, and so most perfectly perform its duty as a curtain to shut off any excess of light whenever there is danger of a superabundance injuring the sensitive retina within. The aqueous humor, being shut in by the convex cornea, must, of course, take the shape of that clear membrane, and, forming with it a convex lens, still further aids the crystalline body in bringing the rays of light to a focus upon the retina, and so forming a sharp image upon that sensitive membrane.

Action of Aqueous Humor.—The action of the aqueous humor in this instance is precisely similar to that of water poured into a glass globe standing in the sunshine. Whilst the globe is empty, it has but little effect in concentrating the sun's rays into a focus, but when filled with water, its power as a lens is considerable, and it may even operate so energetically as a burning-glass as to set fire to inflammable substances placed at a proper distance. Want of suitable curvature, and also in many cases the fact of its being curved unequally in different directions, by making the lens or magnifying glass too strong or too weak, has much to do with causing imperfect sight.

Vitreous Humor.—The chief bulk of the eye is made up of the vitreous humor, which receives its name from its vitreous or glassy appearance. This fluid is contained in the cavity of the retina, and has running through it numerous fine, interlacing fibres, as transparent as itself, which probably help to prevent the delicate retina from being injured by its shaking about during violent movements of the head and body.

Duty of Vitreous Humor.—The vitreous humor has little or no share in aiding to form the image upon the retina, but does perform an important duty in keeping the globe distended, so that in a sound eye the retina is held at the exact distance, where it can receive images of objects cast upon it in their sharpest and best defined condition.

How to Understand the Eye.—An excellent way to understand fully how the eye acts as an optical instrument, is to actually make a camera of the eye of an ox or other large animal, by cutting away the sclerotic coat at the black part, and then shading this in a small box, for instance, so that the images formed by cornea and crystalline lens can be seen inverted upon the translucent retina at the hinder portion of the eye.

Eye Diseases.—The diseases of the eye, according to the nomenclature here followed, are seventy-five in number, so that it is impossible properly to describe the treatment of any but the more important. Among the first of these are to be ranked the diseases of the conjunctiva.

CONJUNCTIVITIS OR OPHTHALMIA.

Character.—This is an inflammation of the delicate membrane over the front of the eye, covering the whole of the cornea, and the part of the sclerotic coat or white of the eye, which is naturally visible.

Symptoms.—The usual symptoms of inflammation can nowhere be observed more distinctly than in the eye; the four great characters of this morbid process, as described by Celsus, about the beginning of the first century, being very apparent. Here, as elsewhere, redness, heat, pain and swelling are the indications of inflammation, just as they were in the days of the old Roman physician, more than eighteen hundred years ago. The redness of the eye in this affection varies with the intensity assumed, but in severe cases it may completely obscure the white of the eye, so that the whole surface, except the cornea, appears quite red. The pain and burning heat of the eyes are sometimes almost unendurable.

The Swelling.—The swelling of the conjunctiva is often so considerable as to rise up all around the edge of the cornea, and this projection of the inflamed membrane may be so great as to prevent the eyelids from being closed. Intolerance of light and profuse flow of tears, the latter resulting from irritation sympathetically extended to the lachrymal gland, which supplies those persuasive drops of salt-water, are common symptoms in some forms.

Catarrhal Conjunctivitis.—Catharral conjunctivitis or catarrhal ophthalmia, as it is also named, is the form of this affection usually produced by cold. Redness and pain, as if a particle of dust had got into the eye, with a free discharge of water, are the first symptoms. Intolerance of light is not very great, unless the cornea becomes involved. Vision may be slightly obscured, but is seldom seriously affected.

Treatment.—1. The treatment consists of active purgation with calomel (one-tenth to one-fifth of a grain every hour until one to two grains are taken), followed by epsom or rochelle salts. Soothing lotions to the eye, as, for example, that of sassafras pith with a very little extract of belladonna to begin with, and, after a day or two, applications of weak solutions of lunar caustic (silver nitrate) should be used.

R.—Silver nitrate .... 15 grains
Distilled water .... 1 ounce
Mix. Directions.—Apply one drop to the inner eyelids with a little cotton wrapped on a toothpick or a matchstick. Then wash the eye with a solution containing ½ teaspoonful salt to a cup of water.

The application should be made once a day for several days, and although the caustic solution smarts severely at first, it leaves, after fifteen or twenty minutes, an astonishing feeling of relief to the affected organ, and in favorable cases rapidly reduces the inflammatory action.

2. To prevent the eyelids from adhering during sleep, and so aggravating the trouble when pulled apart in the morning, an ointment should be used, preferably that recommended by Professor Pegensticker, which is a favorite of most physicians. The formula is:

R.—Yellow oxide of mercury .... 1 grain
Vaseline or cosmoline .... 1 ounce
Mix thoroughly and apply lightly to inner eyelids night and morning.

3. In many cases "ordinary salt water or a 2 per cent. solution of boric acid will suffice to effect a cure. Simple conjunctivitis of a chronic nature is often associated with catarrh of the nasal mucous membrane, and may be cured by correcting the catarrh of the membrane."

Pustular Ophthalmia.—This, called also phlyctænular conjunctivitis and strumous ophthalmia, is the form in which the scrofulous predisposition to disease is very apt to manifest itself in young children. It is almost always accompanied with an eczema of the head or face.

Treatment.—In this affection general treatment for the constitutional disease is the most important. The patient should be placed in the best hygienic surroundings. The eyes should be kept clean with an antiseptic solution, as a 2 per cent. boric acid wash, and the yellow oxide of mercury ointment, mentioned above, rubbed into the eyes once or twice daily.

Purulent Ophthalmia.—This is a more violent and contagious form of conjunctivitis, in which the sight is sometimes seriously endangered. The discharge of thick, yellow pus or matter is abundant, and the inflammation sometimes progresses with great rapidity.

Treatment.—Active purgation, leeching followed by blisters behind the ears, and application of the stronger solutions of nitrate of silver, are often necessary to preserve the sight. In the contagious variety great care must be taken to avoid conveying the disease from the sick to the well by the use of soiled towels, handkerchiefs, and so forth.

Spread of the Infection.—In bad cases it is probable that the infection may occur by being wafted along in the atmosphere through a large room, or even through a whole house, as is seen sometimes in boarding schools and children's infirmaries.

Purulent Ophthalmia of Infants (*ophthalmia neonatorum*).—This is another contagious form of the disease, affecting new-born children and, if not properly attended to, destroying their sight. It is the result of an infection with the gonococcus which Niesser discovered in 1879 to be the cause of gonorrhea. The inflammation develops in less than three days after birth.

Symptoms.—First there is redness and irritability of the conjunctiva.

2. In about twenty-four hours an excessive secretion of tears and a whitish discharge appears.

3. This is followed later by a swelling of the lids and of the conjunctiva and a change in the character of the discharge from a whitish to a yellow, purulent type.

4. The child suffers very little at first, but later, when the discharge becomes more plentiful and thinner, the patient loses his appetite, is restless and suffers a great deal of pain.

Treatment.—The treatment is divided into two classes. 1. Prophylactive or preventive; and 2, Curative.

1. That prophylaxis is possible was demonstrated by Credé, a noted

obstetrician of Bonn, who reduced the percentage of these cases in the wards of his hospital from 13 per cent. to less than 2 per cent.

Application of the Treatment.—This he accomplished by dropping one or two drops of a 2 per cent. solution of nitrate of silver in the eyes of new-born infants. This procedure is commanded by law in some communities. American authorities only recommend it where the birth canal is presumed or known to be affected.

Analysis of Prophylactic Treatment.—The Cyclopedia of Medicine and Surgery (Gould and Pyle) says: The prophylactic treatment consists:

1. In removing the disease from the mother before labor if possible.

2. Through disinfection of the vagina before labor with solution of creolin, carbolic acid, boric acid, salicylic acid, mercuric chloride or other antiseptic.

3. Thorough disinfection of the child's eyes as soon as born.

These precautions should be carried out in all suspicious cases.

2. **Curative Treatment.**—After the disease has made its appearance, the most strenuous efforts and the most unceasing vigilance and care are demanded to prevent a partial or total loss of sight. Many of the blind we see about us, for whom we feel so much sympathy, can blame their unfortunate condition upon the lack of treatment in the first few days of their lives.

If possible a physician should be summoned at once and his orders followed implicitly, and it may be necessary for him to see the child several times a day to make the necessary applications.

Rules for Treatment.—If a physician can not be had, thorough attention to the following rules will probably result in a cure:

1. Cold applications which tend to lessen the amount of local inflammation.

2. Frequent and thorough flushings of the eyes with mild antiseptics, as boric acid in distilled water all day and night every hour or two.

3. The application of lunar caustic (silver nitrate) ten grains in the fluid ounce of distilled water, two or three times a day.

4. If any ulcers appear on the cornea, weak yellow oxide of mercury ointment should be rubbed, thoroughly but gently, into the lids twice a day.

5. Nourishment, cleanliness and warmth must be maintained.

Diphtheritic Conjunctivitis.—This is a condition of the eye caused by an infection with diphtheria. Fortunately it is extremely rare in America.

Symptoms.—Pain is present, the lids are swollen and hard. The discharge is scanty and may be watery or a thin pus. The constitutional symptoms of diphtheria may be present.

Treatment.—Instillations of very weak solutions of atrophine will relieve the pain. Antitoxin should be administered very early. Otherwise the treatment is the same as in purulent conjunctivitis.

Trachoma.—Granular conjunctivitis, or granular lids, is also a contagious disease of the eyes.

Symptoms.—The inner sides of the lids become rough, inflamed, and covered with little projections which irritate the cornea at every movement of the ball or lids. It seriously affects vision, and is often very obstinate, but can frequently be vastly benefited.

Treatment.—1. Perseverance in constitutional treatment.

2. Local applications of nitrate of silver solution, or sulphate of copper to the granulations.

3. Unless improvement follows soon, local treatment should be discontinued and a specialist consulted. There is rarely complete recovery.

DISEASES OF THE CORNEA.

Causes.—Keratitis or inflammation of the cornea may occur from a punctured wound of the eye, or it may be the result of the scrofulous diathesis, or even more commonly of inherited syphilis. It occasionally results in ulceration of the cornea, which sometimes perforates this structure and, allowing the humors of the eye to run out, irrevocably destroys the sight.

Treatment.—Local treatment of the accompanying conjunctivitis and the use of atropia to keep the pupil dilated, so that it, the iris, may not become involved in the inflammation, are important, but the chief reliance must be placed upon constitutional remedies for those general diseases, of which this affection of the eye is little more than a symptom. The white spot or scar left by an ulcer of the cornea is generally permanent, and not only disfigures the organ of vision, but more or less completely obscures the sight for life.

Preventive Treatment.—Since a scar of this kind is so injurious and when once fully formed can scarcely ever be removed, the ounce of prevention is of tenfold importance, and every care should be taken, by securing the most skillful treatment for ophthalmia as promptly as possible, to reduce to its smallest dimensions the danger of such a catastrophe to sight.

THE EYE

FIGURE No. 1.—Iris, ciliary muscle and coroidea membrane.

1. The pupil.
2. Ciliary muscle.
4. Arteries of the coroidea membrane.

5,5,5,5. Sclerotic tunic, cut circularly and removed.

7. The optic nerve.

FIGURE No. 2.—Vertical section of the pupil.

FIGURE No. 3.—Artificial eye.

FIGURE No. 4.—External muscles of pupil.

1. Part of the sphenoidal bone to which some muscles are attached.

2,2. External straight muscle.

3. Optic nerve.
4. Internal straight muscle.
5. Upper straight muscle.
6. Lower straight muscle.
7. Upper oblique muscle.
8. Insertion of the upper oblique muscle of the pupil.
9. Lower oblique muscle.
10. Sclerotic tunic.
11. Cornea.
12. Cartilaginous pulley of the upper oblique muscle.

FIGURE No. 5.—View of the second pair of optic nerves,

1. Globe of the eye. The left, perfect. The right one has the sclerotic and coroidea tunics removed, showing the retina.
2. Quiasm of the optic nerve.
3. The whitish bodies.
4. The infundible.
5. Varolius bridge.
6. The medulla oblongata.
7. Third pair: motor nerves of the eye.
8. Fourth pair: pathetic.
9. Fifth pair: trigeminous.
10. Sixth pair: external motors.
11. Seventh pair: auditive and facial nerves.
12. Eighth pair: pneumogastric, accessory, spinal and glossopharyngeal.
13. Ninth pair: hypoglossus.

FIGURE No. 6.—Lachrymal apparatus (the skin of the eyelid has been removed).

1. Cartilage of the eyelid.
2. Insertion of the eyelashes.

3,3. Lachrymal ends or openings of lachrymal canals in the eyelids.

4. Conduit to the nose.
6. Cul-de-sac at the orbital extremity of the canal.
7. Lower corner of the eye.
9. Lachrymal gland.

10,10. Canals carrying tears to the eye.

FIGURE No. 7.—Formation of an image on the retina.

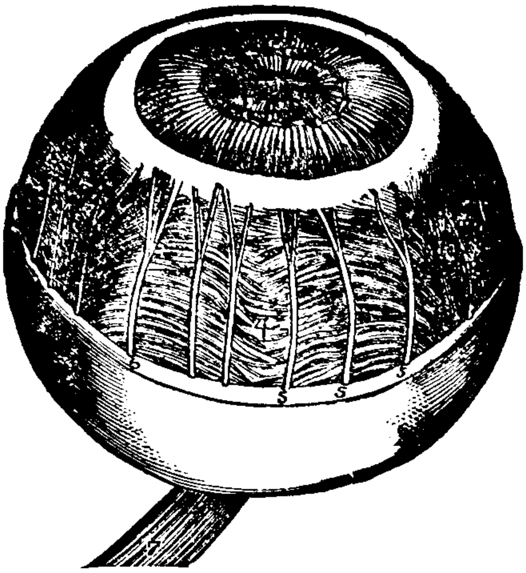


Fig. 1.—The iris, the ciliary muscle and coroidea membrane.

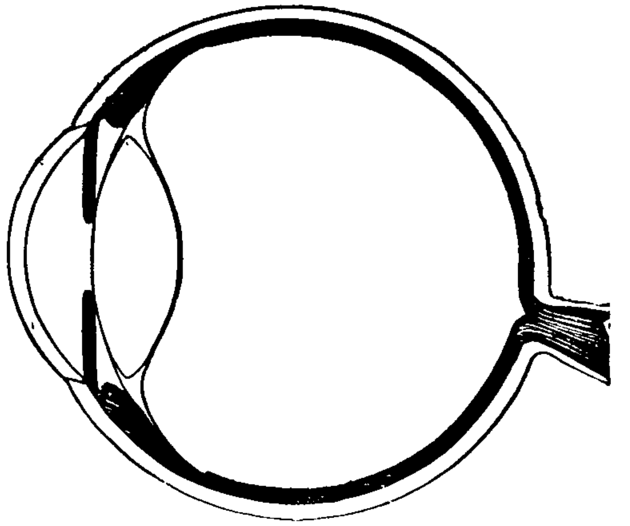


Fig. 2.—Vertical section of the pupil.

Fig. 3.—An artificial eye.

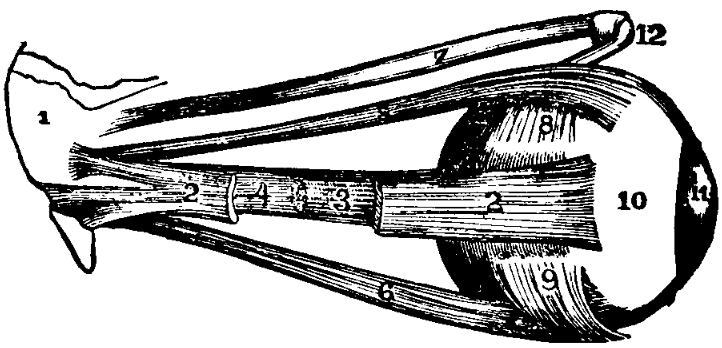


Fig. 4.—External muscles of the pupil.

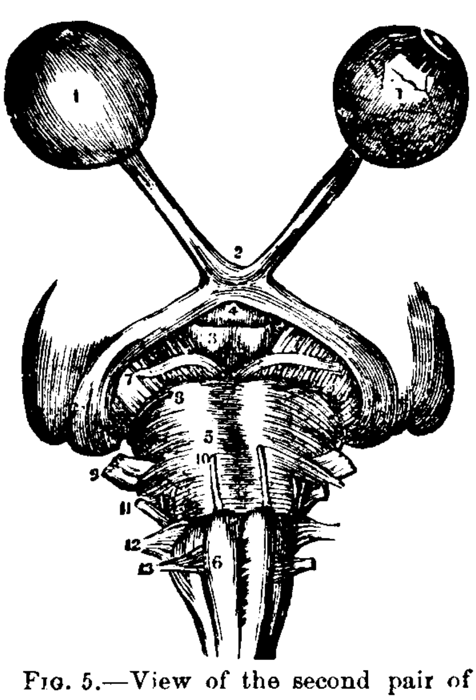


Fig. 5.—View of the second pair of optic nerves.

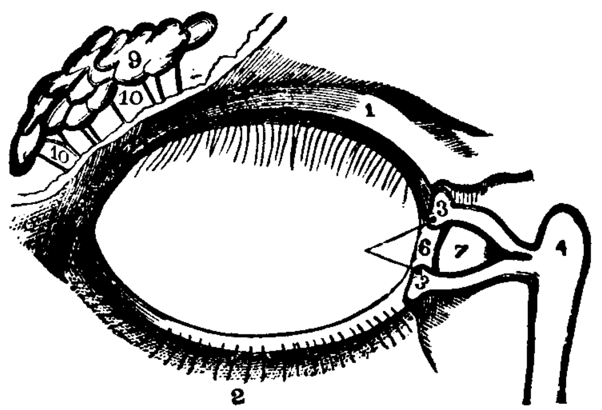


Fig. 6.—Lachrymal apparatus (eyelid sk'n has been removed).

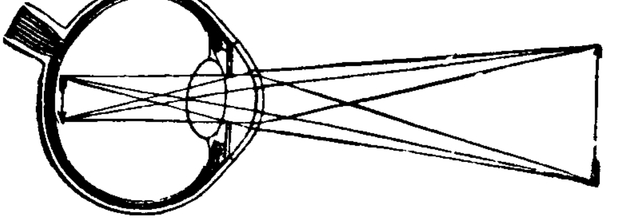


Fig. 7.—Formation of an image in the retina

THE EYE.

For an explanation of the illustrations see text on opposite page

DISEASES OF THE SCLEROTIC COAT.

Symptoms.—Inflammation of the sclerotic coat, or sclerotitis, is generally characterized by the intense, deep-seated pain it causes, and by the pink hue of the white of the eye produced. The chief varieties are the rheumatic and the syphilitic.

Treatment.—The treatment is to be more especially directed towards counteracting by general remedies the poisons of these two virulent constitutional affections.

IRITIS.

Character.—This is an inflammation of the iris, which may be simple or gouty, syphilitic or scrofulous.

Symptoms.—Its symptoms are intense pain in most cases, although in others little uneasiness is felt; change in color of the iris, contraction of the pupil, and impairment of vision. Inflammation of the iris has always possessed a great interest for physicians, because it is the only cavity lined by a serous membrane into which we have the privilege of looking and seeing what is going on when the membrane which forms its boundary is inflamed. Hence, the observation of a case of iritis is not only the most interesting, but also the most instructive, lesson in the sciences of pathology and therapeutics which nature ever vouchsafes to us, as we carefully watch the progress of the disease and the effects of medical treatment from day to day.

Treatment.—Since one of the greatest dangers of iritis is that the pupil will be drawn together by the whitish lymph infused in the inflammatory process, and, by being thus closed, shut off the sight, it is very important to keep this opening of the pupil as large as possible by the use of belladonna, or its active principle, atropia, throughout the attack of iritis. Besides this, general bleeding, or free leeching behind the ears, or on the nape of the neck, followed by repeated blistering, should be employed, and active purgatives with mercury to slight salivation contribute toward the cure. Opium by hypodermic injection to relieve the intense pain, and cool anodyne applications to the affected organ, are valuable palliatives.

RETINITIS.

Character.—This is an inflammation of the retina and seldom occurs alone. It may be due to Bright's disease, may result from a specific taint, or may be of the hemorrhagic variety. The last named condition is nearly always in the aged and is an occasional accident happening in cases where the kidneys are hard and shrunken.

Treatment.—The treatment is of course directed to the disease which causes this inflammation.

CHOROIDITIS.

Causes.—This is also usually in conjunction with systemic diseases, as tuberculosis, syphilis, rheumatism and gout. The suppurative variety may be due to a blow or may be carried from some distant suppurative process.

Treatment.—The treatment is directed to the cause and is mostly general.

AMAUROSIS OR GUTTA SERONA.

Character.—This is a disease of the retina, dependent upon various changes of the retinal surface and ending in an inability of the nervous expansion to receive and transmit visual impressions from the outside world to the brain.

Causes.—1. It may be produced by exposure of the eye for a longer or shorter period to a white, dazzling object like snow, and snow-blindness is the most familiar example of this affection.

2. It also occurs occasionally from accidents, such as lightning-stroke and blows on the head.

3. It may be due to degenerative changes in the retina following exhausting illness, or connected with sympathetic irritation.

4. Excessive use of tobacco sometimes produces it.

Treatment.—Where the cause of amaurosis can be discovered and removed, some hope of cure may be indulged, but ordinarily the melancholy fate of becoming permanently blind—as the poet Milton was rendered by this malady—awaits the patient. Of course, the earlier treatment is undertaken the better is the chance of arresting the malady before utter destruction of the sight is accomplished.

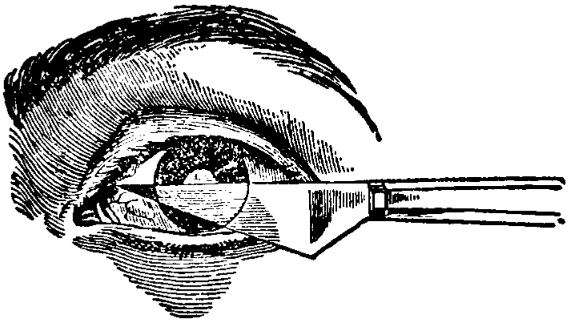
CATARACT.

Character.—This is an inappropriate but long-established term indicating an opacity of the crystalline lens of the eye. In cataract, the lens becomes white and opaque, first at some point on its surface, or in the capsular membrane which envelops the albumenoid substance of which the lens is composed. The opacity extends, until at length the whole of the lens may be involved, and blindness rendered complete.

Development of Cataract.—The development of cataract is usually slow in its progress, except in the case of diabetic cataract, or cataract from a punctured wound, which may form in a few days. The process of becoming totally opaque is called by surgeons the ripening of the cataract, and it is customary to wait for the cataractous change or ripening to be complete before any operation is attempted for its cure.

Causes.—Most frequently there is some change in the vascular system supplying the lens, and to this lack of nutrition is due. Senility, diabetes mellitus, convulsions, injury, exposure and privation are the causes.

Treatment.—No medical treatment, as yet discovered, is of any avail in the treatment of cataract, but the disease may be entirely remedied by the operation of extraction, which is illustrated in the accompanying figure. As there shown, a peculiar, wedge-shaped knife, called a cataract-knife, is used to cut an opening in the edge of the cornea, through which the opaque lens is carefully drawn out, and then the eye closed up and permitted to heal.



Operation for Cataract.

Restoration of Vision.—When successful, as this operation proves in the hands of skillful oculists nearly nine times out of ten, useful vision is restored, and by the aid of very thick spectacles, to substitute the lost crystalline lens, the patient is often enabled to read, write or sew, as well as before being attacked with this disease. This operation of extracting the cataract is generally the most successful with the common form, which occurs in old people, where the crystalline lens is not only opaque, but hardened into a sort of horny substance.

Treatment of Other Forms.—In some of the other varieties of cataract, such as that produced by wounds or other injuries, especially in young people, the treatment by breaking up the lens with a very delicate knife, about the size of a large needle, is resorted to with success. The old-fashioned operation for cataract by couching, or reclination of the opaque crystalline lens, is now generally abandoned, as being much less satisfactory in every way than the process of extraction.

Cataract Often Hereditary.—The tendency to the formation of cataract is often hereditary, but something can be done by hygienic care of the eyes to avert, or at least to postpone, its active development. Since it has been found that operatives who use their eyes opposite to a very strong light—such as glass-blowers—are particularly liable to cataract, it is advisable to avoid such exposure as much as possible.

Effect of Electric Lights.—Very probably electric lights may tend to promote the formation of cataract, unless guarded with special care. It is a curious fact, however, and one which at once disproves the fanciful theory that cataract is a disease of over-civilization and excessive study, that cataracts are frequently met with in animals, especially the horse, where the disease may often be seen in great perfection.

GLAUCOMA.

Symptoms.—This is a disease in which the most prominent symptom is an increase in the tension of the eyeball. By primary glaucoma we mean an increase in tension originating in the eye itself independent of any outside influence. Secondary glaucoma is the same condition due to an injury, some previous inflammatory process, or resulting from valvular heart disease, and so forth.

If the glaucoma is simple in character, the first symptom is partial loss of vision. In cases of inflammatory character pain may be the first feature to attract attention and may be much more severe at times.

Predisposing factors are heredity, excesses of various kinds, gouty or rheumatic tendencies.

Treatment.—Medical treatment is of value in some primary cases. Warm applications may ease the pain, or instillation of one-quarter to one per cent. solution of eserine. Operative measures of various kinds may be necessary from iridectomy to complete removal of the globe.

WEAK SIGHT OR ASTHENOPIA.

Weak or enfeebled sight, though a term in familiar use, is not easily defined as specially connected with any constant change in the eyeball.

Causes.—It may be due to an irritable condition of the retina, or to an impoverished state of the blood. More frequently, perhaps, it arises from a want of power to keep up the accommodation of the eye for distances, to nervous anxiety about the sight, or to the commencement of one of the serious organic diseases about the eyes and its appendages.

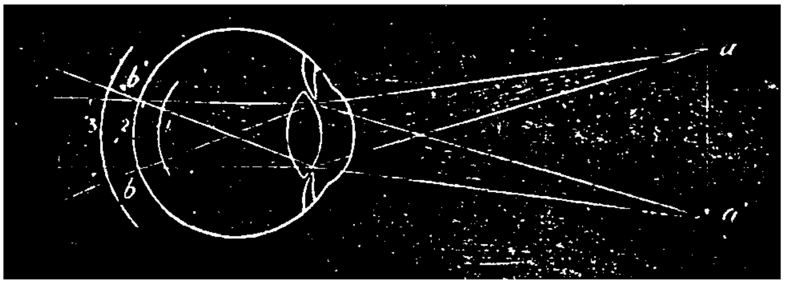
Treatment.—Except in the latter case, much can be done by treat-

30

ment, using general and local tonics, and by care of the eyes in the mode to be pointed out in the next article.

SHORT-SIGHT OR MYOPIA.

Character.—This is a very common condition of vision in which, from the greater convexity or improper position of the lenses of the eyeball, the focus of parallel rays of light does not fall upon the retina, but at some point in the vitreous humor. This error of development, as it often is, will be better comprehended by the aid of the annexed figure, in which is shown a diagram of the eyeball and the course of the rays of light, to form a clear and distinct image of the arrow, on the retina at *b, b*. If, however, the eyeball is elongated, so that the retina occupies the position of the line marked 3, as is often found to be the case in near-sighted persons, it is obvious that the rays of light will have passed their true focus,



The Error in Curvature of Lens.

and consequently when they reach the retina in this wrong position can only give a blurred and indistinct image of the object.

Remedy.—The remedy for myopia is the use of a concave glass, accurately adapted to the particular eye for which it is employed, and just strong enough to render the rays of light so divergent when they strike the cornea that they will be brought to an exact focus upon the misplaced retina, in its unnatural position, making in this way one error precisely counterbalance the other.

Application of the Remedy.—This remedy should by all means be applied even in early youth, in order to prevent the effort of accommodation, the straining of the eye to see as much as other children do at school and elsewhere, from not only increasing the myopia, but laying the foundation of more serious disease and ultimately, perhaps, destroying the sight.

Increase of Short-Sightedness.—The alarming increase of myopia, and especially its prevalence among young people of both sexes in city schools, must have caused many observant biologists to speculate as to the exact mechanism by which the unfavorable influences of our present civilization were at work so as to bring about this rapid deterioration of the visual organs in the last few generations of mankind.

Myopia Hereditary.—There is no doubt also that myopia is hereditary, and that according to the great law of "the extinction of the unfit," the children of myopic parents are predisposed to the development of this disease. Hence they will almost certainly suffer from it if they are exposed to conditions which would be apt to engender near-sightedness in healthy eyes, from any taint of hereditary tendency.

Preventive Measures.—Among the general conclusions arrived at by scientists for aiding in this object, so important to the rising generation, the following are worthy of especial notice:

1. In the first place, study-rooms should be well lighted during the day, and especially toward evening, because a feeble or badly-arranged light compels us to diminish the distance between the eye and the book whilst reading or writing.

2. Light should be allowed to enter from the left side. Illumination from the front is more or less dazzling, and obliges the pupils to bend forward too much, or to sit sidewise in constrained and fatiguing positions. Again, light coming from behind is entirely insufficient, because in great measure cut off by the head and upper part of the body of each scholar.

3. The windows of a school-room should be large and high, and be arranged along the left side of the apartment, so as to shed the light upon desks placed in rows, at right angles to the wall in which the windows are cut.

4. The light from above, furnished by a skylight, is not so good as that derived from lateral illumination. The light of lamps is recommended as being preferable to gas, and the gaslight shining through ground-glass globes is condemned as being particularly objectionable.

5. The inclination of the desk at which the pupil sits to read or write is a matter of no small importance. Desks which are horizontal, or only slightly inclined, favor the development of myopia, by compelling the scholar to bend the head over a good deal whilst reading or writing. Such a position brings on, as a result of mere weight of the blood, passive congestion of the head and eyes, and this in turn results in an intra-ocular tension, insensible, perhaps, when it first appears, but very marked in its effects when long and constantly continued.

Children's School Desks.—Besides, a child who acquires the habit of leaning forward in this manner is very apt to bend nearer and nearer his book, as the muscles of his back become fatigued, and thus, by straining his power of accommodation at short focus, promote the rapid development of myopia. The desks of school children should therefore be sharply inclined at an angle of 40 degrees or 45 degrees when used for reading, and their seats should not be too high, and should be furnished with comfortable backs.

6. Great care should be taken to secure school-books well printed in large, clear type; since those printed in small, indistinct letters, upon bad paper, with poor ink, as is the case with too many of the classics and the dictionaries in common use, necessitate a close approximation of the eyes to the page, and consequently exaggerated efforts at accommodation, favoring myopia. Furthermore, all punishments of school children which consist in depriving them of recreation or exercise out of doors, or in adding to their amount of study, and consequent employment of the visual apparatus, should be relinquished.

Faults of School Furniture.—The general principles which must be kept in view in the construction of seats and desks for school children, according to the investigation of Cohn and others, may be expressed as follows:

The faults of school furniture which give rise to injurious postures, and so conduce both to myopia and asthenopia, as well as to scoliosis or lateral curvature of the spine, are:

1. Want of, or unsuitable, backs.
2. Too great a distance between the seat and the desk.
3. Disproportion, generally too great a difference between the height of the seat and that of the desk.
4. Wrong form and slope of the desk.

Ideal School Desks.—Dr. Liebreich gives a very clear exposition of the way in which these defects cause the diseases already mentioned, and concludes with the subjoined recommendations, which he considers, however, less advantageous than what he calls the American plan of having the seat and desk made to every child's measure, or the Swiss system, where seven or more different sizes of seats and desks are manufactured to suit the different classes:

1. One and the same size and model desk should be used for children and grown-up persons of both sexes.

2. The adaptation to the height of each child should be effected by varying the height of the seat and the footboard.

3. The edge of the table is always to be in a perpendicular line above that of the seat.

4. No seat is to be without a back, and the top of this is always to be one inch lower than the edge of the table for boys, and one inch higher than the edge of the table for girls.

5. In all classes where the boys change places the height of the seat is to be regulated in proportion to the average height of the pupils.

6. In all girls' schools, in all those boys' schools where the children do not change places, in boarding schools, and in private schoolrooms, the seat of each child should be accurately regulated in proportion to its height.

Back Support, Etc.—The support for the back should incline only a few degrees from the perpendicular, and be so arranged as to press upon the spinal column just above the hips of the pupil. The breadth of the seat should be considerable, in order to support most of the thighs, and its height just such as to allow the feet to rest easily upon the footboard. The desk should be so arranged, by means of a hinged flap or otherwise, as to hold the book at an angle of 40 degrees or 45 degrees whilst reading, and the paper at an angle of 20 degrees whilst writing is being performed by the scholars.

ASTIGMATISM.

Definition.—This term is applied to a defect of sight due to a difference in the curves of the cornea and crystalline lens in different directions; that is to say, the cornea, for example, may be so curved in the direction of a horizontal line through it as to have a focus of one inch, and be so much less curved on a perpendicular line that its focus in that direction is an inch and a quarter. The result of this different refraction, in different meridians of the globe of the eye, is necessarily an indistinctness of vision, because all the rays of light entering the eye from a bright point are not brought precisely to a point again upon the retina as they should be.

Treatment.—This defect, which is found to be exceedingly common, especially in myopic eyes, can be very accurately corrected by the use of properly adjusted cylindrical glasses, which are so arranged as to distort the rays of light before they enter the eye just enough in a contrary direction to cause them to be brought to an exact focus by the imperfect cornea and crystalline lens of the astigmatic eye.

Use of Spectacles.—Spectacles giving this compensation ought to be procured and faithfully worn, not only because their use will tend to preserve the eyes, which would otherwise be apt to grow strained in the effort to make up for this defect by accommodating the lens, but also on account of the headache which is often the result of such constant effort to adapt the eye to clearer vision.

Day-Blindness.—Day-blindness is a term used to describe a disease in which the person affected can only see when the light is subdued, as in the twilight.

Night-Blindness.—Night-blindness, on the contrary, indicates a condition in which there is indistinctness of vision, except in a bright light.

Causes.—The causes of these two conditions are not very well understood, but night-blindness is known to chiefly affect those who have used their eyes too long and too steadily in a brilliant illumination or who have been exposed to intense or sparkling light.

Treatment.—Rest is the chief means of cure, but prevention of these diseases by the proper protection of the organs of vision by colored glasses, or by the mechanical appliances mentioned when speaking of light, is infinitely preferable.

DISEASES OF THE TEAR APPARATUS.

Character.—The lachrymal gland, which supplies the tears, and is situated at the upper and outer angle of the eye, is subject to inflammation and the usual structural changes which result from that process. The most common disease, however, connected with the lachrymal apparatus is obstruction of the lachrymal duct or tube, which runs from the inner corners of the eyelids down into the cavity of the nose, and conveys the tears into the nasal cavity, which, under ordinary circumstances, they merely serve to keep comfortably moist.

Causes.—This obstruction may result from inflammation of the lining membrane of the duct, caused, perhaps, by cold or brought about by acute or chronic inflammations of the nasal chambers. If neglected, abscess may result requiring surgical interference.

Treatment.—In its incipiency attention to the nasal passages and correction of the deformities and catarrhal condition there may suffice to effect a cure of the constriction of the duct. While acutely inflamed, anodyne lotions, as lead water and laudanum, cold or hot applications should be faithfully tried. When dilatation of the duct is demanded it should be continued until a cure is effected.

DISEASES OF THE EYELIDS

STYE OR HORDEOLUM.

A stye is a little boil at the edge of the lid.

Causes.—When styes recur, refractive errors should be at once suspected and corrected. Ill health favors a stye as it does boils in other localities. Uncleanliness is sometimes the cause.

Symptoms.—These are so well known that it is not necessary to go into them. Suffice it to say that when a yellow spot is discernible on the stye, it is ripe and should be opened.

Treatment.—To hasten the pointing of a stye, apply hot compresses for fifteen minutes every two hours. Tonics are indicated in the debilitated; glasses—properly fitted—should be worn, and a boric acid eyewash used until long after the stye has disappeared.

WILD HAIRS OR TRICHIASIS.

Dangers.—This is the name for that growing in of the eyelashes, commonly known as wild hairs in the eye. Even one of these hairs, by rubbing upon the sensitive cornea whenever the patient winks, may cause much irritation and even injury to the sight.

Treatment.—Temporary relief is afforded by pulling out the offending hairs with small tweezers, but often a surgical operation is necessary to accomplish a permanent cure.

SQUINTING OR STRABISMUS.

Character.—This disease is the commonest of the derangements of the eyeballs within their orbits. In it the eye is involuntarily drawn from its straight position to one or the other side, so that the natural and agreeable parallelism of its axis with that of its fellow is not maintained. When the eyes are turned in toward the nose, as is more commonly the case, the strabismus is called *convergent,* and when the squint is outward, it is spoken of as *divergent* strabismus.

Causes.—This defect is due either to shortening of one of the six little muscles by which the eyes are moved in their sockets, or to the spasmodic contraction of one of these muscles, or to paralysis of one of them and relative over-action of its natural opponent. Strabismus is in some cases an acquired affection, and may even result from the bad habit among children of imitating deformities of this kind. More frequently it appears to be the product of hereditary tendency. It may affect both eyes in the same person, and even in the same direction, and is then called double strabismus, or it may be confined to one eye, the other remaining perfectly healthy.

Treatment.—Something can be done in the treatment of this malady when it first commences in children who are not too young to wear spectacles by having these arranged with half pieces of black glass, so that the patient is compelled to look straight forward. But the simple operation of cutting through a part or the whole of the contracted muscle is in suitable cases the best remedy, and often, not always, proves perfectly successful in removing the deformity.

TRACHOMA (Granulated Eyelids).

Trachoma is a highly contagious disease which attacks the eyes. It is a granular conjunctivitis, characterized by small, sago-like elevations on the conjunctiva, followed by the lids adhering to the eyeball, ulcers form and the eyelids contract and are deformed, at the same time destroying the sight.

Persons of all ages suffer from this disease and school children are exposed to it in the mountainous districts of Kentucky and other States in the United States.

The disease is spread by the ignorant persons of pauper countries, where their habits are dirty. They usually know nothing of sanitation or hygiene. They live in large numbers in small huts or cabins, which are scarcely large enough for two people; all using the same towel and sleeping in the same bed with the one who suffers from the disease.

Prevention.—A child or adult suffering from trachoma must be isolated from the rest of the family, school children, etc. As these cases occur among the very poor they should receive treatment in a public institution. The State and Federal authorities can prevent its spread by appropriating money to fight the disease, by sending into the mountainous districts, physicians and nurses to treat and educate the people; erect suitable buildings to place the sufferers in until cured.

Every person with granulated eyelids or sore eyes should summon a physician, or report the trouble to the local board of health, as immediate attention to the trouble will prevent blindness and protect others. No case should be treated by home remedies. *Delay means blindness to you and others in the community.*

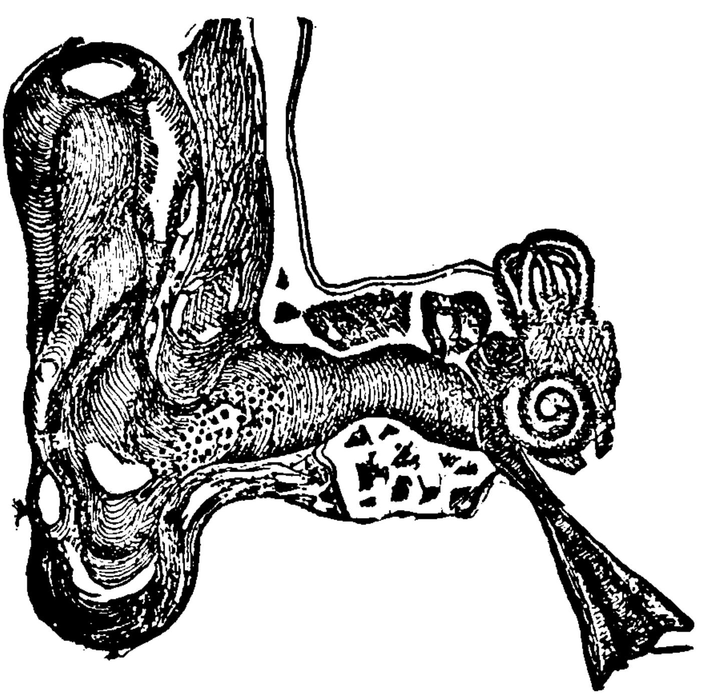
Do not use a towel that any one else uses if you have granulated lids. Do not go near any public place where people congregate. Do not use the family linen, etc.

Blindness spreads through ignorance of the individual, the State's and the National Government's indifference to the dangers of gonorrhœa and trachoma by not appropriating funds to fight them. The negligence of the sufferer from gonorrhœa, his shame and lack of treatment are reasons for blindness.

Educate your children in the danger of these diseases, watch their morals and have them treated when contaminated. Be free from disease before marriage.

DISEASES OF THE EAR.

Number of Diseases.—The number of diseases of the ear is twenty-four, but as a majority of them require for their recognition and effective treatment more or less peculiar and costly apparatus, only a few of the most important require notice in this chapter. For the understanding of these, however, a brief review of the anatomy of the ear is necessary.



Section of Right Ear.

Anatomy of the Ear.—The external ear, or auricle, as anatomists call it, is supposed by many people to be the chief part of the organ of hearing, but in reality the essential pieces lie inside the head, some, indeed, imbedded in the most solid bone of the skull, and one so hard that it has received the name of the *petrous* or rocky portion of the temporal bone.

Auditory Canal—Besides the auricle, which is all that portion of the ear projecting from the head, the external ear is considered by anatomists

THE EAR AND ORGANS OF HEARING

FIGURE No. 1.
1, 2, 3. The inner cavity open, showing the spiral lamina.
4, 5, 6. Rest of the cells of the inner cavity.
7, 8. Vestibule.
9, 10. Upper canal.
11, 12. Lower canal.
13. Outer canal.
14, 14. Semicircular membranous canal.
15,16,17. Acoustic or auditive nerve.

FIGURE No. 2.
1, 2. Origin and end of the helix.
3. Antihelix.
4. Antitragus.
5. Tragus.
6. Lobe of the outer part of the ear.
7. It points to the navicular pit, and is in front and over the wing.
8. Shell.
9. Outer auditive duct.

FIGURE No. 3.
1. Swelling of the upper semicircular canal.
2. Swelling of the outer canal.
3. Swelling of the lower canal.
4. Upper semicircular membranous canal.
5. Outer membranous canal.
6. Lower membranous canal.
7. Spaces between the semicircular membranous and bony canals, supposed to be filled with coatunni humor.
8. Common duct formed by the union of upper and lower membranous canals.
9. Place where the inner semicircular canal opens into the elliptical urn of the vestibule.
10. Elliptical urn which contains the:
11. Breschid otocones.
12. Spheric urn containing also some:
13. Otocones.
14,15,16,17,18. Expansions of the acoustic nerve to the membranous canal and the elliptical urn, and also the spheric.
19. Turns of the spiral lamina.
20. Ladder of tympanum.
21. Nervous expansion to the back swelling.
22. Vestibule ladder.
23. Modiolus.

FIGURE No. 4.
1. Thickness of outer covering of inner cavity.
2, 2. Vestibule ladder or upper cover of the spiral lamina.
3, 3. Tympanum ladder or lower cover.
4. Hook of the inner cavity.
5. Centre of the infundible.
6. Round opening communicating with the tympanum.
7. Thickness of the outer cover of the vestibule.
9. Oval opening.
10. Orifice of the aqueduct of the vestibule.
11. Lower semicircular canal.
12. Upper semicircular canal.
13. Outer semicircular canal.
14. Swelling of the lower canal.
15. Swelling of the upper canal.
16. Common orifices of upper and lower canals.
17. Swelling of the outer canal.

FIGURE No. 5.
1. Normal size. The other is much enlarged.
2. Zone of acoustic nerve.
3. Arrangement of filaments in the vesicular zone.
5. Membranous zone.
6. Bony texture of the modiolus.
7. Opening between the two ladders.

FIGURE No. 6.
1, 1. Zone of the acoustic nerve.
2, 2. Filaments of the same in the bony zone.
3, 3. Anastomosis in the vesicular zone.
4, 4. Membranous zone.
5, 5. Fold of outer edge.
6, 6. Axis of inner cavity.
7. The modiolus.
8, 8. Outer bony walls of the inner cavity.
9, 9. Bony layers of the spiral lamina.
10. Vestibule ladder.
12. Hook of the inner cavity.
13. Infundible.
14. Horse hair passed through the course of the spiral lamina.

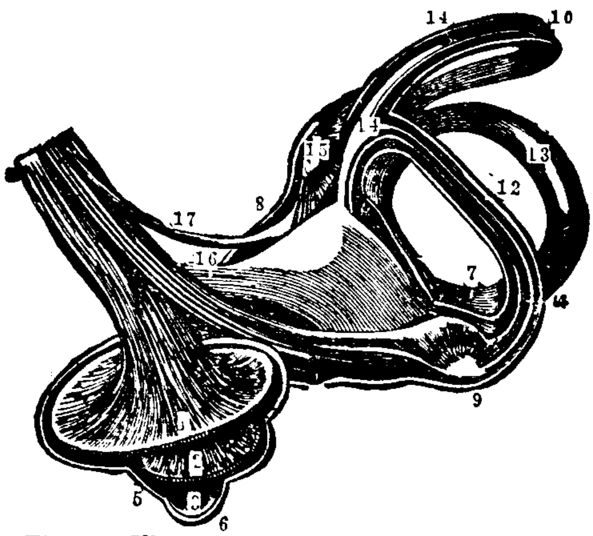


Fig. 1.—View of the labyrinth in a straight position, open to show the distribution of the nerves.

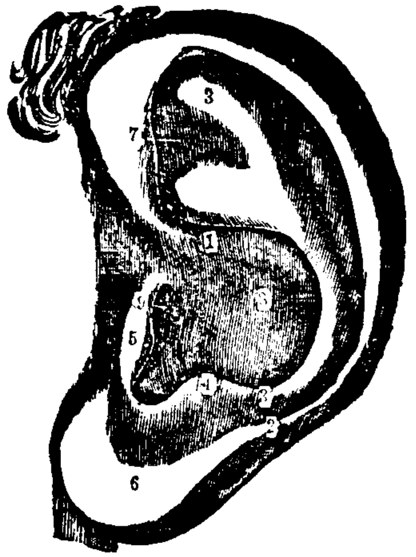


Fig. 2.—View of the left ear in its normal state.

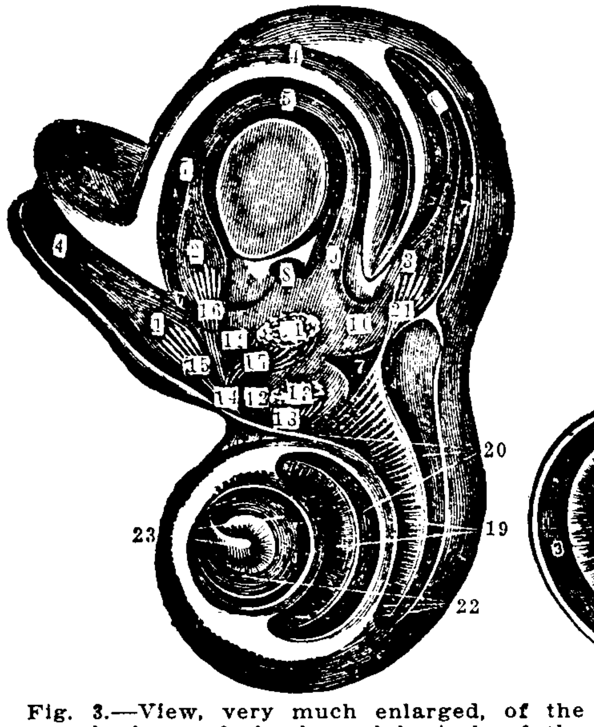


Fig. 3.—View, very much enlarged, of the external phase of the bony labyrinth of the left side, open, exposing the vestibule and its contents, etc.

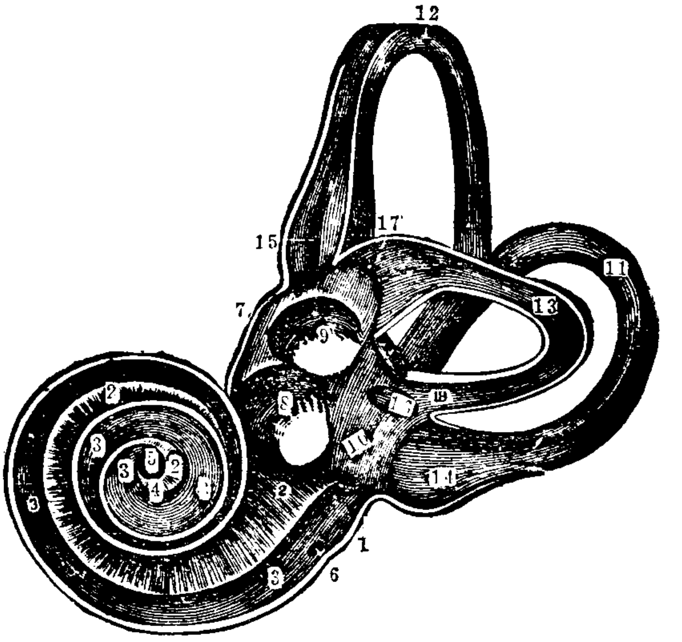


Fig. 4.—View of the labyrinth on the left side, open throughout, in order to show its structure—enlarged.

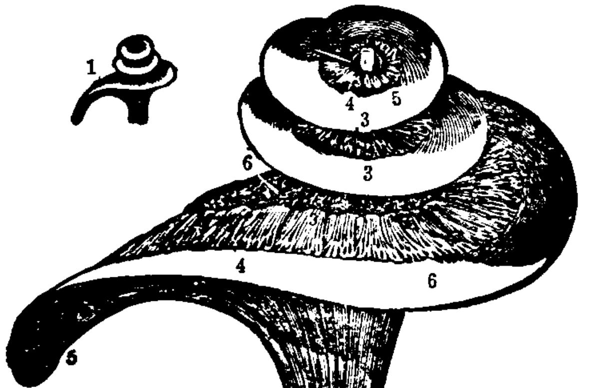


Fig. 5.—Figure or imaginary plan of the inner cavity of the ear.

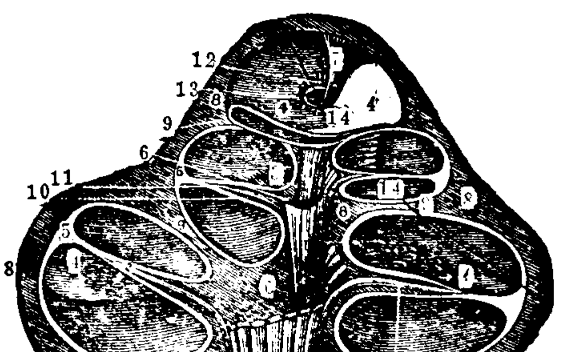


Fig. 6.—Vertical section of the inner cavity of the ear, very much enlarged, showing the arrangement and connection of the different parts.

THE EAR AND ORGANS OF HEARING

For an explanation of the illustrations see text on opposite page.

to include the auditory canal (a) or opening into the head, and the delicate tympanic membrane or drumhead (b), which is drawn across the auditory canal like a curtain, at a depth of about one inch and a quarter from the outside.

The Ear Drum.—The middle ear, as it has been named, called also the drum of the ear, is bounded outwardly by the tympanic membrane, and inwardly by the bony portion of the labyrinth or internal ear. It includes the Eustachian tube (c), which is a fleshy pipe, communicating through the head with the upper and back part of the throat, and it contains the ossicles or little bones of the ear (d, e, and f).

Ossicles or Little Bones.—The ossicles are three in number, and are named from their resemblance to the familiar objects after which they are called—the hammer (d), the anvil (e), and the stirrup (f). These remarkable little bones play a curiously elaborate part in the mechanism of hearing.

The Labyrinth.—The chief portions of the internal ear, or labyrinth, as it is often called, on account of its perplexing structure and function, are the cochlea or snail-shell (g), and the semicircular canals (h). The appearances of these are sufficiently indicated by their names, and their positions can be best understood by looking at the adjoining picture.

Use of the Auricle.—The object of the auricle in man is to collect the waves of sound, just as the broad mouth of an ear-trumpet does, and it seems to have no other duty in the process of hearing. In order to prevent, as far as possible, the entrance of insects with the sound-waves into the auditory canal, the exterior opening of this tube is guarded by stiff, coarse hairs.

Ear-Wax.—It is also generally covered with a sticky, bitter substance, the ear-wax, secreted by numerous ceruminous glands (i), apparently to stop, or disgust, any adventurous creatures which may attempt to make their way in toward the drum. This provision is highly necessary, because the tympanic membrane is so exceedingly sensitive that a very slight touch, even from the foot of a small insect, would cause intense pain.

Delicacy of the Drum.—On account of this great delicacy of the membrane of the drum, it is unsafe to put any hard object into the ear for the purpose of cleansing it. Hence, the corner of a towel is far better to wipe out the ear than an earpick or any other solid instrument.

Wax Plugs.—Sometimes a firm plug of wax accumulates in the external auditory canal, and causes deafness, which, however, can be entirely and immediately cured if the hardened wax is removed by syringing with warm water.

Foreign Objects in the Ear.—When children put beads, grains of corn, and so forth, into their ears, no attempt should be made to pick them out with hairpins or bodkins, lest, on the contrary, they be pushed further down the tube. It is much wiser to send for a physician, who is provided with suitable, delicate forceps for removing them without risk of such a serious addition to the original misfortune.

Insects in the Ear.—If an insect makes its way into a person's ear, notwithstanding nature's safeguards against such an accident, the patient should at once lie down on the opposite side and have the affected ear filled with olive oil, which will probably kill the creature and cause it to float up to the mouth of the auditory canal, where it can be picked out.

Office of Auditory Canal.—The office of the auditory canal is to convey sounds, after they have been collected by the auricle, to the drum-head, which is caused to vibrate just as that of a soldier's drum does when it is beaten, or rather as the sounding-board of a piano does when the keys are struck. The vibrations thus produced are transmitted along the chain of ossicles, that is to say, the handle of the malleus or hammer, being fastened to the tympanic membrane, moves with it. In thus moving it tilts the incus or anvil slightly over, and this motion of the anvil in its turn causes a slight oscillation of the stapes or stirrup.

The Stirrup.—But the stirrup is fastened by its foot-plate to the membrane covering a little hole in the bony wall of the labyrinth, called the oval window, so that any vibration of the drum-head or tympanic membrane is carried along over this chain, or bridge of bones, to the covering of the oval window. Behind this latter membrane the whole labyrinth is filled with a watery fluid, which bathes the terminations of the auditory nerve in the cochlea.

The Semicircular Canals.—The exact use of the semicircular canals is not understood, but there is little doubt that the fine hairs proceeding from cells found in the cochlea are thrown into vibrations by undulations transmitted from the membrane of the oval window through the fluid contained in the cavities of the labyrinth. Then these vibrations of sound are perceived by the delicate nerve-fibres, in which auditory nerve terminates, very much as the undulations which constitute light and color are perceived by the filaments of the optic nerve, where they terminate in the rods and cones of the retina. Obviously, with such a complicated and excessively delicate mechanism for carrying on the process of hearing, the wonder is, not that few people hear imperfectly, but that everybody is not as deaf to all sound as the world has been in previous ages to the teachings of hygiene.

DISEASES OF THE AURICLE OF THE EAR.

Ear Tumors.—This outer part of the ear is the occasional seat of gouty and other deposits, which give rise to prominences and irregularities of its surface; it may also be affected with a kind of vascular tumor called hæmatoma, and still more frequently be the seat of benignant and malignant or cancerous tumors, and of various malformations.

Sizes of the Ear.—In persons of slight and delicate organizations, with a scanty stock of vitality, the outer ear is often exceedingly small, although it may be perfectly shaped. In persons of large build and actively circulating blood, the auricle is sometimes relatively large, the lower lobe being pendulous and of exaggerated development.

What Large Lobes Indicate.—As a rule, a large lobe of the ear indicates a free vascular supply of blood to the brain, and is said to be to some extent a sign of epilepsy, and of other kindred nervous diseases.

Danger from Earrings.—If people choose to run the risk of suffering from the dangerous little tumors which are sometimes caused by the barbarism of wearing earrings, they should be very careful to diminish the chance of injury as much as possible by having the auricle pierced with a clean, bright instrument, and by preventing the cartilage, which sometimes comes quite low down in the lobe of the ear, from being wounded.

Boxing and Pulling Ears.—Children should never be punished by "boxing" or pulling the ears. The former piece of brutality might instantly burst the tympanic membrane, causing deafness for life, and the latter is liable to originate severe inflammation of the auricle, leading to the same unfortunate result.

ECZEMA OF THE AURICLE.

Symptoms.—The symptoms of this affection are the same as of acute eczema and the reader is referred to the article on that subject. There is also a chronic form in which the skin is thickened and crusts are formed.

Causes.—1. Detention, when it is due to nerve-irritation.

2. Discharges from the ear which irritate the auricle.

3. Hoods by pressing the auricle against the side of the head and preventing the evaporation of the perspiration.

4. A chronic form sometimes found in old people is due, likely, to a weakened "tone" of the tissues.

Treatment.—The treatment is the same as in eczema of other parts of the body. Where it is possible, the cause should be removed. Cleanliness is essential, but water is contra-indicated and the crusts should be removed by olive oil. The ammoniated mercury ointment, which is official and to be had at all drug stores, should be applied twice daily after thorough cleansing. Cod-liver oil and iron are often used as internal remedies.

HEMATOMA OF THE AURICLE.

Definition.—This is a swelling of the auricle in which there is an infusion of blood between the cartilage of the auricle and the perichondrium. It is frequently caused by traumatism and often occurs in the insane.

Symptoms.—The symptoms are swelling and slight pain.

Treatment.—Gruber recommends, if the blood is coagulated, incising the tumor and removing the clot. Painting with tincture of iodine is advised for the thickening. Cold or warm applications may be tried to relieve the pain.

MASTOIDITIS.

This is an inflammation with pus filling up the porous portion of the mastoid bone back of the ear. It may be primary or secondary, though the latter is seldom observed. Among the predisposing causes are inflammation of the middle ear, exanthematous diseases, la grippe, tuberculosis, syphilis and pathogenic infections. There are instances on record where it has existed for months without subjective or objective signs, but as a rule it characteristically manifests itself at an early stage.

Symptoms.—The symptoms of acute or primary mastoiditis are heat, redness and swelling of the skin behind the auricle, and tenderness upon pressure. This primary disease usually terminates in three or four days in recovery or else in an involvement of the deeper structures with the formation of an abscess.

In the secondary form the symptoms vary in different individuals, manifesting themselves before or after spontaneous rupture of the drum. Tenderness, persistent or remittent pain and redness with swelling over the mastoid and bulging of the superior and posterior auditory canal, are the most prominent symptoms. The temperature varies from normal to 104 degrees F. and is much higher in infants as a rule than in adults. If the case be observed before rupture the drum will be seen bulging in the posterior and superior portions. After the rupture of the drum the discharge from the ear is usually profuse.

TREATMENT.—The treatment of mastoiditis is divided into medical and surgical—by medical in this instance being meant minor surgical methods and the application of antiphlogistic remedies. When early observed effort should be made to abort acute inflammation of the mastoid by cold application by use of the Leiter coil or cracked ice bags. This should be continued for twenty-four hours without interruption. The patient should be absolutely confined to bed and given light diet and gentle purgative. If the pain and inflammation continue after forty-eight hours an operation will in most cases be necessary. To relieve elevation of temperature, acetanilid in five-grain doses may be repeated hourly until fifteen grains have been taken.

Mastoiditis is of such serious character and is liable to such complications that if it be suspected the best medical advice obtainable should be secured without delay, for none but an expert can properly care for the sufferer from this disease and know just whether an operation be necessary or not.

DISEASES AND AFFECTIONS OF THE AUDITORY CANAL

BOILS OR FURUNCULOSIS.

Character.—This is one of the most painful maladies that flesh is heir to. It is rendered so frightfully painful by the fact that it is shut in between a layer of strong cartilage and solid bone. Probably the most common cause of abscess in the ear is taking cold, although picking the ears with hard, sharp instruments sometimes seems to excite it. As it is impossible to tell which side of the auditory canal the abscess is going to form, early in the case, lancing must be deferred.

Treatment.—As a rule, all that can be afforded in the way of relief is gained by hot poultices made out of ground flaxseed, bread and milk, or little bags of hops dipped in hot vinegar and changed very frequently, or as soon as they grow cool. As soon as the abscess is well localized it should be opened by a physician, thereby relieving the patient of a great deal of suffering. In the meantime some respite and sleep may be obtained by the use of opium suppositories containing one grain each used every four hours, or hypodermic injections of one-eighth to one-half of a grain of morphia.

BONY TUMOR OR EXOSTOSIS.

Causes.—An exostosis or bony tumor occasionally springs from the walls of the auditory canal, pushing the mucous lining before it, and filling up part or all the calibre of the tube. It is most frequently met with in people of a rheumatic or gouty tendency. Until chiseled away it is sometimes very painful and a serious obstacle to hearing.

WAX OR IMPACTED CERUMEN.

Causes.—This is the name given to that condition in which the canal is partially or completely filled with ear-wax. The wax may be very hard and may be mixed with dirt and dust. It is caused sometimes by the shape of the canal, and on the other hand is often due to one's occupation.

Symptoms.—Deafness, dizziness and buzzing in the ear are frequently complained of, but to make sure that impacted wax is present it should be seen. It appears as a dark mass in the canal.

Treatment.—If the wax is soft, it may be removed by repeated syringings with warm water. If it is hard, the canal should be filled with warm olive oil and then the syringing tried. An instrument of any kind should never be introduced into the canal for its removal by the unskilled hand.

FOREIGN BODIES IN THE EAR.

Symptoms.—Inanimate foreign bodies, such as beads, buttons, grains of corn, etc., give rise to the same symptoms as impacted wax. In the case of grains, water tends to swell them and so makes their removal more difficult. In such cases the surgeon should be called upon.

Use of Syringe.—Insects occasion great pain which may simulate intense neuralgia, or, by a reflex action, may refer the pain to the teeth and so lead one astray. The syringe should be used and heated water is very grateful to the patient, soothing the inflamed part. Great care is necessary that the water is not hot enough to do injury.

DISEASES OF THE TYMPANIC MEMBRANE OF THE EAR

EARACHE.

Character.—Inflammation of the drum-head is an acutely painful affection, sometimes attended with fainting fits in its early stages, and usually resulting in deafness because the membrane is left thickened, and therefore incapable of properly responding to the vibrations of sound.

Treatment.—Leeching, followed by blisters behind the ear, or on the nape of the neck and opium internally or hypodermically, to mitigate the suffering, which is often very severe, will prove of great value. Hot applications to the ear in the shape of bags of hops, a stove lid wrapped in flannel, or the hot-water bottle may be sufficient to give relief.

Treatment of Children.—In young children a hot foot bath will relieve by dilating the small blood-vessels of the lower extremities and so drawing some of the blood from the inflamed area. As hot water as can be borne may be dropped into the ear. A two per cent. solution of cocaine will generally relieve the pain.

PERFORATION OF THE TYMPANIC MEMBRANE.

Causes.—This is especially liable to occur during the course of scarlet fever from suppuration of the middle ear, and if neglected leads to permanent deafness. Hence, in scarlatina, the ears of a child should be carefully examined daily with the little conical ear-speculum, if there is the slightest complaint of pain in them, in order to prevent this disaster by early puncture of the drum-head, which allows the escape of the imprisoned pus, and so saves the organ of hearing. Still, when the perforation remains in the drum-head the auditory sense is often only slightly impaired.

Treatment.—Suppurating or running ears need, above all things, that cleanliness should be maintained as much as possible. If pus remains in the middle ear, a chronic inflammation is kept up and normal tissue is destroyed—eaten away as one might say. Hearing becomes more and more difficult and life is constantly in jeopardy, for the bone may become affected and the brain finally exposed to infection and a brain-abscess develop. Cleanliness may be maintained usually by washing out the ear with a hot solution of carbolic acid two or three times daily. A two per cent. strength is sufficient. If this fails to cure the ear, which would be evidenced by a cessation of all symptoms, especially pain and discharge, a specialist should be at once consulted. Dead or necrosed bone may be present, or granulation tissue—"proud flesh,"—and should be removed as soon as possible.

Thickening of Tympanum.—Thickening and condensation of the tympanic membrane are liable to occur in advanced life, the delicate skin forming the drum-head undergoing a slow process of change, by which it loses its elasticity and becomes firm and hard almost like the nail of the finger. Of course, in this condition the vibrations into which it should naturally be thrown are rendered very imperfect, and the hearing is correspondingly defective in old people who are the subjects of this degeneration.

DISEASES OF THE EUSTACHIAN TUBE.

Causes.—The Eustachian tube is liable to inflammation from extension of disease from the throat, even such a simple irritation as that of a common cold. It is also subject to obstruction and contraction, so that the air cannot pass freely through it into the cavity of the tympanum, as it should do in health. When this takes place, the vibration of the drum is interfered with, there is pressure within the cavity, and consequently a sense of fullness and deafness is experienced, which is very oppressive.

Treatment.—This distressing condition can often be greatly relieved by calling in a skillful aurist, who may pass a probe or hollow tube along the Eustachian canal into the middle ear, and so restore the communication of the latter with the external air.

Diseases of the Middle Ear.—Diseases of the middle ear and of the internal ear comprise inflammation, ulceration and abscess. All these are very painful, difficult to recognize with certainty, and, as a rule, beyond the power of any but the most skillful treatment. In every case an experienced aurist should therefore be immediately called in, and until he arrives the severity of the pain may, perhaps, be held in check by some of the means suggested when speaking of abscess of the auditory canal.

DISEASES OF THE NOSE.

Anatomy of the Nose.—The organ of the sense of smell is much more extensive than people who have never studied anatomy imagine. Instead of being merely a triangular projection of some two or three inches long, and an inch or an inch and a half high, occupying the middle of the face it is a large double cavity reaching far back into the head, and communicating by the posterior nares or hinder nostrils with the upper part of the throat. The external portion of the nose is composed at its upper third of small bones, which are continued at its lower part by plates of cartilage.

Nose Bones and Cartilages.—These cartilages and bones are covered on the outside with a thin skin, and on the inside with a mucous membrane, which in the deeper recesses of the cavity is identical and continuous with that of the mouth and throat. The external division between the two nostrils is carried upward and backward by a flat, very thin bone named the vomer; and the sides of the two cavities, which are continuous with the exterior nostrils, are partly filled up with soft, spongy processes of bone, three of which are called the turbinated bones, because they are rolled up like a scroll.

The Mucous Membrane.—These turbinated bones are covered, like the rest of the nasal cavities, with a mucous membrane, named the Schneiderian membrane, richly supplied with blood-vessels, which approach very near its soft and delicate surface. It is from these small, but active, little blood-vessels that the hemorrhage usually comes in bleeding from the nose.

The Olfactory Nerves.—The nerves of smelling, called the olfactory nerves, enter the upper part of the nose through openings in the sieve-like bone, which forms the roof of the nasal fossa. After passing into the nose, these olfactory nerves divide up into a great number of tiny branches, which run along under the surface of the Schneiderian membrane, and are spread out upon the superior and middle turbinate bones, and on the sides of the partition between the two nasal cavities. The great use of the turbinated bones and processes is to furnish a large extent of surface upon which these branches of the olfactory nerve can be expanded.

Functions of the Olfactories.—And this spreading out of the olfactory nerve is evidently in order that the sensitive filaments may, on occasion, come in contact with as large a number as possible of the exceedingly minute, odorous particles which many substances, such as musk or camphor, are constantly giving off in such abundance.

How We Smell.—These odorous particles have the power of affecting the terminal filaments of the olfactory nerves in different ways, which we recognize as the agreeable or disagreeable odors of the objects from which they originate. The excessive minuteness of such particles may be comprehended from the fact that the apartment of the Empress Josephine in one of the French Imperial palaces was found, after twenty-four years of disuse, to give off a distinct odor of the musk employed by that unfortunate lady when she occupied it.

Uses of the Sense of Smell.—The power of distinguishing odors, which to some animals, including all those beasts which pursue their prey by scent, is one of the most vitally important, chiefly serves as a means of gratification or its opposite to human beings.

Hygienic Office of Smell.—But although the sense of smell does not in civilized communities contribute anything toward sustaining life by helping us to secure food, it has a very useful hygienic office, which should never be forgotten, in guarding us against some of the most common and dangerous causes of disease, in foul air and polluted water.

Nose as a Warming Organ.—Besides this the nose has an important work to do in warming and, to some extent, purifying the air we breathe, as that air is drawn through the narrow and winding passages among the turbinated bones. The Schneiderian membrane over which this air passes being generally moist, and more or less covered with adhesive mucus, helps to catch not only the odorous particles, but larger and more hurtful impurities, and so is quite mechanically a valuable protector to human health.

NOSE BLEED OR EPISTAXIS.

Causes.—Nose bleed may be due to a blow, picking the nose, the presence of a foreign body in the nose, or to the use of instruments in the nose. Diseased conditions within the nose often occasion it. In girls it may replace the natural menstruation. Diseases of the heart, liver and kidneys may give rise to it.

Treatment.—In cases of slight bleeding, pressure or the snuffing of ice-water may suffice. If these fail, cotton dipped in a one to ten thousand solution of adrenalin, should be packed into the nostril and kept there for ten or fifteen minutes. Iron, tannic acid and alum—the remedies our grandmothers used—are now supplanted by this modern drug which does not irritate the delicate lining of the nose as the old remedies did. If the adrenalin solution does not check the hemorrhage, it may be necessary for the physician to plug up both the anterior and posterior nostrils by the aid of an ingenious little instrument which has been devised for that purpose.

NASAL CATARRH.

Forms and Causes.—"Catarrh" is a word derived from the Greek word *katarheo,* meaning to flow down, and is used in medicine to designate a particular form of inflammation of the mucous membrane. It has many forms and is due to many causes, and no one has ever found nor ever will find one remedy for catarrh. This truth should be better and more generally known by the intelligent public.

Causes.—As causes of catarrh may be mentioned:

1. Climatic influences. Many patients lose their catarrh when they change from one climate to another.

2. Inherited predisposition. One cannot inherit catarrh, but the weakness of the mucous tissues may be inherited and so predispose to the affection.

3. Indigestion, constipation, intestinal parasites (worms), heart, lung, liver and kidney diseases are often provocative of a catarrhal state of the nasal mucous membrane.

4. Many fevers at their beginning or during their course are accompanied by acute catarrhal disturbance. Typhoid fever, measles, and scarlatina are examples.

5. Deformity within the nasal chambers is one of the most frequent factors, and local remedies are of no avail as far as a permanent cure is concerned. In these cases the only sensible treatment is the correction of the deformities, thus bringing the organ into a condition as near the normal as possible.

Catarrh as the Cause of Tuberculosis.—There is a general belief that catarrh is to blame for the great majority of the cases of consumption. This needs some modification before it is to be accepted. Surroundings, family predisposition, climate, and weak, non-resisting tissues are as much to be blamed for the occurrence of this terrible malady. Catarrh does, however, play some part as a factor.

Liability of Infection.—Professor Osler, of Johns Hopkins University, says on this subject: "The liability of infection in the cervical and bronchial glands in children is probably associated with the common occurrence of catarrhal processes in the throat and bronchi." This means that neglect of catarrhal conditions in a child makes that child more likely to be infected with tuberculosis, and if the family has a history of tuberculosis there is all the more reason for thoroughness of treatment of the existing catarrhal condition.

FETID CATARRH OR OZENA.

Character.—This is a term applied to a form of catarrh characterized by a horrible and peculiar stench and the formation in the nose of crusts of dried secretions upon which the fetor depends.

Causes.—In some cases it is due to a constitutional disease, as syphilis. In the majority of instances, however, it is the continuation of a catarrhal inflammation, in which the mucous membrane shrinks—atrophies—and the secretions therefrom are changed, becoming more tenacious and concentrated.

Symptoms.—These are the crusts and the peculiar fetor mentioned above.

Treatment.—Cleanliness is the great *sine qua non*—a fact easily remembered when one realizes that the fetor is from the decomposing crust. To detach the crusts various washes have been prescribed. A solution of bicarbonate of soda is a good solvent and may be prescribed as follows:

R.—Bicarbonate of soda .... 2 ounces
Common table salt .... 1 ounce
Menthol .... 4 grains
Mix. Directions: Half a teaspoonful in a cup of warm water, snuffed up the nose until the nostrils are clear. Use twice daily.

Or,

R.—Bicarbonate of soda .... 2 ounces
Biborate of soda .... ½ ounce
Salicylic acid .... 1 drachm
Menthol .... 4 grains
Mix. Directions: Same as for preceding prescription.

Or,

R.—Liquor antiseptic alka. .... 6 ounces
Use freely night and morning with an atomizer.

Or,

R.—Dobell's Solution.
Dilute with three or four parts of warm water and use as a nose wash.

Steam Inhalations.—If these washes are not effectual in removing the crusts, steam or hot vapor inhalations may be tried. In obstinate cases it is often necessary to remove the crusts with some force, either with cotton on a probe or with forceps. After the crusts are gotten rid of, antiseptics and deodorizants should be employed. Weak solutions of potassium permanganate, bichloride of mercury, and when the patient can stand the pain, a one-half to a one per cent. solution of formaldehyde.

Removal of Dead Bone.—When the fetor is due to dead bone, the dead bone should be at once removed.

Treatment of Syphilitic Catarrh.—If a syphilitic taint, either inherited or acquired, is the foundation of the odor, proper constitutional treatment should be instituted at once and maintained until long after the nasal symptoms have disappeared.

GRAPE-LIKE TUMORS OR NASAL POLYPS.

Causes.—Nasal polyps are grape-like tumors which are dependent from the upper and outer wall of the nose—on the inside—and are supposed to be one of the possible results of chronic inflammation of the lining mucous membrane. They are rarely seen before the fifteenth year.

Symptoms.—When small they may present no symptoms. If they are large they may cause obstruction to the respiration, pervert the nasal secretions, cause headaches, give a nasal twang to the voice, and, in some cases, undoubtedly provoke asthmatic attacks.

Treatment.—The treatment is removal, which may be accomplished by twisting the tumor free from its attachment, by cutting it at its base, or preferably by using a wire snare.

ACNE ROSACEA.

Nature.—This is a skin disease affecting usually the skin-covering of the nose, is chronic, and is characterized by redness, thickening of the skin, and more or less acne.

Causes.—These are various. According to Prof. Van Harlingen, "in early life it is generally due to anemia and debility, nervous prostration or dyspepsia. In later life the use of spirituous liquors is often the cause, and, perhaps nearly as often, dyspepsia in some of its forms." In women, disturbances of the menstrual function, even pregnancy, may act as a causative factor.

Treatment.—To be successful persistence in treatment is often necessary. The first thing to be done is to remove the cause. "Uterine and menstrual derangements are to be looked after, the stomach and bowels kept in good order, and all hygienic measures used to improve the general health. Alcoholic and malt liquors are to be totally eschewed. Tea and coffee should be drunk in moderation and not strong. Inveterate tea drinkers are very apt to have red noses."

The Favorite Drug.—The favorite drug both for internal and external use in this disease is ichthyol. Internally it may be administered in peppermint water, equal parts of each, ten drops being the dose and given every four to six hours. Locally it may be used as an ointment or as a paint:

R.—Ichthyol	1 drachm
Subnitrate of bismuth	1 drachm
Ammoniated mercury	1 drachm
Vaseline	10 drachms

Mix. Apply freely before retiring. (Dr. Latoir.)

R.—Ichthyol	1 ounce
Oil of eucalyptus	10 drops
Oil of bergampt	5 drops

Mix. Paint on at night; wash off in morning with soap and warm water; then apply dusting powder. (Merk.)

Vleminck's solution is recommended by Stelwagon, diluted one to ten parts of water. The formula for the strong solution is:

R.—Calcis	½ ounce
Sublimed sulphur	1 ounce
Water	10 ounces

Boil down to six ounces and filter. Apply locally three or four times a day.

ADENOID GROWTHS.

These growths resemble proud flesh. They grow in the back part of the nostrils, and are generally due to catarrhal conditions. They block the nose passages, producing snoring and difficult breathing. The treatment consists in scraping them away with a scoop, or even with the finger, to the great relief of the patient.

WARTS ON THE NOSE.

Treatment.—Warts in this locality are often mistaken by the laity for cancer and afford the charlatan and the advertising doctor an opportunity to make "cures" of this greatly feared disease. Warts in this locality are treated just as in other parts of the body.

PART V OF BOOK IV

Tells of the circulatory and absorbent systems of the body and the affections to which they are subiect.

ILLUSTRATIONS

CURATIVE MEDICINE

PART V.

DISEASES OF THE CIRCULATORY AND ABSORBENT SYSTEMS

New Medical Views.—Affections of this class were, until recently, supposed to present symptoms of very much the same general character, and therefore to constitute a class of maladies which possessed considerable unity in their intrinsic nature. They are now, however, found to consist of a variety of distinct affections producing very different and sometimes opposite symptoms. Thus hypertrophy produces increased and dilatation diminished force of the circulation. In order, therefore, to appreciate the value and familiarize ourselves with the nature of each class of symptoms, it is necessary to study the several affections in an isolated form. We are thus enabled, on meeting with a compound case—one consisting of a complication of several of the simple affections—to analyze or unravel the symptoms, ascertain the relative importance of each class, and in this manner establish rational and secure principles of treatment. In conformity with this view, the various articles on the diseases of the circulatory and absorbent systems, instead of being assembled under the present head, are, for facility of reference, diffused alphabetically throughout the work.

ACTION OF THE HEART.

Hearing the Heart-Beats.—If we apply the ear, with or without the stethoscope, to the cardiac region of a person in health, we perceive most distinctly a series of sounds of a very marked and peculiar kind, subdivided into uniform parts by a brief interval of silence after every second sound. Two sounds follow each other instantly, or within so short a space that the ear separates them rather by difference in their quality than from the intervention of any notable cessation of sound; then ensues a brief but well-marked pause, which is again succeeded by the first of the time sounds. This series of sounds may be perfectly well represented, as to rhythm, by musicial notation. The relative duration of the sounds and pause is represented by Lawrence to be nearly as follows: the whole being divided into four parts, two of these are occupied by the first sound, and one by the second sound and the pause respectively.

Difference in the Sounds.—The two sounds differ in kind as well as in duration. The first is nearly double the length of the second, of a graver and more subdued tone, rather louder at its commencement than at its termination, as if it was about to die away, when suddenly interrupted by the second. The second is brief, smart and clear, like a gentle tap with the pulp of the finger on a solid table, or like the sharp sound produced by the pulling back of a valve, the cracking of a whip, or the lapping of a dog. Exactly synchronous with the first sound, there is perceptible, in most cases, a well-marked impulse or shock communicated evidently by a body in motion within, in the walls of the chest. Every one acquainted with anatomy and physiology will at once conclude that the sounds and impulse just described are produced by the motions of the heart; and this conclusion will be justified and confirmed by an examination of the pulse in the extremities. It will be found, in all healthy subjects, that there is an invariable connection between the sounds and the pulse; every stroke of the latter corresponding very accurately with every repetition of the twin sounds; as, under every variation of circumstances as to loudness, frequency, and so forth, the same exact relation is perceived, it cannot be doubted that there exists an essential physical connection between the causes of the sounds and the pulse.

Rhythm of the Heart.—The first motion of the heart which interrupts the interval of repose is the auricular systole. It is a very slight and brief contractile movement, more considerable in the auricular appendix than elsewhere, and propagated with a rapid vermicular motion toward the ventricle, in the systole of which it terminates rather by continuity of action than by the sucession of a new movement. The ventricular systole commences suddenly and is accompanied with a considerable diminution of the volume of the organ. Synchronous with the systole are the first sounds—the impulse of the apex against the ribs and the pulse in vessels near the heart; in the radials the pulse follows at a barely appreciable interval.

The Diastole Motion.—The systole of the ventricles is followed by their diastole, during which they return, by an instantaneous expansive movement, sensible to the touch and sight, to the same state (with respect to size, shape, position, and so forth), as during the previous interval of repose. This movement, or diastole, is accompanied by the second sound, by an influx of blood from the auricle, by a retractile motion of this cavity most observable at its sinus, and by a retrocession of the apex of the heart from the walls of the chest. Next succeeds the intervals of repose, during which the ventricles remain at rest, in a state of fullness though not of distension, through the whole period intervening between the second and the first sounds; but the auricle remains at rest during the first portion only of the period, the remainder being occupied by its next contraction, with which recommences the series of actions described.

1. The ventricular systole occupies half the time of a whole beat.
2. The ventricular diastole occupies one-fourth or one-third.
3. The interval of ventricular repose occupies one-fourth, or rather less, during the latter half of which the auricular systole takes place.

Causes of the Motions.—The auricles, which are always in a state of fullness, arrive, during the first half of the period of ventricular repose, at the state of distension, by which they are stimulated to contract. The object of the contraction at this movement is to propel a small additional quantity of blood into the ventricles for the purpose of bringing them from the state of fullness to that of distension; an object which could not be accomplished without a contraction, as the blood could not otherwise force its way into the ventricles against the resistance offered by their elasticity. The cavities, then, being brought to the state of distension, are by this stimulated to contract; they expel a greater or less proportion of their contents; in small animals—frogs, for instance—they expel the whole; which is proved by the ventricle being full. In larger animals they do not appear to expel the whole, but the fact does not admit of demonstration. During the act of expulsion, the apex is tilted up, in consequence of the retraction of the ventricles toward the base and upon the auricles, which, in a state of extreme distension, are placed like a fulcrum beneath them.

Causes of Diastole Motion.—The diastole appears to be occasioned by several concurrent causes, viz.:

1. That power of the muscle by which it reverts from the state of contraction to that of relaxation, and in virtue of which it exercises a degree of motion. It may be called elasticity.

2. The distension of the auricles, which is greater at this moment than at any other, as they have been filling during a longer period; namely—that of the ventricular contraction, or half a whole beat.

3. The weight of the ventricles collapsing on the distended auricles underneath them.

4. The width of the auricular-ventricular orifice, which allows the blood to shoot in instantaneously and with great facility.

It is obvious that, as so many powerful causes conspire to promote the influx of the blood, an auricular contraction for this purpose would be superfluous. The escape of blood from the auricles during the diastole causes the slight retraction observable in them at the same moment. The expelled blood being instantly replaced from the vena cava, distension of the auricles recommences, and the same series of actions is renewed.

Causes of the Sounds.—The ventricular systole is the cause of the first sound, by the impulse which it communicates to the blood within it, thereby exciting sonorous vibrations of the fluid. If the sound of the muscular contraction contributes at all to the first sound it can only be in a very slight degree. The ventricular diastole is the cause of the second sound, by the reaction of the walls on the blood, and the consequent production of sonorous vibrations, when its cause is abruptly arrested by the completion of the diastole. Hence this sound is loud, brief and clear. The auricles are not concerned in the production of the two sounds, as they take place when these cavities are motionless; nor do they appear to be productive of any sound, as no third sound is audible.

Auscultation or Sounding.—We now proceed to examine more minutely the phenomena produced by the actions of the heart, in health and disease, with the view to deduce therefrom such diagnostic signs as they are capable of affording. It is hardly necessary to premise that the auscultatory diagnostics of cardiac diseases are founded precisely on the same principles as those which apply to diseases of the lungs.

GENERAL SYMPTOMS OF HEART DISEASE.

Physical Signs.—Disturbance of the functions of the heart must necessarily produce decided effects throughout the whole circulatory apparatus. Appreciable modifications of the arterial pulse of the state of the veins and capillaries show that the circulation is embarrassed. The pulse irregular, unequal and intermittent, as are the pulsations of the heart very small; but when there is considerable hypertrophy of the left ventricle, the pulse is also hard and vibrating, presenting sometimes a peculiar fremitus, which is most distinct in the carotid, subclavian and radial arteries. In some cases the arterial pulsations succeed one another, stroke by stroke, and this reduplication of the pulse is coincident with a regurgitant murmur heard on auscultating the heart. The insufficiency of the aortic valves is characterized by a bellows-murmur at the base, accompanying the second sound of the heart, and by a bounding pulse with flexuosity of the radial artery.

Symptoms.—When disease of the heart has reached a pretty advanced stage, the existing impediment to the venous circulation is indicated by swelling of the veins near the heart; those, for example, of the neck and face; and this turgescence is particularly obvious in the external jugular veins, where it is sometimes accompanied by undulatory pulsations, analagous to and synchronous with the arterial pulse. This is the venous pulse indicative of hypertrophy of the right ventricle.

Further Symptoms.—In addition to the embarrassment of the venous, there is embarrassment of the capillary circulation, which declares itself by a livid tint of the skin, swelling of the face, puffiness of the eyelids, a bluish color of the lips, and more or less injection of the skin of the extremities.

Palpitation.—As palpitation is under all circumstances dependent on over-excitement of the nerves of the heart, the phenomenon is always essentially the same. The varieties which it presents arise merely from differences in the causes and from the different routes which these causes pursue in order to arrive at and convey their stimulus to the heart.

Blue Skin.—Cyanosis is a morbid appearance which consists in the skin assuming a blue, purple or violet color, especially in those parts where the cutaneous capillary vessels are superficial, as on the cheeks and lips. It is generally accompanied by difficult respiration, palpitation of the heart with diminution of the natural temperature, an irregular or intermitting pulse, and is often attended with dropsical symptoms, the face especially, in addition to the purple color, being bloated and edematous; all these symptoms are much aggravated by any exertion.

PERICARDITIS.

Intensity of the Disease.—Its intensity varies considerably in different cases, being sometimes excruciating and sometimes slight or even wanting.

THE HEART

On the opposite page will be found a diagram of the heart. This illustration gives a front view of the organ with the pericardium or sac which covers it removed, thus showing the relative position of the heart, lungs and connecting arteries. The thin line around the upper part of the heart proper and crossing the arch of aorta shows the cut edge of the pericardium. The following is a key to the numbers given in diagram:

1—The trachea or windpipe, through which air is conveyed to the lungs.

2 & 3—Right and left common carotid arteries.

4 & 5—Right and left sub. clavian arteries. The right arises from the innominate artery, as shown in figure 6, and the left from the aorta at the termination of the arch.

6—Innominate artery. The origin of this artery is the arch of the aorta, and subdivides into the right sub. clavian and the right common carotid arteries.

7 & 8—Right and left innominate veins or nameless veins. These veins unite to form the superior vena cava.

9—Superior vena cava or superior hollow vein. Through this transmission of blood is made to the heart from the head and neck.

10—Arch of the aorta. The curved parts between the ascending and descending portions of the aorta.

11—Ascending aorta or the large arterial trunk arising from the left ventricle of the heart and giving origin to every artery except the pulmonary and its branches.

12—The pulmonary artery. The branches of this artery supply all parts of the lungs.

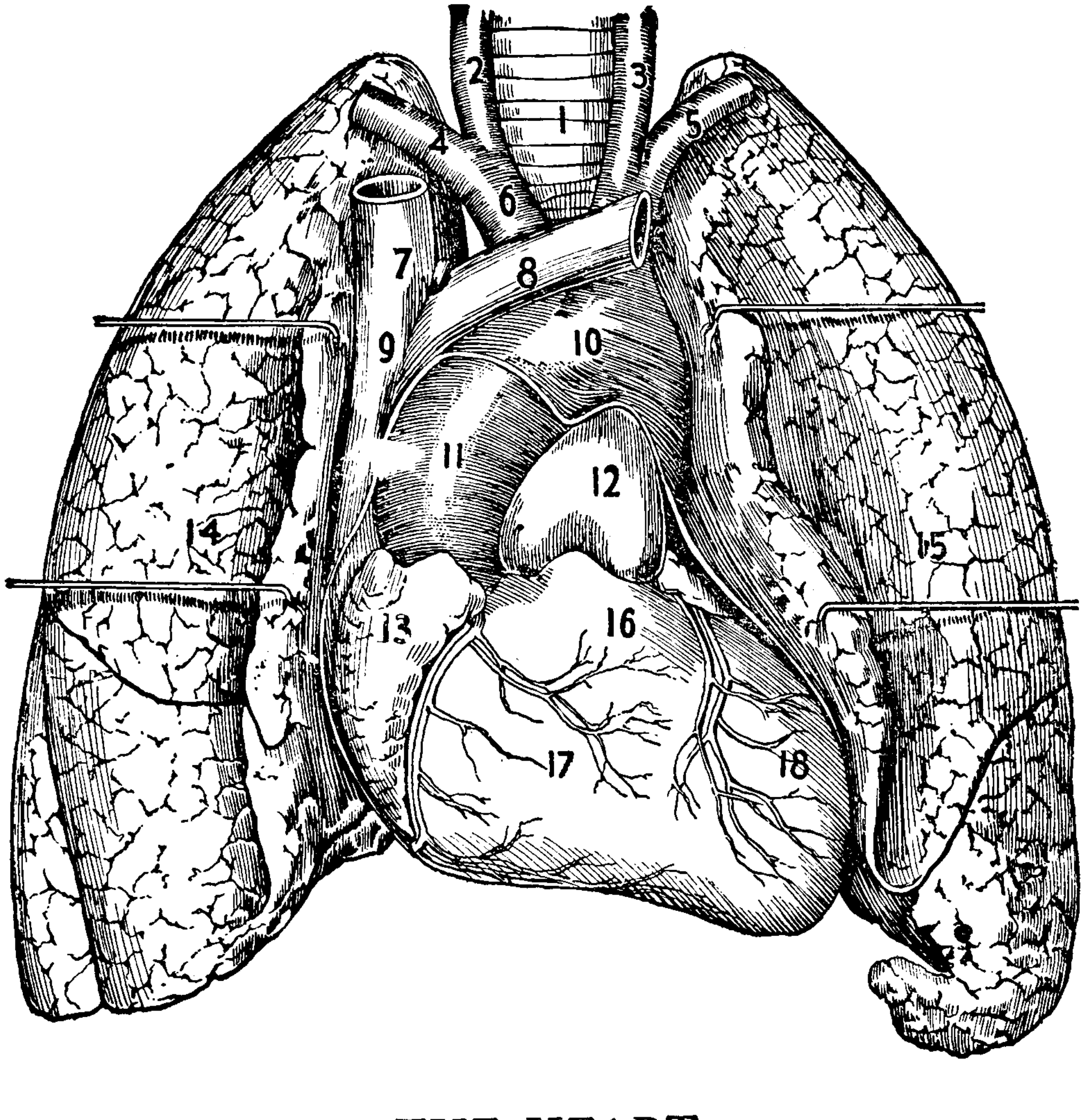
13—Right atrium and auricula.

14 & 15—Right and left lung. In the drawing they are laid back, exposing the position of the heart and the various arteries and veins. The air passing through the small air vessels oxygenate or purify the blood a most necessary function in all warm-blooded animals. The seat of the much-dreaded and fatal disease, Pulmonary Tuberculosis, is in the lungs.

16—Conus Arteriosus. The upper angle of the ventricle is prolonged into a conical pouch termed the Conus Arteriosus.

17—The right ventricle or cavity in the heart for the pulmonary circulation.

18—The left ventricle for the general or systemic circulation.



THE HEART

For an explanation of this illustration see text on opposite page

There is also more or less tenderness on pressure over the region of the heart, and its action is notably increased. With these local symptoms are associated those pertaining to the system at large which accompany symptomatic fever. As the affection is almost always developed in connection with other diseases, the symptoms of the latter are of course combined with those of the former.

Diagnosis.—The diagnosis or recognition of pericarditis has been rendered prompt and positive by means of auscultation and percussion. Soon after the attack the exudation of fibrine occasions a friction sound with the heart's movements, and this is proof of the existence of the disease. Afterward, when considerable liquid has been effused into the sac, the friction sound may cease, but it is practicable to determine the presence and the quantity of liquid within the sac by physical signs, which are obtained only by auscultation and percussion. The danger in cases of pericarditis depends, other things being equal, on the intensity of the inflammation, the quantity of exuded fibrine and the amount of effused fluid. Aside from these conditions, much depends on the diseases with which it is associated.

Symptoms.—When developed in connection with rheumatism, it ends in recovery in the majority of cases; but occurring in connection with diseases of the kidneys, with pleurisy or pneumonia, and in cases of pyemia, it ends in death much oftener than in recovery. When death is not sudden, the disease destroys life by slow asthenia or exhaustion.

As a rule from the outset we have acute inflammatory fever, a pungent, burning, lancinating pain in the region of the heart, shooting to the left scapula, shoulder, and upper arm, but rarely descending below the elbow, or even quite to it. The pain is increased by full inspiration, by stretching the left side, and especially by pressure between the precardial ribs, and by forcing the epigastrium upward underneath the left hypochondrium. When the inflammation is only subacute the pain is more or less dull, and does not lancinate. There is inability of lying on the left side, and sometimes in any position but one, which is most commonly on the back, dry cough, hurried respiration, palpitation of the heart, the impulse of which is sometimes violent, bounding and regular, though its beats may at the same time be unequal in strength, at other times it is feeble, fluttering and irregular, pulse always frequent, and generally, at the outset, full, hard, jerking and often with a thrill.

Causes.—The most frequent causes are blows or excessive pressure in the pericardial region, inflammation propagated from the lungs or pleura, and far above all, rheumatism. From this cause children and young persons suffer much oftener than others. The remaining causes are those of inflammation in general, viz., cold, febrile excitement, and so forth.

Treatment.—As regards treatment, acute pericarditis claims in general the measures indicated in other inflammatory affections. The antiphlogistic treatment, in as energetic a form as circumstances will allow, should be employed with the utmost promptitude. The loss of a few hours at first may be irretrievable, and hence hesitation and indecision may seal the fate of the patient. These measures, however, are in many cases to be modified by the circumstances pertaining to the diseases with which this is associated.

Strength of the Remedies.—The strength of the remedies employed must in each case be apportioned to the vigor of the patient's constitution; but the object is the same in all, expeditiously to prostrate the action of the heart, and for a time to keep it prostrate by preventing the re-establishment of reaction. If this object can be accomplished for the first twenty, thirty or forty hours, the disease frequently does not rally, but remains perfectly under the control of remedies.

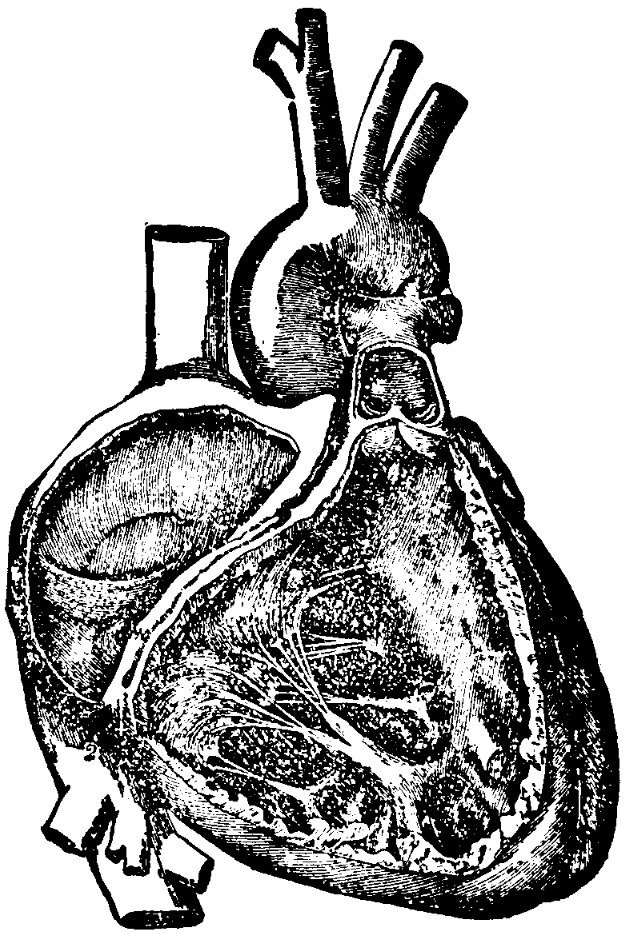
Additional Treatment.—In addition to the above measures diluent cooling drinks—as four scruples of bitartrate, or two of nitrate of potassa in a quart of water, and flavored at pleasure—should be allowed in unlimited quantity, in order by diluting the blood to render it less stimulant to the heart. Nauseating doses of tartrate of antimony, as one-sixth to one-eighth of a grain every two hours, may be employed with advantage. Colchicum often proves useful, especially so when the disease is of rheumatic origin. Calomel, trusted still by some and abused by others, may be confined to open asthenic cases in previously good constitutions. Where the rheumatic diathesis is marked, alkalies will be indicated. Carbonate or bicarbonate of potassium, or bicarbonate of sodium, may be given in scruple or half doses, with as much of rochelle salts, three or four times a day.

Continued Treatment.—Should pain continue in the advanced stages of the disease, blisters may be resorted to, and repeated in quick succession, with great advantage. For the stage of effusion we have occasionally found a third or a fourth necessary, combined with the use of diuretics, as squills, juniper, sps. ether, nit., and so forth, varied and continued until absorption occurs. Tonics will often promote the same end.

Convalescence.—An individual who has recently been affected with pericarditis is peculiarly liable to a recurrence of it, especially if it has resulted from rheumatism, and if the reparation has been incomplete. In this case, should rheumatism return, it rarely fails to be accompanied with a renovation of the pericarditic symptoms.

Diet.—A very spare unstimulating diet and extreme tranquillity must be imperatively enjoined until the action of the heart has become perfectly and permanently natural. This should consist wholly of the weakest slops, as barley, water gruel, weak tea, arrow root, and so forth.

Chronic Pericarditis.—Chronic pericarditis may be a sequel of the acute affection, or the inflammation may be subacute from the first. In some cases the inflammation continues with an abundant exudation of lymph, agglutinating the inner surfaces of the sac, and proving fatal by slow exhaustion. In other cases a large accumulation of liquid takes place, amounting to several pounds in weight, and to the exhaustion incident to the persistance of the inflammation is added the compression of the heart thus occasioned. In both varieties of the disease, as a rule, proves fatal sooner or later.



Cavities of Right Side of Heart, with their Valves.

Treatment of Chronic Pericarditis.—A rapidly depressing case of pericarditis, with cold, blue skin and feeble, irregular pulse, will require, instead of the above, a supporting or stimulating treatment from the first; with dry cups and blisters instead of local or general bleeding; and quinine, ammonia and whiskey, instead of sudorifics or laxatives.

ENDOCARDITIS.

Signs of the Disease.—Inflammation of the internal membrane of the heart. In this affection the inflamed membrane is in contact with the blood contained within the cavities of the heart; hence, although fibrinous exudation takes place as in pericarditis, the exuded lymph is in a great measure washed away from the membrane and carried into the circulation. A portion, however, adheres to the membrane, roughening the sur face in contact with the blood, and giving rise to an abnormal sound (an endocardial or bellows murmur), which is an important physical sign of the disease. Moreover, upon the little masses of lymph which adhere to the membrane, coagulated fibrine from the blood contained in the cavities of the heart is apt to be deposited, and in this way are produced the so-called vegetations or warty growths, which being sometimes detached and carried into the arteries with the current of the blood, are arrested in vessels too small to allow of their further progress, become fixed and occasion an obstruction which may lead to hemorrhage (hemorrhagic infarctions), and to the impairment of nutrition within a circumscribed area beyond the point at which the obstruction is seated. These movable plugs or emboli, as they are termed, play an important part in affections proceeding from disturbance of the circulation and nutrition in different organs of the body, more especially the brain.

Local Effects.—The local effects of endocarditis are also of much importance as laying the foundation for progressive changes, especially in the valves of the heart, constituting what are called valvular lesions. The inflammation in endocarditis is generally limited to the left side of the heart; that is, to the endocardial membrane lining the left ventricle and the left auricle.

Causes.—Like pericarditis, this is very rarely a primary disease, and in the great majority of cases it occurs in connection with acute articular rheumatism. It is evidently due to the same internal agency which in rheumatism causes the inflammation within the joints; this agent, being a morbid principle in the blood, is supposed to be lactic acid.

Diagnosis.—Its development is attended with little or no pain or other subjective symptoms referable to the heart; the diagnosis rests wholly upon physical evidence attained by auscultation. The roughening of the endocardial membrane within the left ventricle causes, as already stated, an adventitious sound or murmur, and the production of this murmur, while a patient is under observation, constitutes the proof of the presence of the affection.

Symptoms.—The symptoms produced are blueness and coldness of the skin, the result of the disease affecting the valves of the heart so as to render them more or less incompetent to perform their functions, and

HUMAN INTERNAL ORGANS.

THE LUNGS.

Upper Left-Hand Plate.—This handsome plate shows, at the top, the windpipe (trachea) entering the lungs. It divides into two branches, one for each lung, and each branch subdivides, so as to carry air to every part of the lung.

Lobes.—The plate shows the two great parts of the lungs, right and left lobes. These are filled with the air cells. Notice in the lobes the immense number of veins which form the circulatory system of the lungs.

Heart.—The heart is seen in its true position, to the right of the centre.

Pulmonary Vein.—To the left of the centre is seen the great pulmonary vein, carrying the lung-blood to the left auricle of the heart.

Pleura.—The pleura membrane is seen surrounding the entire lungs and walling them in.

THE LIVER.

Upper Right-Hand Plate.—The liver is the largest gland in the body. Situated on the right side, and partly covers the stomach.

Lobes.—The plate shows its two lobes on upper surface and five on under surface.

Vessels.—The entire circulatory system is shown—portal vein, hepatic artery, hepatic duct, lymphatic and smaller veins. To the left, in pear-shape, is the gall bladder.

THE HEART.

Lower Left-Hand Plate.—The plate shows the cone-shaped heart, situate in the chest, between the lungs, its apex toward the left. Though supplying blood to the whole body, it yet has its own circulation, as seen by its veins.

Cavities.—It has four cavities, an auricle and ventricle on each side. The right auricle receives the venous blood and pumps it into the right ventricle. The right ventricle throws its blood into the left auricle. The left ventricle pumps it into the aorta and thence through the body. The upper section of the plate shows the aorta and the great pulmonary vein.

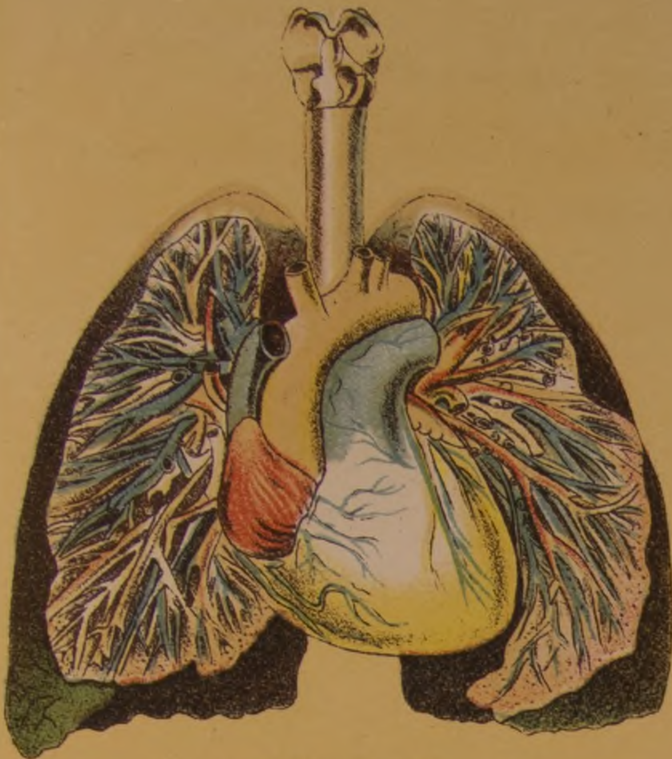
THE STOMACH.

Lower Right-Hand Plate.—The plate shows the stomach when one is in a reclining position.

Veins.—The numerous veins show how well it is nourished.

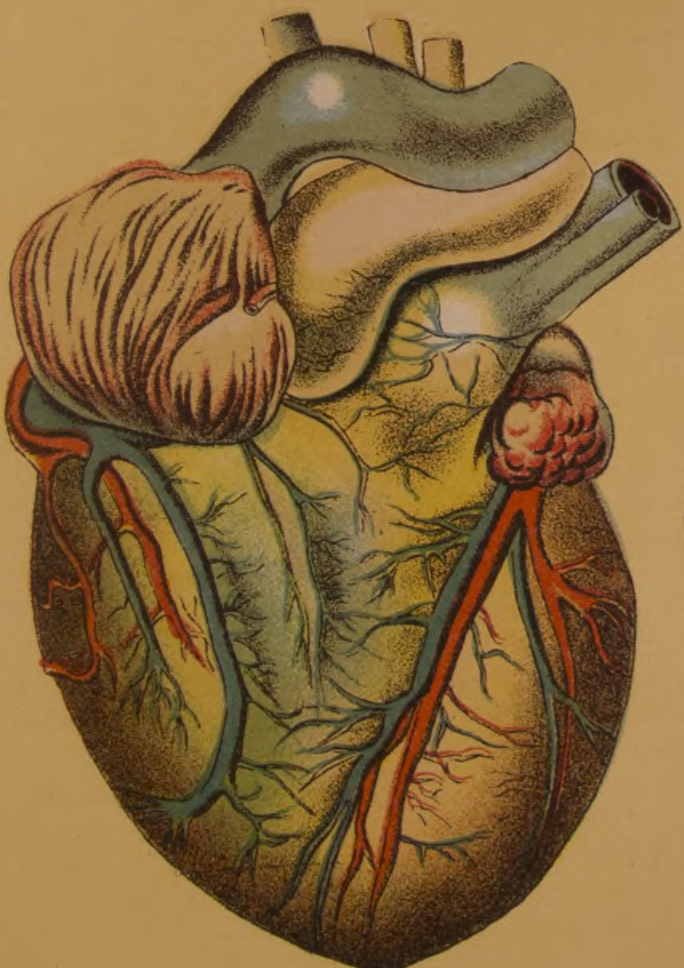
Liver.—To the left is the liver. Above it is the opening through which food passes from the gullet (œsophagus). At the opposite end is the pyloric gate, through which the partly digested food passes into the duodenum (twelve-inch bowel).

Muscles.—Around the stomach, in brown and white, are seen the powerful abdominal muscles. The white represents streaks of fatty matter. The stomach is usually about twelve inches long and four inches in diameter.



Lungs & Heart in Position

Section of Liver



The Heart Showing The Great Arteris.

The Stomach - Front view Figure in Reclining Position.

Human Internal organs.

diminishing the size of the mitral or aortic orifice so as to produce more or less obstruction to the passage of blood. Obstruction of the flow of blood through the orifices within the heart, and regurgitation, lead to enlargement of the organ and to various morbid effects in other organs; indistinctness of the heart sound, feebleness and irregularity of the pulse, nausea and vomiting, anxiety of expression and fainting.

Treatment.—In every case the important question is, less the state of the particular valves than the amount of interference with the functional action of the heart. In young persons remarkable recoveries sometimes take place. In other instances, adaptation of the heart itself, and of the general system by degrees, is effected, so that quite good health, and even capacity for exercise, may be attained, while the physical signs of the local organic change remain. Sudden death is less common in heart disease than is popularly supposed.

The Circulation.—The circulation should be kept as tranquil as possible by a quiet life and a moderate unstimulating diet. The food, however, should be rather nutritious, comprising a little animal food or soup twice a day, in order to keep the muscular system in general, and that of the heart in particular, in tone. The same may be promoted by a clear, bracing, dry air. The general health and strength may likewise be improved by the occasional exhibition of bitters, mineral acid and chalybeates, with aromatics. The stomach, in particular, should be kept in good order, as its derangements, even a little flatulence or acidity, have a surprising effect in disturbing the action of the heart. The same may be said of the biliary secretion, when there is an unequal distribution of venous power, indicated by hysterical symptoms, and so forth, antispasmodics will be found useful.

Value of a Bath.—Attacks of dyspnœa are best relieved by immersing all the extremities in warm water, a blanket being thrown around the patient to promote perspiration, and fresh, cool air being admitted to satisfy the craving for breath. While this is being done he should take an antispasmodic draught, composed of either laudanum, camphor, ammonia, and asafetida, combined according to circumstances. It may be repeated two or three times, at intervals of from half an hour to an hour, according to circumstances.

Diet.—For the avoidance of attacks the more important of the measures of management relate to a proper regulation of the habits of life as regards diet, exercise and so forth. While excessive muscular exercise is to be avoided, such an amount as is taken, without discomfort, may be highly useful by improving the general condition of the system; while excesses in eating and drinking are hurtful, a deficient alimentation is not less so. In brief, the great end of treatment is to render the system tolerant of the lesions as much and as long as possible, and this end is promoted by such a course of management, hygienic and medicinal, as conduces to the general welfare of the economy.

ADDISON'S DISEASE.

Nature.—Certain forms of general anemia which are neither attributable to excessive antecedent hemorrhages, nor to profuse or long continued intestinal fluxes, and which cannot by symptoms be connected with any diathesic state or marsh miasmatic influences, forms of general anemia, in fact, which appear to supervene under the influence of non-recognizable causes, in which besides the debility and languor of the patient, are characterized by a bronzed hue of the integuments, and which is most strikingly apparent on the skin of the hands, penis, groin, scrotum and axilla.

It has been termed by Addison the bronzed disease.

Symptoms.—The malady begins slowly, and its existence is not at first perceived. The patient has difficulty in fixing with precision the date at which he experienced its earliest symptoms. Its first manifestations are general discomfort, an enfeebling of the physical and moral faculties, and a state of real languor. The arterial pulsations are small and feeble, the pulse full, soft and easily compressed. The appetite is capricious, the patient showing repugnance to animal food, or a diminished appetite. At first digestion proceeds in a normal manner; at a later stage this function is disturbed by intractable vomiting. This symptom is accompanied by pain, or at least by a painful sensation in the epigastric region. The patient wastes away, and yet the most minute examination fails to discover any sign of organic change sufficient to account for the great disturbance of health and extreme anemia which exist. Finally there is a state of extreme debility.

Treatment.—In the treatment, having no specific remedy, we are obliged to direct our measures against the symptoms of anemia; ferruginous medicines, preparations of cinchona, and a tonic regimen are indicated. Decided advantage has followed the use of a combination of glycerine, in two-drachm doses, with fifteen or twenty minims each of chloroform and tincture of chloride of iron.

OBSTRUCTION OR OCCLUSION OF THE ARTERIES

EMBOLISM.

Symptoms.—When the right half of the heart has received an embolus and the pulmonary artery is obstructed, collapse of the lungs, partial or entire, follows. Pleurisy, hemorrhage or bronchitis may also occur, or the symptoms may be great anxiety and dyspnœa, with reduction of the temperature of the body, a systolic murmur may be heard on auscultation; the rhythm of the heart becomes irregular, and pulsation of the jugular veins may be noticed. Giddiness may be present, with blueness and edema of the hands, feet, or both. Where emboli have become broken up and decomposed, septicemia results, commonly known as pyemia.

Treatment.—The objects we should have in view in the treatment of a vessel occluded by an embolus are, to favor the venous circulation through the limb by its elevation, and to establish the arterial collateral circulation by maintaining the warmth of the limb by means of cotton carefully wrapped round it over oil lint. Pain can be relieved by sedatives, while the powers of the patient are to be maintained by nutritious diet, by stimulants carefully administered and by tonics. When gangrene has taken place the parts may be covered with some antiseptic material, as carbolic acid in a watery or oily solution, one part to thirty, or with powdered chloral. When the line of demarcation has formed and the gangrenous part can be removed by amputation, such an operation may be performed.

GOITRE (GRAVE'S DISEASE).

Goitre may be simple or exopthalmic. Simple goitre is a local affection with only symptoms such as dyspnœa, or the cough as of a broken-winded horse and difficulty in breathing on slight exertion. Exopthalmic goitre is a disease of the nervous system characterized by protrusion of the eyeballs, enlargement of the thyroid gland and palpitation of the heart, a peculiar thrill in the blood-vessels and a general deterioration in muscular and brain power. The veins and arteries of the thyroid glands are enlarged. As a rule the development of the disease is gradual. The goitre is elastic and rather soft. The protrusion of the eyeballs follows the swelling of the gland. The disease is more common with women than with men.

Recovery occurs in a fair number of cases, but the course is slow. Although occasionally sporadic, it is essentially an endemic disease in cold and damp countries, as in the deep valleys of the Alps, the Pyrenees, the North American Rockies, the Cordilleras of South America, and the chalky districts of Derbyshire, England.

Treatment.—Simple goitres are to be treated on ordinary principles, viz., by attention to the general health, the inhalation of fresh air and by tonic medicines. Filtered or distilled water should always be taken, more particularly in districts where chalk, lime and magnesia abound. Iodine has always been held in high repute in this disease, in the form of compound solution of iodine, three drops in a glass of milk, three times a day. For some years we have employed tonics alone by the mouth, and have ordered the air in the room to be kept iodized by means of solid iodine put into a box with a perforated lid; the metal thus evaporates steadily into the room where the patient sits and sleeps, and in this way it becomes absorbed.

ANEURISM OR BLOODY TUMOR.

Causes.—A low form of inflammation of the arterial walls is without doubt the most common predisposing cause, while over-action of the heart and circulation is the exciting one. Direct injury to an artery (traumatic) is an occasional cause.

Symptoms.—The early symptoms of aneurism are very uncertain. It often happens that the patient's attention is first directed to some swelling, although it may be only that of local throbbing, some weakness or stiffness of an extremity, or some nerve pain preceding the discovery of the disease; yet such symptoms are not constant. When, however, you are consulted for pain which shoots down the course of a nerve running in contact with a large artery, you should allow the thought of aneurismal pressure to pass through your mind, and, when this is associated with the presence of a tumor connected with the vessels, the suspicion of its being aneurismal should be excited. If this tumor be soft and pulsating, and becomes tense on the application of pressure to the trunk of the artery on the distal side, and placid, non-pulsatile and vanishing on pressure in the vessel below, the chances of its being aneurismal amount almost to a certainty. Should it expand again readily on the removal of pressure, this expansion is accompanied with a peculiar thrill on the readmission of blood into the sac, with a bellows murmur or aneurismal bruit, synchronous with the pulse.

Treatment.—The spontaneous cure of an aneurism is caused by the coagulation of the blood in the sac; how to induce this coagulation by natural processes is our aim; therefore, it is necessary to have a feeble circulation through it; for this purpose, rest in the recumbent position is an essential point of practice, and should be maintained in every case. When the force of the circulation is too strong and the powers of the patient are good, bleeding under this circumstances is not only rational but scientific. Medicines do not seem to have much influence in the coagulating process, though the acetate of lead has been found useful and iodide of potassium. The local treatment is based on similar principles, the aim being to diminish the circulation through the sac. This may be effected by the following means, viz., by compression in one of its forms of the artery above the aneurism, indirect; by compression of the aneurism itself, direct; by the Hunterian operation, viz., the application of a ligature to the artery on its cardiac side; by imitating the rare natural process of closure of the artery on its distal side by the application of a ligature, or by pressure, or by the artificial production of an embolic plug, by Fergusson's method of manipulation, and last of all it may be laid open and both ends tied. The treatment by electro-puncture, injection, and the introduction of some foreign body into the sac may be adopted in exceptional cases.

PHLEBITIS OR INFLAMMATION OF THE VEINS.

Symptoms.—The most prominent symptom of an obstructed vein is edema of the parts below the obstruction, some fullness of the superficial veins, local pain and tenderness; constitutional disturbance of variable degrees of severity generally preceding. When superficial veins are involved the symptoms may be chiefly local, but in the case of deep veins constitutional disturbance is certain to accompany local action. Among the superficial veins the saphena of the leg and thigh is most commonly affected, and is often a sequelæ of a varicose condition. Under these circumstances the tortuous, dilated, indurated vein becomes a marked object, set as it were in a frame of hardened inflamed skin and a cellular tissue.

Treatment.—The two great indications for treatment in these cases are to favor venous circulation of the part, and to improve the general condition of the patient.

THE ARTERIES

FIGURE No. 1.—Arteries of the palm of the hand and front of forearm.

3. Deep part of the raised pronator of the radius.
4. Long supinator muscle.
5. Long flexor of the thumb.
6. Square pronator.
7. Deep flexor of the fingers.
8. Cubital flexor of the wrist.
9. Annular ligament, with the tendons that pass under the centre of the palm of the hand; the member is on the tendon of the long palmary muscle divided• near its insertion.
10. The brachial artery.
12. Radial artery.
13. Recurring radial artery joining the end of the upper deep one.
14. Superficial veins.
15. Cubital artery.
16. Superficial palmary arch from which spring digital branches to three and one-half fingers.
17. Magna artery of the thumb and radial artery of the index.
18. Back cubital recurring artery.
19. Front interosseous artery.
20. Back interosseous artery passing through the interosseous membrane.

FIGURE No. 2.

1. Primitive carotid artery dividing itself into carotid external and carotid internal.
3. Occipital branch to the back part of the skull.
4. Upper hyoides artery.
5. Lower pharyngeal artery.
6. Masseter artery.
7. Submental artery.
8. Lower coronary artery.
9. Upper coronary artery.
10. Deep branch.
11. Back cervical artery.
12. Continuation and fold of the occipital.
13. Descending branch for muscles of the neck.
14. Posterior auricular.

15, 15. Temporal artery.

16. Parietal branches.
17. Frontal branches.
19. Orbitary branches.
20. Subclavian artery.

FIGURE No. 3.

Thoracic aorta.

The three branches from left to right are the unnamed ones.

The primitive left carotid and the subclavian left one.

The small branch in the curve is the bronchial one.

FIGURE No. 4.

1. The liver.
2. The stomach.
3. Upper gut.
4. Pancreas.
6. Great mesenteric artery.
7. Gastric branch.
8. Spleen.
9. Pyloric branch.
10. Pancreatic branch.
11. Hepatic artery.
12. Duodenal branch.
13. Cystic artery.
14. Branches to the stomach.

15, 16. Spleenic arteries.

17. Gastro-epiploic artery.
18. Descending aorta.
19. Great mesenteric artery.

FIGURE No. 5.

1. Cheek arteries.
2. Cœliac axis.
3. Gastric artery.
4. Hepatic artery dividing itself into right and left branches.
5. Spleenic artery.
6. Supra-renal artery on right side.
7. Right renal artery, which is longer than the left.
8. Lumbar arteries.
9. Upper mesenteric artery.
10. The two spermatic arteries.
11. The lower mesenteric.
12. The middle sacras.
13. The common iliac.
14. Internal iliac of the right side.
15. External iliac.
16. Epigastric artery.
17. Circumflex iliac artery.
18. Femoral artery.

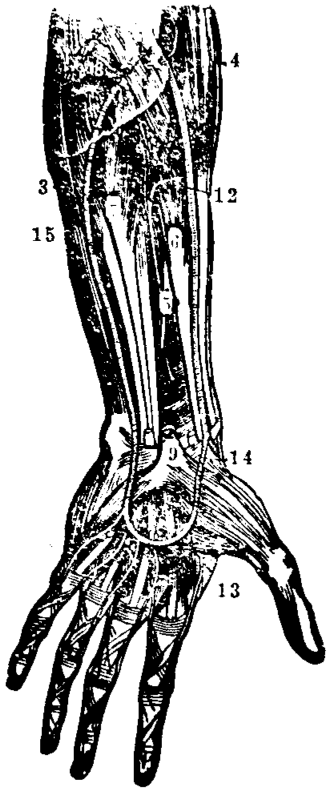


Figure No. 1.

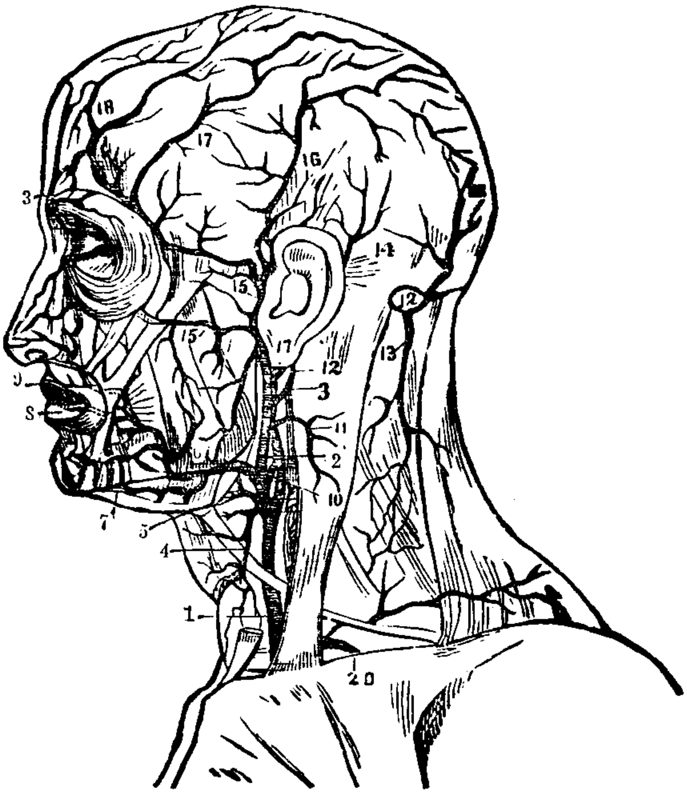


Figure No. 2.

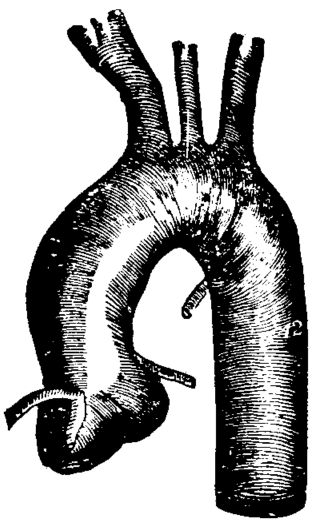


Figure No. 3.

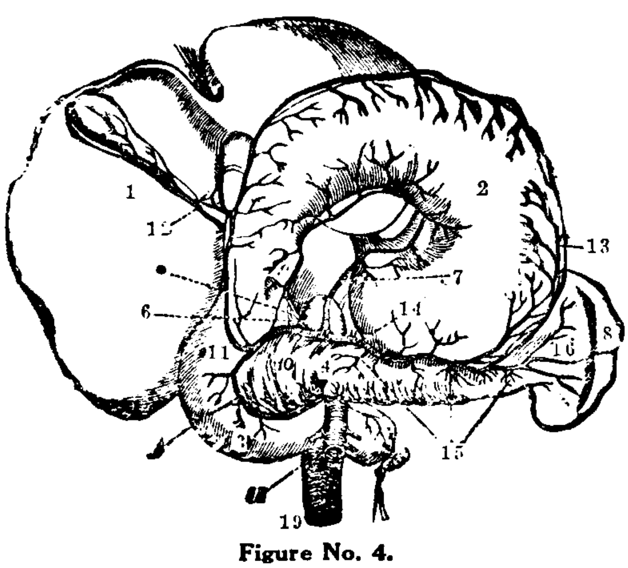


Figure No. 4.

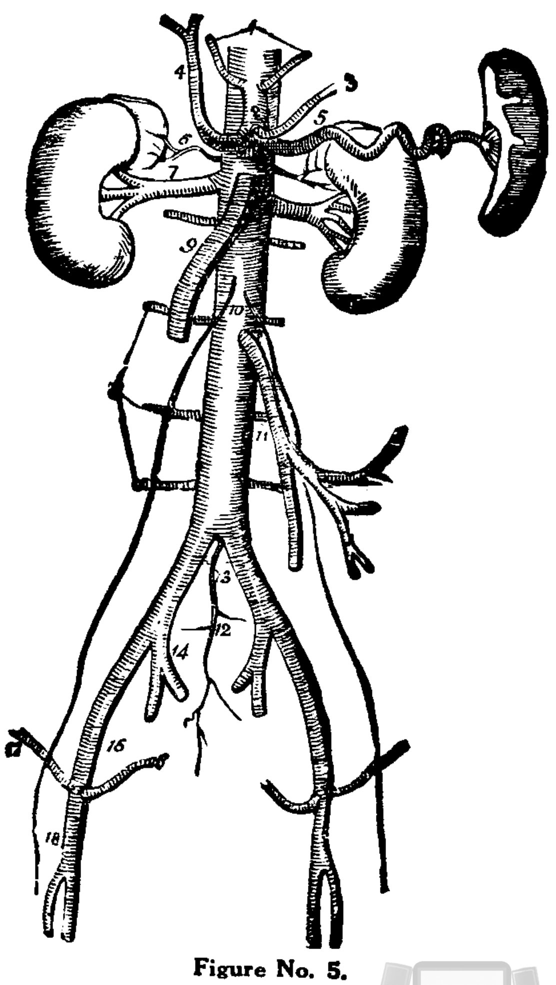


Figure No. 5.

THE ARTERIES.

For an explanation of the illustrations see text on opposite page.

The first is attained by elevation of the limb, the foot being raised higher than the hip, and by the application of warmth. The second can be carried out by the administration of a simple nutritious diet, tonics, such as quinine, bark or iron, and stimulants carefully adjusted to the wants of the individual case.

Pain must be allayed by both local and general means, as poppy fomentations, and the internal use of sedatives. Leeching should never be resorted to, nor the use of mercury. When suppuration appears it must be dealt with on ordinary principles, but it is well, as a rule, to evacuate it as soon as it has declared itself.

INFLAMMATION OF THE LYMPHATIC VESSELS AND GLANDS.

Symptoms.—1. The absorbent glands with their ducts are liable to inflammation, adenitis or angeioleucitis, and this action is the result of the absorption of some septic material. It is almost always associated with a wound, punctured or open-inflamed suppurating, healing; with some point of irritation or suppuration, even a papule or pustule; with some centre from which morbific elements may be taken up. In what is called a simple wound the inflammation of the absorbents may be acute, but in poisoned it is violent and diffused. The inflammation always follows the course of the absorbents, leading from the centre of absorption toward the glands; that is, toward the body, and it never spreads backward. When it has reached the glands, the diseased action ceases to spread, that is, it expends its force upon the group of glands in which the absorbents naturally end, and does not extend through another series of absorbents to a second group. When pyemia follows or complicates the case, it may be open to question whether the poisonous fluid circulating in the lymphatics has not been allowed to pass into the blood through its usual channels, viz., through the inflamed glands onward, and set up inflammation in the tubes and glands, was taken directly into the blood through the venous channels, thus giving rise to blood-poisoning.

2. Pain and tenderness in some of the glands are generally early symptoms, and with these, or some following them, will be seen a band of redness varying in diameter, leading from the wound or infecting centre toward the gland. This red line may be continuous or interrupted; it may be a thin streak or a broad stripe of redness, and in some instances so radiate into the surrounding tissues as to simulate erysipelas. The whole line of redness is very painful, and with these local symptoms there

will also be some febrne disturbance. The red lines follow the course of the absorbents and not of the veins.

Treatment.—When any indications of absorbent inflammation show themselves the wound or sore should be well cleansed and any collection of pus let out. The effected limb should be raised, the foot, when involved, brought higher than the hip; the hand or elbow than the shoulder, and warm poppy fomentations should be applied along the whole course of the lymphatics up to the group of glands in which they terminate. As soon as suppuration appears the abscess must be opened, whether this follows directly upon the inflammation or subsequently. A saline purge should be administered; sedatives should be given to allay pain. When suppuration has taken place tonics may be administered. In chronic cases, where induration in the track of the ducts remains, mercurial ointment and friction are sometimes valuable

DISEASES OF THE DUCTLESS GLANDS.

The glands without any outlet in the body are three in number, namely: the thyroid, situated in the front of the neck; the spleen, located in the left side below the heart, and the supra-renal capsules, which are placed one over each kidney, deep in the loins on either side of the spinal column. Although the functions of these organs are still undetermined, many of their diseases are well known.

DISEASES OF THE SPLEEN (SPLENITIS).

Symptoms.—Diseases of the spleen may be acute or chronic. The acute symptoms are a sensation of cold and partial rigor, a feeling of weight, fullness and pain in the left side extending to the left shoulder, increased on pressure and coughing; thirst; some degree of nausea; dry cough with the usual symptoms of pyrexia. Wandering pains in the limbs, sometimes ending in collections of pus under the integuments of the thigh, arm, and so forth, are not uncommon in chronic splenitis. In the latter periods of the disease the debility and emaciation become very great; the complexion darkens and the appetite fails. Hectic, more or less violent, comes on with diarrhœa or vomiting of unconquerable pertinacity and blood is frequently discharged both upward and downward.

There is a simple enlargement of the spleen from mere temporary congestion, as when brought on by sudden mental emotion or by oscillations of the circulation from internal causes. In temperate climates the

33

more permanent enlargement or hypertrophy of this organ, not being accompanied by the same violence of constitutional disease as in the latter, is usually of a passive character and is owing to relaxation of fibre. The most frequent causes of enlarged spleen are ague (ague cake) and remittent fever. The most characteristic symptoms are a sense of weight in the left side with or without evident swelling; inability to lie on the right side with ease; debility; disordered stomach; dry cough and absence of fever.

Treatment.—The indications of treatment are: first, to remove the cause; secondly, to restore the organ to its natural condition; and thirdly, to improve the general health. If ague be the exciting cause it must be combated by appropriate remedies, warm and brisk purgatives should be given once or twice a week so as to affect the upper bowels. Mercurials should be omitted. The bowels being kept more open than ordinary, the nascent irritative stage having gone by and the case being strictly passive, tonics are to be had recourse to and especially the acids with preparations of iron.

Leucocythemia.—Leucocythemia or white-cell blood is a disease of the circulating fluid often associated with enlargement of the spleen and supposed to be caused in part by the morbid condition of that organ. The great characteristic of this malady, as its name indicates, is the preponderance of white corpuscles in the blood.

Symptoms.—The general or constitutional symptoms are a slowly progressive anemia, weakness and emaciation, with incapacity for exertion, shortness of breath and digestive derangements. The bodily temperature is often somewhat raised and sometimes persistently elevated. The urine may be normal in appearance but less urea appears to be secreted in it. In the later stages there is a tendency to dropsy and to hemorrhage from various surfaces, especially the mucous membranes. The only certain mode of determining this remarkable disease is by a microscopic examination of the blood.

Treatment.—No specific for leucocythemia has yet been discovered. The constitution requires generous support, if not stimulation. Tincture of the chloride of iron in doses of ten or fifteen drops three times a day sometimes acts admirably.

DILATATION OF THE HEART.

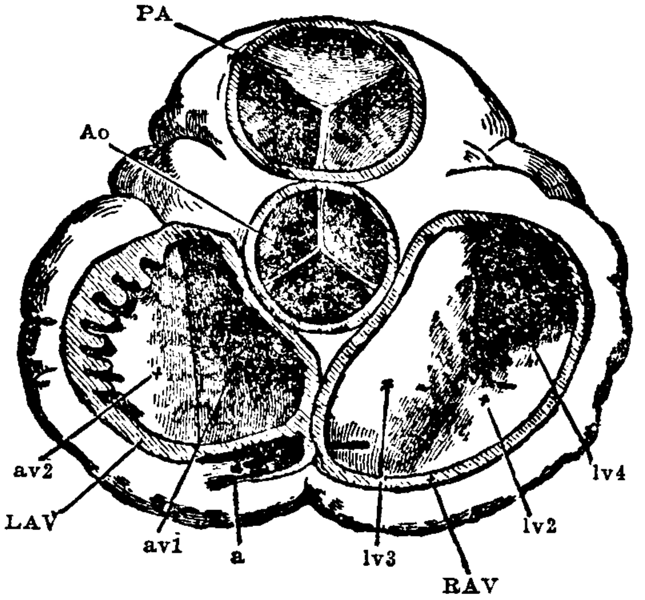
Symptoms.—Dilatation of the heart is indicated, upon physical exploration, when, with extended impulse of the heart we have dullness on percussion beyond the usual limits. If true hypertrophy or muscular thickening be present the impulse is very forcible as well as extended. The heart-sounds are apt to be clear, though not loud, in attenuated dilatation; rather loud, but dull-toned, in enlargement with thickening. It is most often induced by valvular obstruction or regurgitation, compelling unusual and continued efforts to sustain this circulation. Sometimes, however, it is more truly idiopathic, following causes of overaction of a heart otherwise sound, thus, violent exercise, self-abuse, coffee, tobacco, alcohol, and so forth, are, with good reason in predisposed cases, accused of producing it.

Treatment.—In the treatment avoidance of such exciting causes and particularly of violent exercise, alcohol and venery, is the main principle. Robust or plethoric patients may bear and be benefited by occasional leeching or cupping over the heart. Acetate of lead as an astringent cardiac sedative has proved useful in the dose of one grain thrice daily, with care to avoid saturnine poisoning. Digitalis here acts as a tonic to the heart, through ganglionic influences, lessening rapidity of action when that depends on debility, and veratrum viride as a sedative and palliative in violent acceleration of the pulse, as in muscular hypertrophy and in some forms of palpitation.

ENLARGEMENT OF THE HEART.

Symptoms.—Enlargement of the heart and its extent are easily determined by means of physical signs, palpation and percussion. By the touch it is found that apex beat is more or less lowered and carried to the left of its normal situation. Between the apex and the base of the organ are found impulses not perceptible in health. By percussion the boundaries of the organ are readily ascertained in the great majority of cases. The vocal resonance also, as heard with the stethoscope, enables the physician to define the limits to which the organ extends. Palpitation and auscultation furnish signs by which predominant hypertrophy may be differentiated from dilatation. If hypertrophy predominates the impulses of the heart as felt by the hand are strong, and often there is a heaving movement extending over the region of the heart. The first sound of the heart, over the apex, is abnormally loud, long and booming. On the other hand, if dilatation be considerable or great, weakness of the organ is denoted by feeble impulses and by diminished intensity, together with shortness and a valvular quantity of the first sound of the heart in the situation of the apex.

Treatment.—In addition to purgatives we have seen the most decided advantage result from diuretics, and not only when there was dropsy, but equally when there was none. Their mode of operation appears to be ultimately the same as that of purgatives, viz., they drain off the serous portion of the blood. We have found many patients, conscious of the benefit which they derived from this class of remedies, to be in the constant habit of taking cream of tartar, brown tea and other similar popular medicines. One patient, affected with contraction of the mitral valve to the size of an ordinary pea, by these means warded off dropsy beyond the slightest edema of the feet for ten years. When decided dropsy appears it must be combated by the most efficient diuretics, the acetate, or tartrate and nitrate of potash, squill, digitalis, spirits of nitre, ether, and so forth, as no class of remedies is more variable and uncertain than this. When one fails another should be resorted to.



Bird's-Eye View of the Valves of the Heart.

Diet.—The treatment consists of a highly nutritious diet, into which fatty articles should enter sparingly, together with the employment of hygienic measures and remedies designed to give tone to and to invigorate the heart.

CHRONIC VALVULAR DISEASE.

Diagnosis.—The diagnosis of valvular disease has been rendered very complete by means of auscultation. With very rare exceptions it gives rise to adventitious sounds or murmurs, the characters of which, as regards their situation, their transmission in different directions, and their relations to the heart sounds, enable the physician not only to determine their existence but to localize them and to distinguish between those which involve obstruction and regurgitation. When valvular disease has advanced sufficiently to produce obvious symptoms referable to either obstruction or regurgitation, or to both, they will destroy life sooner or later.

Whether the disease of the valves be cartilaginous, osseous, or consist of vegetations, the general symptoms are the same if the degree of contraction be equal. The general symptoms are cough, copious watery expectoration, dyspnœa, orthopnœa, frightful dreams and starting from sleep. Edema of the lungs, pulmonary apoplexy, passive hemoptysis (sputa stained with dark or grumous blood), turgescence of the jugular veins, lividity of the face, anasarca, injection of almost all the mucous membranes, passive hemorrhages, especially of the mucous membranes, engorgement of the liver spleen, and so forth, and congestion of the brain with symptoms of oppression, sometimes amounting to apoplexy.

The preceding illustration represents a hardened section of the heart, cut transversely across the organ so as to show how the pocket-like valves come together in the middle of the openings in order to close those orifices. At LAV are seen the two flaps of the mitral valve, which shuts off the return current of the blood as it is being driven by the strong left ventricle into the aorta, and at Ao are depicted the three flaps of the aortic valve, which is closed by the return current of the blood from the great aorta after it is pumped into that large blood-vessel by the ventricular contraction. It is plain to be seen that if the edges of these valves are rough or ragged or perforated, they cannot shut tightly and will allow some leakage to occur.

Symptoms.—When the disease is combined with hypertrophy or dilatation, as is commonly the case, the symptoms are more severe than those of hypertrophy or of dilatation alone, the paroxysms of palpitation and dyspnœa in particular being more violent, more obstinate and more easily excited. The action of the heart is irregular. The pulse is small, weak, intermittent, irregular and unequal.

Treatment.—Since we can neither replace or repair the damaged valves of the heart, the principles of treatment for chronic valvular disease are, in general terms, such as diminish the force and activity of the circulation, occasional venesection to a moderate extent, an unstimulating and rather spare, though sufficiently nutritious diet, a tranquil life, with respect both to the body and the mind, and a good state of the digestive organs and alimentary canal.

When there is dropsy diuretics are of the greatest utility. They are remarkably beneficial in an anterior stage of the disease; for, by drawing off the serous portion of the blood, they diminish the quantity without deteriorating the quality of the fluid, and thus relieve palpitation and dyspnœa and obviate infiltration, without materially reducing the patient.

When diuretics do not remove dropsy and purgatives have failed, the practitioner is compelled to resort to puncturing. We say compelled, because the remedy is a last and dangerous resource. The danger, however, may be considerably diminished by making small punctures with a grooved needle, and allowing the fluid to ooze slowly during four or five days or a week. When incisions are made with a scalpel or lance, the fluid is evacuated quickly, as in twelve or forty hours, and the patient, according to our observation, generally dies.

FAINTING OR SYNCOPE.

Complete and, commonly, sudden loss of sensation and motion with considerable diminution or entire suspension of the pulsations of the heart and respiratory movements.

Symptoms.—It is to be distinguished from an epileptic or apoplectic fit by the fuller and apparent failure of the pulse and respiration, as well as by the previous history, if that can be obtained from friends or bystanders.

Treatment.—Syncope is, commonly, an affection of no consequence, but sometimes it is an index of diseased heart. Generally recovery from a swoon is rapid if the patient is laid flat upon the ground, without any pillow, the clothing loosened from the neck and a little cold water sprinkled in the face and the application of volatile substances to the nostrils are all that will be required during the fit. If recovery is delayed a turpentine injection or one containing a little whiskey and water should be administered, and the electro-magnetic current may be transmitted through the walls of the chest to stimulate the failing powers of the lungs and heart.

PALPITATION.

Symptoms.—All excessive or consciously disturbed action of the heart is commonly thus designated. Over-action in particular may have either one of the following origins: Nervous or hysterical, dyspeptic, rheumatic or gouty, hypertrophic.

All of the above forms of merely functional disturbance of the heart, and especially the purely nervous, may be known from hypertrophic over-action, or the conscious impulse of dilatation of the heart, by the fact that they are not increased by moderate exercise; are often, indeed, much diminished thereby.

Treatment.—The treatment must vary according to its cause. If nervous, invigoration of the system and enrichment of the blood are most probably required, by iron and other tonics and regimen. Dyspepsia will require appropriate treatment; as a part of which exercise in the open air will not be counter-indicated at all by sympathetic palpitation.

ANGINA PECTORIS OR HEART PANG.

Symptoms.—It is a disease of an intermitting character in which the patient has intervals of comparative ease or perfect health between paroxysms of greater or less suffering. It is characterized by sudden attacks of severe pain, extending from the heart along the left arm, with a sense of stricture in the chest, prostration and alarm. The pain is rarely confined to its primary and principal site in the cardiac region, but increases, in different instances, very variously both in direction and extent. It shoots upward or downward or to the right side and almost always through the left side of the chest toward the shoulder and axilla and very frequently into the left arm.

Treatment.—The violence of the patient's sufferings and the belief in the nervous or spasmodic nature of the pain, suggested by its sudden invasion, would naturally lead the medical attendant, in the first place, to attempt to afford relief by anodynes; such attempts, however, have generally been attended with less success than might have been expected. In angina, as in toothache or tic douleureux, gastralgia, colic, or other violent pains, nature seems as if she scorned to be controlled by art, although so much under the influence of similar applications when less needed, as in the case of milder pains. Antispasmodics, cordials, carminatives, and so forth, have been much recommended and employed; and, upon the whole, with better success than anodynes. The inhalation of one or two drops of nitrate of amyl sometimes relaxes the spasm and affords prompt relief. Small doses of nitro-glycerine and hypodermic injections of from one-eighth to one-half grain of morphia also partly relieve the pain after a little longer delay. But although these or other means may afford relief, or may even ward off death, it is evident that every kind of treatment confined to the paroxysm is of very slight importance. Compared with that which is to be employed in the interval, the former can, at most, afford temporary relief; the latter may cure the disease.

HEART ASTHMA.

Symptoms.—Asthma from disease of the heart often imitates the characters of the other varieties, and this perhaps for a very simple reason; that the lungs are in much the same state as in those varieties. Thus the asthma is humid or humeral when there is permanent engorgement of the lungs, causing copious sero-mucous effusion into the air passages, as in cases of contraction of the mitral valve. It is dry when the engorgement is only transitory, as in cases of pure hypertrophy. It is continued when there is a permanent obstruction to the circulation, and may be convulsive when the heart has sufficient power to palpitate violently.

Treatment.—Numberless remedies have been tried; among them stramonium, nitrate of amyl, chloroform inhalations, and so forth. Arsenic enjoys full favor and deservedly holds an important rank as a therapeutic agent.

DISEASES OF THE ARTERIES.

The larger blood-vessels, both arteries and veins, are liable, like the heart itself, to various structural changes in disease, which, of course, lead to more or less serious disturbances in the circulation of the blood.

Symptoms.—Arteritis or inflammation of the substance of a blood-vessel, commonly commencing with the inner coat of the artery and extending through the whole structure of the wall of the tube, is a rare affection and scarcely ever detected before death.

Fatty and calcareous degenerations of the arteries are much more common, and consist in the deposit of fatty or chalky material in the arterial walls, generally in patches varying in size from a mere speck to an inch or more in diameter. This condition is commonly spoken of as a hardening of the arteries.

Treatment.—These diseases do not occur until after middle life, and no satisfactory treatment has been found.

PART VI OF BOOK IV

Treats of the diseases of the respiratory system, their causes, symptoms and treatments.

ILLUSTRATIONS

CURATIVE MEDICINE

PART VI

DISEASES OF THE RESPIRATORY SYSTEM

ASTHMA.

Causes.—An exciting cause may be an impurity of the blood. More commonly it arises from indigestion, bronchitis or valvular disease of the heart. Hay asthma is caused by the inhalation of particles such as arise from dried hay. The pollen from flowers and also from dogs, cats and other animals frequently give rise to it.

Symptoms.—This disease comes on in paroxysms. The paroxysm may be preceded for a variable time by a sense of oppression and constriction about the chest, with wheezing respiration. In many instances, however, it develops without any warning and most commonly at night. The patient awakes suddenly, scarcely able to breathe, and is forced to assume the sitting posture, or even to stand erect, with the shoulders raised and fixed, the head thrown back, the mouth open and all the extraordinary muscles of respiration brought into play to assist those powers of the system which are usually sufficient for the purpose. The face, in severe cases, wears an aspect of terror, the eyes are widely opened, the skin is pale and dusky and often bedewed with sweat. The feet and hands are cold and the pulse small and quick. The breathing, however, is not hurried, but inspiration is short and jerky and expiration inordinately prolonged. On percussion, the resonance of the chest is found to be increased and auscultation shows the vesicular breath-sounds are weak or suppressed and attended with whistling or cooing noises called râles. Toward the end of an attack, which may last for several weeks, cough comes on with the expectoration of small, firm, solid pellets of mucus, in rare cases mixed with blood. The duration varies greatly, the paroxysm passing off in a few minutes or lasting for many days. When it continues long, or is left to itself, it is apt to subside gradually; but if brief or cut short by treatment, it often ends abruptly.

Diagnosis.—The diagnosis rests upon the paroxysmal and usually sudden nature of the onset, the absence of moist râles as determined by auscultation, and the complete recovery of patients in the intervals of their attacks. The cooing and whistling sounds heard all over the chest show the absence of any serious obstruction in the larynx and trachea, and the muscular effort being made for the purpose of inflating the lungs chiefly in asthma, from heart disease, instead of also in expiration as in the spasmodic form, which we are now considering, is another indication of value.

Treatment.—1. Among the most certain treatments are the inhalation of chloroform or ether and the hypodermic injection of an eighth or a quarter of a grain of morphia, either of which, in a majority of instances, may be depended on to relax the spasm and afford prompt relief.

2. Some of the most reliable internal remedies are chloral in fifteen-grain doses, which should be employed with great caution, or not at all if the heart is organically affected; ten or fifteen drops of tincture of lobelia or of ipecacuanha, as a nauseant or emetic, belladonna, valerian and strong black coffee.

3. The inhalation of the vapor of stramonium leaves, produced either by burning them on a red-hot shovel or smoking them in a pipe, and of the smoke of soft bibulous paper which has been soaked in strong saltpetre water and then dried, often affords relief, and, perhaps, as often fails in its desired object.

4. The treatment during the interval between the paroxysms must be directed toward building up the general health and fortifying the nervous system against the exciting causes of the disease. In some instances the action of small doses of lobelia is highly beneficial, and in others, patients who have been for years great sufferers from asthma enjoy a complete immunity from the malady as long as they keep themselves under the influence of iodide of potassium by taking from five to ten grains of it three times daily.

5. If medicinal treatment for the prevention of asthma proves unsuccessful, a change of climate and particularly a sea voyage should be undertaken, and it is claimed by some physicians in Colorado that the air of that region is almost a specific against asthmatic complaints.

HAY FEVER.

Symptoms.—Hay asthma or rose cold, commonly called hay fever, is a very prevalent form of asthma which comes on with symptoms of ordinary but severe cold in the head, constant sneezing, great discharge from the nose and in many cases intense difficulty of breathing. Many sufferers from this curious malady are perfectly well until a certain day in one of the months of June, July or August of every year, when they wake up in the morning, perhaps, with the symptoms above described.

Causes.—As already remarked, this form seems to be due to the inhalation of pollen from certain grasses or flowers, but when once commenced it may continue for several days, or even weeks, after its supposed cause has been removed.

Treatment.—Many cases of Hay Fever respond to the serum treatment. There is now prepared a serum for the various pollens that produce the disease, such as Golden Rod, Rag Weed and many other pollens. The White Mountains or certain seaside resorts are looked upon by some patients as absolutely necessary for their health and comfort during an attack of this complaint. Adrenalin used in an atomizer three to six times a day will afford great relief.

Various Forms of Asthma.—Under the title of industrial asthma have been grouped several kinds of pulmonary disease, incident to different trades and occupations. These include saw-grinder's asthma, miner's asthma, potter's asthma and miller's asthma, caused by the mechanical irritation of minute particles of dust in the respired air.

NOSE CATARRH.

Symptoms.—This disease, so well known to every one as a common "cold in the head," is often epidemic, and is characterized at first by chilliness with sneezing and later by an abundant discharge of fluid from the nose. When severe it is attended with slight fever, pain and sense of weight in the head, pain in the limbs, prostration of strength, irritability of temper and inactivity of mind.

Causes.—Its origin can generally be traced to some imprudent violation of the laws of hygiene, such as exposure to draughts, insufficient clothing, sudden cooling when heated, and so forth.

Treatment.—The number and diversity of the infallible remedies for a common cold is sufficient evidence of their generally unsatisfactory nature, but as the natural duration of the disase is from three to five days, the third or fourth medicine which receives twenty-four hours' trial often gains the credit of accomplishing a cure. If, as is usually the case, the bowels are constipated, a saline purgative, such as a Seidlitz powder or a bottle of citrate of magnesia, will usually relieve the headache, and then light diet, abstinence from fluids for a day and ten grains of Dover's powder at bed-time often seem to hasten the departure of this unwelcome guest.

LARYNGITIS OR INFLAMMATION OF THE LARYNX.

Three Forms.—This disease, which is one of the accompaniments of a common cold whenever hoarseness of the voice comes on, presents itself under three forms: First, the acute or edematous; second, the subacute or catarrhal, and third, chronic laryngitis. The first of these varieties may, if not properly treated, prove quickly fatal, by closing up the avenue of entrance for the air to the lungs and thus causing death by suffocation.

Symptoms of Acute Form.—Acute or dropsical laryngitis may commence as a slight catarrh, quickly followed by high fever. Speech, cough and respiration are all soon modified. The voice at first metallic, soon becomes whispering. The cough primarily clear and shrill, then harsh and croupy, is also reduced to little more than a whisper, and a peculiar noise like a loud whisper accompanies both inspiration and expiration, which are, from the beginning almost, laborious and wheezing. As soon as the dropsical swelling comes on and still further narrows the opening of the glottis, the effort to breathe becomes exceedingly painful and difficult and the patient's countenance expresses great anxiety.

Treatment.—1. Since acute laryngitis in the adult may destroy life in a few days, or even hours, it should be treated actively from the first onset by bleeding, if the patient is robust, or by leeching, active purgation with five or ten-grain doses of calomel and jalap and calomel in grain doses every two hours to the extent of producing slight salivation as rapidly as possible.

2. If the inflammatory swelling proceeds or if dropsy comes on and interferes with the respiration sufficiently to cause lividity or blueness of the lips, the operation of opening the windpipe should be at once performed. It is better to open the trachea or windpipe sooner than is absolutely necessary, than to postpone the operation until the blood has been rendered very impure by want of a proper supply of oxygen; yet even up

to the last gasp and for, perhaps, a minute afterward, life may be saved by the surgical operation.

3. For children the danger to life from this malady is comparatively slight, so that bleeding and calomel may generally be dispensed with, and emetics, such as syrup of ipecacuanha or Coxe's hive syrup, in ten-drop doses every three hours for a child of three years old, with the inhalation of warm opiate vapors, as, for example, that from the spout of a teapot, in which has been placed with a small quantity of boiling water fifteen or twenty drops of laudanum, are generally sufficient.

Subacute Form.—The subacute form of laryngitis rarely passes into the acute variety, and is, therefore, of but little importance. If severe, the same treatment by expectorants, nauseants and anodynes, recommended in acute laryngitis of children may be employed. Complete rest of the voice should be enjoined and inhalations of the various anodyne and astringent sprays are of great service in chronic cases.

Image of Vocal Apparatus as Seen in the Laryngoscopic Mirror Held Far Back in the Mouth.

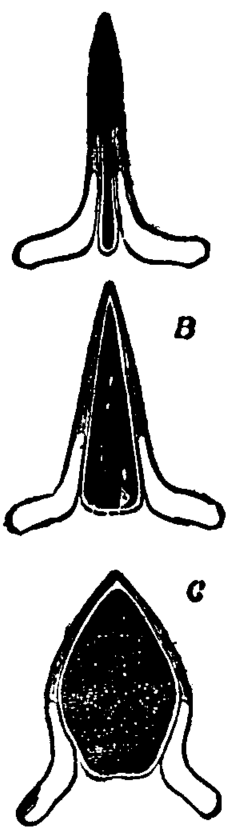
Chronic Laryngitis

Symptoms.—Chronic laryngitis is accompanied with actual thickening of the vocal cords, which, if the deposit be not subsequently absorbed, produces a permanent change in the voice. The respiration is usually but little affected, yet there may be a little tickling cough, an expectoration of small fragments of mucus and an almost constant desire to clear the throat.

Treatment.—Rest, by the avoidance of speaking above a whisper, a warm, moist atmosphere and medicated inhalations, are the important elements of treatment in this affection in its simple form.

The Laryngoscope.—By means of a small, metallic looking-glass, called a laryngoscope, a view of the epiglottis, the glottis itself, and, in favorable instances, the interior of the larynx, with some of the upper rings of the trachea, may be obtained. Such a view is given in the accompanying illustration.

Treatment of Throat Ulcers.—When, by means of the laryngoscope, the existence and seat of an ulcer can be established, it should be touched with a strong solution of nitrate of silver, in the hope of thereby promoting a tendency to heal; or inhalations of astringent solutions, such as that of the sulphate of zinc, or of copper, and of carbolic acid may be employed.



Changes of Position of the Vocal Cords.

TRUE CROUP OR PSEUDO-MEMBRANOUS CROUP.

For a full description of the causes and treatment of this disease see pages 437, 980, 1272.

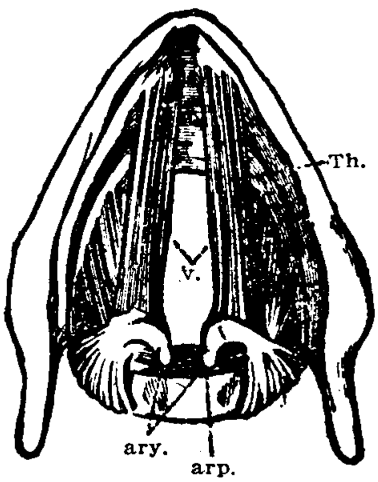
DISEASES OF THE VOCAL CORDS.

Tumors in Vocal Cords.—The development of new growth or little tumors within the cavity of the larynx is a cause of local obstruction to the breathing, which is happily rare. The three different kinds which have been met with are, first, the warty growths, having a firm structure, and attached to the inner surface of the laryngeal cavity by a broad base; second, polypoid growths, similar to those already mentioned as occurring in the nose, of a soft and jelly-like consistence attached to the mucous membrane by a pedicle or stem; and, third, cysts or hollow bags, containing, in some instances, parasites.

Paralysis of Vocal Cords.—Paralysis of the vocal cords, resulting in aphonia or loss of the voice, is a very grave misfortune under certain circumstances, as, for example, to clergymen or lawyers.

Changes in Vocal Cords.—The changes in position which these vocal cords undergo in the different processes in which they are concerned, will probably be understood by reference to the accompanying diagram. At *A* is shown the appearance of the chink of the glottis, formed by the edges of the vocal cords, as it appears when examined by the laryngoscope whilst the patient is engaged in singing. *B* exhibits the condition in which it usually appears during easy and quiet respiration; and at *C* is represented the arrangement during forced inspiration or drawing a long breath.

Muscular Arrangement of Larynx.—The figure in the margin illustrates the arrangement of the muscles of the larynx, as seen after the membrane and elastic tissue constituting the vocal cords has been removed. *Th* represents the large and firm thyroid cartilage; *Ary* the upper ends of the arytenoid cartilages, to which the posterior ends of the vocal cords are attached; *V* indicates the position of the vocal cords. At *Arp* is represented the band of muscle called the posterior arytenoid muscle, which has the duty of pulling the arytenoid cartilages together, and so narrowing the slit of the glottis between the vocal cords as to cause the production of just the right sound for any particular note in singing. The mechanism of hoarseness in the voice or cough is simply as may be understood with ease from this diagram, that the edges of the vocal cords becoming thickened by congestion or slight inflammatory action can no longer vibrate quickly enough to produce the higher notes of the voice.



Muscles of the Larynx.

Loss of Voice.—In paralysis of the muscles of the glottis, which, small as they are, the explanation given a few pages back shows to be very important, not only is the power to produce audible voice sounds lost, but breathing is rendered difficult, and great distress is produced by the inability to take a long breath. Aphonia, or loss of voice, is of two kinds, the simulated and the true. An imitation of the real disease is generally hysterical in its character, and though it may last for a long time, is never really permanent; it may sometimes be recognized by the aid of the laryngoscope.

Treatment.—True aphonia is due to actual palsy of these little laryngeal muscles, is generally dependent upon some serious injury or disease, and therefore in most instances incurable. The treatment of the pretended aphonia is that of hysteria. In bad cases chloroform may be given with advantage. During the intervals between the attacks, the bitter tonics, cod-liver oil and iron, and treatment for any uterine derangement, as described in the chapter on Diseases Peculiar to Women, should such disorder exist, are strongly indicated and will generally accomplish a cure in the course of time.

COMMON COUGH OR BRONCHIAL CATARRH.

Character.—This every-day disease is a subacute inflammation affecting the larynx, trachea, and larger bronchial tubes, sometimes commencing with nasal catarrh and traveling down, as it were, to the pulmonary organs. At other times, or in other patients, it appears to originate in the larynx, and does not affect the nasal passages at any time during its course.

Predisposing Causes.—The predisposing causes to this common affection are enumerated as being the loose, flabby texture of tissue in certain individuals, especially those who are the subjects of the scrofulous diathesis, and rickety children; second, a previous attack, and third, effeminate modes of life.

Direct Causes.—The directly exciting causes are:

1. Chilling of a portion of the skin, and especially the change of temperature of a portion of the body produced by sitting in a draught of air whilst perspiring freely, or with damp clothing or wet shoes.

2. Irritants acting directly on the mucous membrane lining the air-passages, such as dust, acrid vapors, or hot and cold air, and the grinders, millers and stone-cutters.

3. Obstruction to the current of the blood through the great branches of the aorta below the origin of the bronchial arteries, such as may be caused by abdominal dropsy, accumulation of gas, or of refuse matter in the intestines.

4. As a result of morbid states of the blood, as seen when bronchial catarrh is a premonitory symptom of typhoid fever, measles and small-pox.

Symptoms.—The general symptoms of a common cold on the breast are so well known to every one that it is not worth while to occupy space in describing them, and yet, frequent as is popular acquaintance with this disease, few persons realize the terrible dangers which attend upon a neglected cough.

Treatment.—1. The most important thing in relation to this malady is to prevent its occurrence. This could probably be accomplished in four cases out of five by the exercise of a troublesome amount of prudence, which, however, would be well expended were young people willing to make the effort to escape this frequent cause of early death. When, however, a person is unfortunate enough to contract a cough by his own imprudence or otherwise, it may often be cut short by bringing on a free perspiration. A good way to accomplish this is to take a hot mustard foot-bath and ten grains of Dover's powder on retiring for the night, wrapping the throat up in flannel if it feels sore, and being very careful not to undo, and more than undo, the beneficial work of this treatment by uncovering oneself in the night, or by imprudent exposure the next day.

2. If this method is not resorted to early enough, or if it fails and the cough goes on unchecked, ten-drop doses four times a day of antimonial, or ipecacuanha wine, and nitrate of potash, or muriate of ammonia in quantities of five grains every three or four hours, are generally useful.

3. By the third or fourth day great advantage may be derived from the use of a mixture of half a teaspoonful each of syrup of squills and syrup of wild cherry with one-twelfth grain of cyanide of potassium every six hours. If this remedy agrees with the patient it may be taken more frequently or in sufficient doses to quiet the cough through the night, but it must be used with great caution, as it contains ingredients which are poisonous in over-doses, or ammonia chloride, $1\frac{1}{2}$ drachms; Brown's mixture, 4 ounces. One to two teaspoonfuls every three hours.

4. Should the disease persist notwithstanding the employment of these various medicines, counter-irritation with croton oil and tincture of iodine applied to small spots on the upper part of the chest in front, or croton oil alone rubbed on the back, also with great caution, should be resorted to without that further delay during which the catarrhal irritation of the bronchial tubes might become chronic, as it is commonly phrased, and the cough get such a hold that it cannot be shaken off.

Auxiliary Treatment.—A very important part of the treatment is the breathing of a continuously warm, moist atmosphere, and for children especially, the prescription of one warm room is probably more conducive to recovery than any one of the medicines suggested. Particularly ought young children, in whom previous experience has shown there exists any tendency to croup, to be guarded against the development of that dangerous affection by even the slight additional exposure of passing through a cool entry to their meals. At the same time the apartment to which the invalid is confined must not be kept too warm, and due attention should be paid to its proper ventilation.

BRONCHITIS.

Character.—This disease, an inflammation of the bronchial tubes, or air-passages leading to the pulmonary vesicles, is characterized by hoarseness and moderate cough, with heat and soreness of the chest in front, all these being more or less intense according to the severity of the attack. In every common cough there is always some bronchitis, but the element of danger lies in the extension of the inflammatory action to the smaller bronchial tubes or bronchioles, and the approximation consequently to that fatal form of the malady termed capillary bronchitis.

Simple Bronchitis Symptoms.—Simple bronchitis is usually ushered in with a slight chilliness, general discomfort, and some febrile disturbance. A sense of constriction about the chest and some deep-seated soreness beneath the breast bone soon follow. The respiration is slightly increased in frequency, but no urgent dyspnœa is generally present, unless the patient is a sufferer from some chronic affection of the heart or lungs, as, for example, valvular disease of the former organ. Cough is uniformly present in bronchitis, is worse after sleep, and, as a rule, paroxysmal. The expectoration is at first scanty and viscid, but soon becomes more abundant, white and frothy, and still later yellowish or muco-purulent. In this latter stage the cough is looser, less painful, and the phlegm is expectorated more easily.

Capillary Bronchitis Symptoms.—Capillary bronchitis usually develops out of the simple form, and therefore its onset can hardly be said to be characterized by any well-marked symptoms. Occasionally, however, a sharp chill defines the date of its attack. When developed, the patient breathes with difficulty, the complexion is dusky, and the countenance betrays anxiety. The superficial veins are over-filled, as a consequence of the obstruction to the pulmonic circulation, and the movements of the sides of the nostrils are exaggerated. The respiration and pulse are quickened, the former very much so, and out of proportion to the latter. The cough is almost constant, and the expectoration, at first frothy, and after a time yellowish, is expelled with considerable difficulty. Troublesome pains in the intercostal muscles, brought on by the unremitting exertion of coughing, are of frequent occurrence, the temperature rises to a considerable elevation, and the restlessness is extreme; the renal excretion is scanty, and sometimes a little albuminous. In fatal cases the prostration becomes intense, the skin livid, cold and clammy. Dropsy of the feet and legs may come on, and at last fitful drowsiness or muttering delirium precede coma and death.

Acute Bronchitis Diagnosis.—The diagnosis of acute bronchitis is ordinarily not difficult. Capillary bronchitis must be distinguished from pneumonia, which can generally be done by the greater amount of fever and disturbance of the respiration as well as the dullness on percussion, tubular breathing, and irregular distribution over the chest of the latter affection. In acute tuberculosis, or galloping consumption, the violence and irregularity of the fever, the rapid collapse of strength, and the extreme dyspnœa, out of all proportion to the physical signs, indicate the nature of the case in most instances.

Treatment.—1. A threatened attack of bronchitis may sometimes apparently be cut short by a hot foot-bath and dose of Dover's powder, as already suggested, and a full dose of ten grains of salicin or of quinine will perhaps aid the good work of this treatment.

2. After the disease is fully developed the remedies are chiefly palliative, and consist of opiates, such as morphia, belladonna, or preferably, in many cases codeia, in half-grain doses, to quiet the cough and promote the expectoration. The softening of the secretion, and easing of the incessant cough, are also promoted by keeping the patient in a moist atmosphere, as suggested in regard to croup.

3. Pain in the chest can often be relieved by mustard-plasters and stimulating liniments, or painting with tincture of iodine. Half teaspoonful doses of the syrups of squills, ipecacuanha and lobelia, every two, three or four hours, according to the urgency of the symptoms, are probably useful, and the iodide of potassium, in five-grain doses, if well borne by the patient without irritating the mucous membranes of the eyes and throat, as it sometimes does in a singular way, is highly recommended.

Diet.—There is no need of restricting the diet in this disease, and any wholesome food which the patient craves may be allowed. In the treatment of the capillary bronchitis of young children it is necessary to use opiates with much greater caution, and the occasional administration of an emetic, to aid in clearing out the accumulated mucus, is important. Counter-irritation by mustard or turpentine may be tried, and dry cupping often gives great relief.

Chronic Bronchitis.—Chronic bronchitis is a very common malady, its frequency increasing with the coming on of old age. It may be chronic from the outset, or be the result of the acute form. Chronic lung diseases generally are apt to lead to it, and so does the abuse of alcohol.

Treatment.—Chronic bronchitis, especially when in the form called dry catarrh, is often relieved by a mixture containing five grains iodide of potassium and five drops wine of colchicum to the dose three times a day.

PNEUMONIA OR INFLAMMATION OF THE LUNGS.

Causes.—This disease, called also lung fever, is the most serious of the common acute diseases of the pulmonary organs. Long continued exposure to cold is apt to be the exciting cause of pneumonia; but there are some reasons for supposing that it is, at least in many instances, a local manifestation of a general disease, perhaps contagious in its character. It often comes on in the course of other grave maladies and adds very much to their fatality.

The Stages.—The three stages through which this complaint passes in typical cases, are, first, that of congestion, where the lung is engorged with blood; second, that of red-hepatization, in which the inflamed lung is dark red and solid like a piece of liver, sinking in water and breaking down readily under the pressure of the finger; and, third, the stage of grey-hepatization, in which the affected pulmonary tissue is still dense, but of a yellowish-grey color.

Symptoms.—1. The symptoms of an ordinary attack of pneumonia, coming on from exposure to cold, in a robust adult, are quite characteristic. The disease usually sets in with a single severe and prolonged chill, after which the temperature of the body rapidly rises to a high point and this rise is accompanied by the customary symptoms of fever. Pain is commonly felt about the region of the nipple on the affected side and is sharp, stabbing and aggravated by movement in breathing or otherwise, and also by pressure.

2. There is, likewise, well-marked dyspnœa, characterized by extremely frequent, shallow breathing, quite different from the kind of dyspnœa observed in bronchitis and in asthma; the rapidity of respiration ranges from twice to four times the frequency of health; that is, from about thirty to sixty per minute; and this increase in the number of the respiratory efforts is partly due to fever, partly to impurity of the blood and partly to the pain which prevents drawing a full breath. The sides of the nostrils are commonly in active movement at every inspiration.

3. The third prominent symptom is cough, generally frequent, hack-

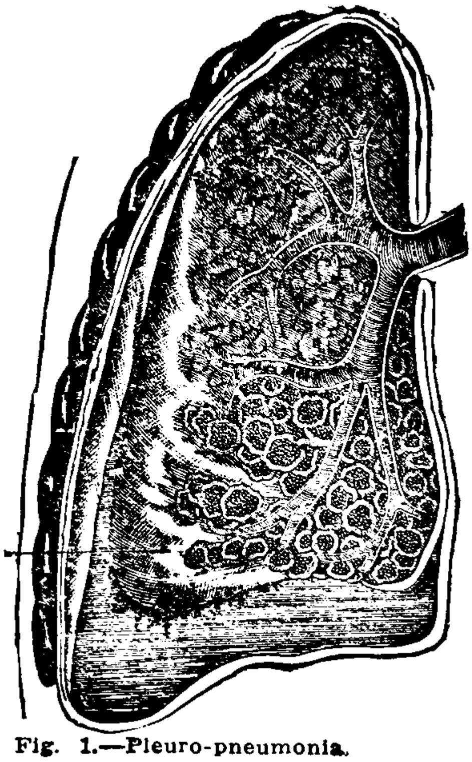
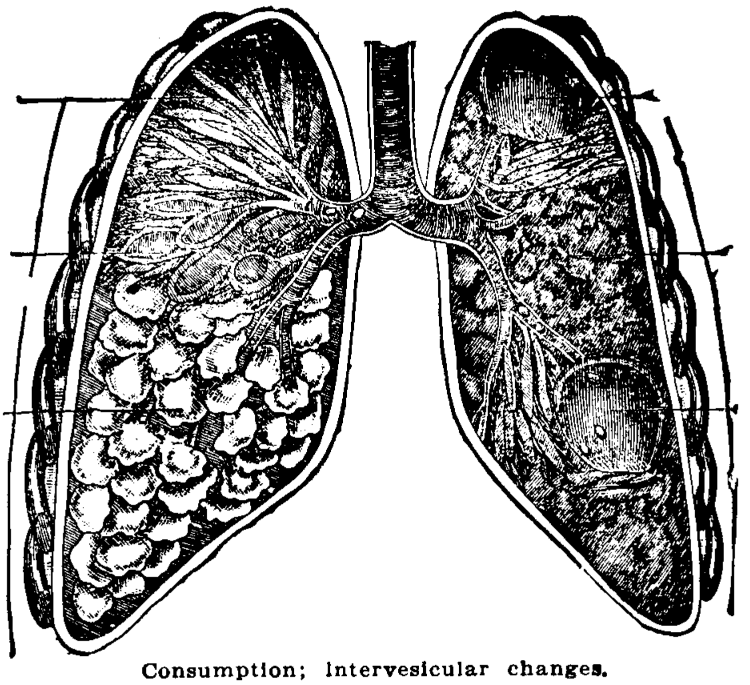


Fig. 1.—Pleuro-pneumonia.



Consumption; intervesicular changes.

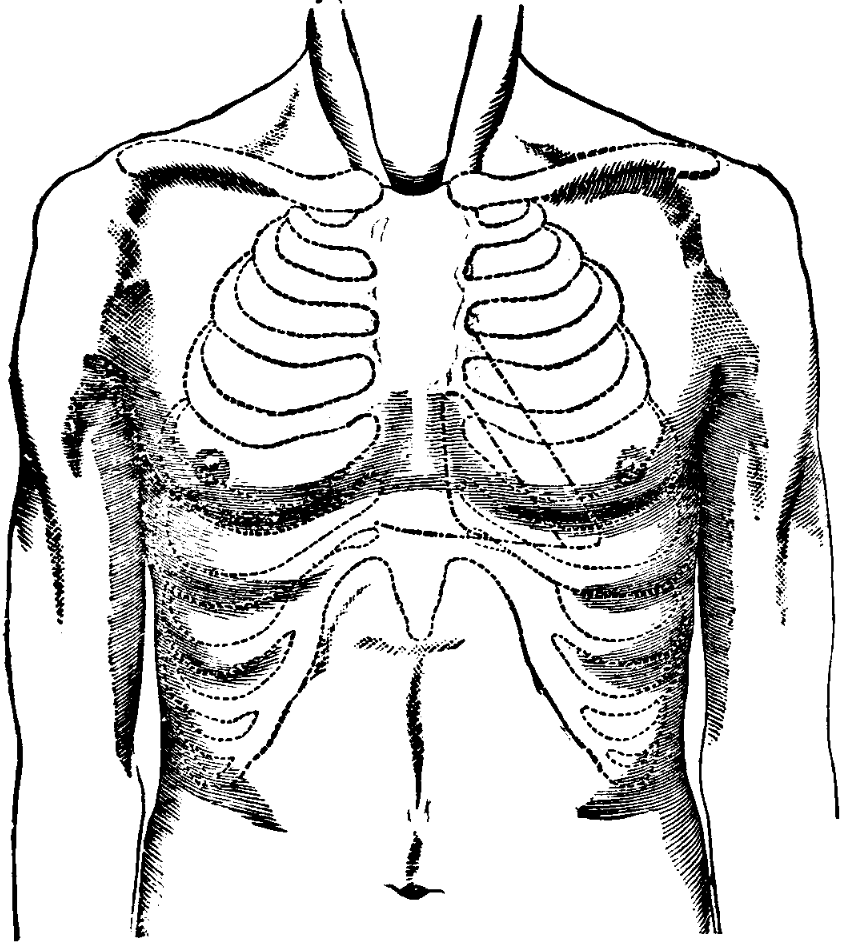


Fig. 3.—Surface of the breast in a normal condition; contours of cardial torpor to the left of the breast bone. The spaces included in the dotted lines represent the intermediate spaces

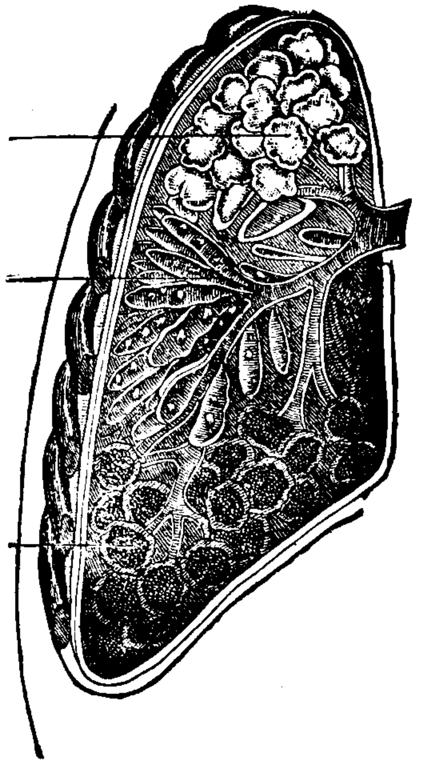


Fig. 4.—Croupous or vesicular pneumonia. Estate of consolidation.

ing and constrained on account of the suffering which it causes. It is dry at first, but on the second or third day the patient commences to bring up at each paroxysm of cough, some of the peculiar, viscid material of exactly the color of rusty iron. This expectoration does not occur in young children, is often absent in secondary pneumonia and in the pneumonia of the aged. The fever usually attains its height on the second or third day.

4. The pulse is usually strong and full at the outset, but later on in the attack it becomes small and weak, partly as a result of the imperfect filling of the arteries from obstruction of the pulmonary circulation and partly from cardiac feebleness. The cheeks are flushed to a very marked degree and an eruption of little blisters, a variety of herpes, is sometimes present upon the lips, which are of a dusky hue. Prostration, feebleness, headache, restlessness and delirium at night are common. The tongue is dry and coated, the thirst is eager, but the appetite for food is lost and the bowels are costive.

5. In favorable cases, these symptoms which have been detailed gradually increase up to the fifth, sixth, or seventh day and may then rapidly subside, the temperature falling to the natural standard two or three days later, and the solidified portions of the lung clearing out occasionally with wonderful celerity. The cough and dyspnœa speedily abate, and the sputum becomes yellow and muco-purulent. When the malady ends fatally, death usually occurs about the end of the first or early in the second week, and results from failure of the action of the heart, or else from pulmonary embarrassment.

Treatment.—1. There is no doubt that the intense pain accompanying the onset of pneumonia can be promptly relieved by blood-letting; but since the tendency of the disease is toward death by debility and it is impossible to say in any given case how far over the pulmonary structure the inflammation will extend, we can never feel sure that the loss of the vital fluid abstracted will be safely borne by the patient. In very robust persons, in the prime of life, it is proper to bleed; because the chance of diminishing the violence of the attack thereby is at least equal to the danger of seriously decreasing the strength. In less vigorous individuals, leeching or cut-cupping, and in patients of feeble constitutions, dry-cupping will generally afford considerable relief.

2. Large doses of quinine, even as much as twenty or twenty-five grains, may be given at the first onset, in the hope of cutting short the disease and later on for the purpose of reducing the fever, which in itself

is a great cause of danger, as already explained. Opiates in the form of Dover's powder, the hypodermic injection of morphia, or of codeia in half-grain doses, when the latter medicine suits the patient, are of great service in diminishing suffering, procuring sleep and allaying cough.

3. Toward the latter part of a severe attack the chief treatment is that of nutrition and stimulation, and as there is often in this disease a great tolerance by the nervous system of alcohol, such as we see in typhoid fever, immense amounts of milk-punch, or diluted brandy and whiskey, are sometimes consumed with apparent benefit. Alcoholic stimulants should never be given to the extent of producing symptoms of intoxication, but short of this point they are of great service in keeping up the action of the heart and thus preventing the fatal effect of cardiac failure.

4. Since the immediate cause of death in many examples of fatal pneumonia is the over-distension of the right side of the heart, with consequent separation of fibrin in the partially stagnating blood constituting heart-clot, it is advisable to diminish this tendency to coagulation of the blood in the heart and the production of a thrombus by the administration of five grains of carbonate of ammonia every three or four hours, which, however, ought not to be continued for more than a day or two.

Diet.—During convalescence from inflammation of the lungs danger from relapse is not nearly so great as in many other maladies, such, for example, as diphtheria, and hence free indulgence of the appetite for all wholesome food and out-door exercise, as soon as the strength permits, may be allowed.

EMPHYSEMA (LUNG DISTENSION).

Varieties.—The two varieties of emphysema are, first, the vesicular, in which the vesicles are distended and dilated, and the interlobular, in which the air has escaped from the air-cells in consequence of their rupture, and diffused itself through the connective tissue of the pulmonary substance. This condition is commonly the result of accidents leading to great straining in the respiratory muscles, as in the violent paroxysms of whooping-cough and of asthma, and men or animals who are the subjects of emphysema are popularly and very accurately described as "broken winded."

Symptoms.—The symptoms of emphysema are in direct proportion to the amount of lung-tissue affected, and consist of dyspnœa which resembles that of asthma and is unlike that of valvular disease of the heart in being especially marked during the effort at expiration. Cough is usually present, but is not attended with expectoration, unless the disease is complicated with chronic bronchitis, as is frequently the case. In bad cases of emphysema the interference with the aeration of the blood is so great that the complexion is dusky and the patient languid and dull.

Treatment.—The treatment of this disease is limited to palliating the symptoms as much as possible, and remedying the maladies, such as chronic bronchitis or asthma, with which it is frequently complicated. Anodynes, which appear urgently called for to relieve the pain and distress must be employed with caution on account of the imperfect aeration of the blood, which is already an element of danger. Dry cupping between the shoulders is often of service, and the use of quinine, iron and strychnia, as directed in anemia, is beneficial by improving the general health. Change of residence to a warmer and more equitable climate than that of the northern United States is probably the best remedy we can urge upon patients afflicted with emphysema.

TUBERCULOSIS.

How We Get Tuberculosis.—We can get tuberculosis only by receiving into the body the little germs known as the tubercle bacilli. The consumptive infects another, or gives tuberculosis of the lungs to another, by means of the tubercle bacilli in the material coughed up from the diseased lungs, which often contains millions of these germs. The germs get out of the body of a person who has tuberculosis, not only in the material which is coughed up, but also in the little drops, too small to be seen, which are sprayed out when persons with tuberculosis cough or sneeze.

Great care should be taken to destroy all material coughed up by the consumptive, and to avoid careless coughing and sneezing. If this is not done, and the sputum is discharged on the floor or carpets or clothing, the germs may live for months, especially in dark, damp, unventilated bedrooms, living rooms, and workrooms.

The germs will live in the darkness and dampness for a long time, and are stirred up in dusting and sweeping these rooms, and float in the air and may be breathed into the lungs, or may fall upon articles of food and be taken into the body in that way.

The disease is often called CONSUMPTION, for the reason that during its progress the patient loses weight rapidly, and hence seems to be consumed. Tuberculosis may infect any other part of the body besides the lungs, such as the bones, joints, intestines, glands, brain, spinal cord, and the skin, but of all forms of inflammation, that of the lungs is most common. *The tubercle bacillus is the only cause of the disease.* Twenty-five hundred of these germs placed end to end would not be one inch in length. These germs may gradually spread through the greater part of one or both lungs, destroying the usefulness of those organs until finally the patient dies of the disease.

Many people think that pulmonary tuberculosis comes from a cold or some other disease, or is inherited. This is not correct. The reason why people develop tuberculosis after a prolonged cold or pneumonia or other exhausting disease is because their systems have run down to such an extent that they are not strong enough to resist the tubercle bacilli when taken into their bodies. These germs are widely distributed, and practically all people breathe them in at times. If their systems are in excellent condition, the germs do not gain a foothold and start the disease. Any condition that weakens the body predisposes one to consumption.

Symptoms.—There are a number of symptoms which might lead a person to suspect that he has pulmonary tuberculosis, namely: loss of weight, loss of appetite, loss of color, fever in the afternoon, cough and expectoration lasting for several weeks, spitting of blood or streaks of blood in the sputum, chills, night sweats, difficulty in breathing, and pains in the chest.

In incipient tuberculosis the commonest symptoms are loss of weight with cough and expectoration. When these symptoms occur it does not necessarily mean that tuberculosis exists, but it would be wise for a person having them to consult a physician.

Medicines.—There is no medicine that will cure consumption. It is a waste of time and money to use so-called "Consumptive Cures." All advertised cures of this nature are frauds. Doctors who advertise should be avoided as much as medicines which are advertised. Reputable doctors do not advertise.

Treatment.—The treatment for tuberculosis is rest, with plenty of fresh air, and enough good wholesome food. No medicine is necessary except in cases where other diseases are present. The disease may be cured at home in many instances if it is recognized early, and proper means are taken for its treatment. When a number of a family is found to have consumption and cannot be sent to a sanatorium, arrangements for taking the cure at home should be made as soon as the disease is discovered.

It is important, in the treatment of tuberculosis, to breathe air that is fresh and pure, to eat an abundance of good food, to stop heavy work and worry, and to take a bodily and mental rest by lying down before and after the noon and evening meals. To obtain the first, the patient must live out of doors. This means that as many hours of the day and night as possible should be spent in the open air, and in order to carry out this treatment some place must be provided which is not only protected from wind, but also from rain and snow, as nothing except the most severe cold weather should prevent the patient from living and sleeping there. The outdoor shelter should be large enough for a bed, a reclining chair, and a table. It should overlook pleasant and sanitary surroundings if possible, as it is to be the home of the patient for months, and will give better results if comfortable and attractive.

Tenement house dwellers and persons living in apartment houses in large cities should make every effort possible to give the open air treatment to a member of the family who contracts tuberculosis. First, consider the possibility of moving into the suburbs or nearby small towns. If this cannot be done, try to obtain from the landlord the use of the roof, and build a small shack there. If this is beyond the means of the family, use one room with a window opening on the street or large court for the patient, and then place the head of the bed beside the window and cover it with a window tent. The cost of a window tent is about $10, and if it cannot be obtained, take two large heavy cotton sheets, sew them together along the edge, tack one end of the double sheet to the top of the window casing and drop the lower end over the outer side of the bed, fastening the bottom of the sheet to the bedrail with tape. There will be enough cloth hanging on each side of the window to form the sides of the tent, and these should be fastened to the window casings. A window tent can be made at home for about $3 by using 12 or 15 yards of heavy denim or light canvas. One straight piece of denim should be hung from the top of the window casing to the outer side of the bed, and the openings between this and the side window casings filled in with sides cut and fitted from the balance of the cloth. By these methods the patient gets fresh air from the window and the room is kept warm in cold weather as a place for dressing and toilet purposes. During mild and warm weather the tent can be removed and the window kept open both at top and bottom.

How to Arrange a Porch.—If the family lives in a small town or in the country, it will usually be found that a porch is the most convenient way of providing open-air quarters. In selecting a site for the porch, it is well to remember that the patient should be placed out of doors in such a way that the cure can be taken with comfort at all seasons of the year. For the winter months the best place is on the south side of the house, as there will be found the greatest amount of sunshine. If this cannot be done, choose first the east, or second the west side, but not the north side except as a last resort, for it is a windy and cold position in winter. The back of the house is usually better than at the front, if the porch cannot be seen from the street. *The most important thing is to find a sheltered spot, for wind is much harder to bear than intense cold.* If the house has permanent verandas, and you cannot afford a special porch, use a veranda, and obtain privacy by putting up canvas curtains or bamboo screens.

How to Build a Cheap Porch.—A useful porch can be built for $12 or $15 with cheap or second-hand lumber, and if only large enough to receive the bed and a chair will still be effective for the outdoor treatment. The roof can be made with a canvas curtain or a few boards and some tar paper. The end most exposed to the wind and rain and the sides below the railing should be tightly boarded to prevent draughts. A window can be used for the approach, but it will be more convenient if it is cut down to the floor and a small Dutch door put in below the window sash. Second and third story porches are supported from the ground by long 4 by 4 posts, or, when small, they can be held by braces set at an angle from the side of the house.

Bed and Bedding for Outdoor Sleeping.—An ordinary iron bedstead with woven wire spring 3 feet 6 inches wide and a moderately thick mattress are all that are necessary except for cold weather. A good hair mattress is best, but when this cannot be obtained, a cotton-felt mattress can be bought for $4, or a wool mattress for about $10. Over the mattress place an old blanket or a cotton bed-pad, the same width as the mattress, and on this the ordinary bed sheets or blanket-sheets. For those who like heavy bed covering as many blankets as desired may be used. Those who prefer light covering can use down comforts, or lamb's wool or cotton-filled comforts, or the material for wool or cotton quilts can be obtained for about $2 and warm covering made at home. Very cheap, light, but warm covering can be made by using paper blankets placed between two thicknesses of outing flannel or bed covers. These paper blankets are sold for fifty cents each and wear for about six months. A woolen horse blanket with an outside of canvas can be used as a covering to protect the bedding in wet and stormy weather.

Sleeping-Bags.—In very severe weather a sleeping bag may be used, and this is made by sewing blankets together around the edges, leaving the top open, using as many layers as desired. The blankets should be 7 feet long by 4 feet wide.

Arrangement of Pillows.—Place two pillows in form of an inverted V, with the apex at the top of the bed and the head at the point where the two pillows meet. This position allows the shoulders to nestle between the pillows and protects them from the cold wind.

How to Prepare the Patient for the Night.—In cold weather the outdoor sleeper should get into the bed in a warm room and have some one roll him out of doors. If this is impossible, use a warm dressing-gown in going back and forth from the dressing room to the porch, and warm the bed by placing in it for a few minutes before retiring a hot water bag, hot bricks, soapstones or bottles filled with hot water. In some cases it is well to leave a hot stone or bottle wrapped in flannel at one corner of the bed, where it will throw off heat slowly during the night.

All covers except the top blanket or comfort should be tucked in under the bed-pad. The topmost cover is then tucked under the mattress to keep the under covers from sliding off when the sleeper is restless.

Clothing Worn at Night.—A woolen undershirt, a sweater and a long outing flannel nightgown or bathrobe are usually worn, but in very cold weather some patients wear a pair of drawers made of flannel, a pair of bed-socks or knitted slippers, and a woolen abdominal bandage. *Never cover the head with the bedclothes.* The patient can wear a knitted skull-cap long enough to be pulled down to the end of the nose and over the ears, or a knitted helmet which covers the whole of the head, face and neck, with the exception of a small opening for the nose and mouth. Care should be taken not to interfere with the inhaling air or to allow the breath as it is expelled from the nose or mouth to come in contact with the cloth and form icicles. Chapping of the face during the night can be prevented by using cold cream or vaseline about the nose and lips.

General Directions.—Rest is a most important part of the open air treatment, and exercise must be regulated by the doctor. Always have at hand an extra wrap, and never remain out if chilled. Cold weather should have a bracing effect, and when it does not, go into a warm room and get a hot drink, preferably milk, remaining indoors until comfortably warm. When going out again use more wraps and keep behind a shield or screen that breaks the force of the wind. Always be cheerful and hopeful; never waste your strength in anger or being cross. Lead a temperate life, go to bed early and get up late; do not use alcohol in any form except when prescribed by your doctor. Do away with tobacco if possible, and use only weak tea and coffee in small quantities. Never swallow the matter coughed up, but always destroy every particle by spitting in a paper or cloth which can be burned. Never allow the hands, face, or clothing to be soiled by sputum, and if this happens by accident, wash the place soiled with soap and hot water. Men who have consumption should not wear a mustache or beard unless it is trimmed close. Particular care must be taken, when sneezing and coughing, to hold in the hands before the face a cloth which can be burned. Soiled bed-clothes, night-dresses, other washable garments and personal linen should be handled as little as possible until they are boiled prior to their being washed. The dishes used by the patient must be boiled after each meal.

All this means care and work, but must be done both as a protection to the household and in order to bring about a speedy cure for the patient.

Deep or full breathing is especially recommended to those who have consumption or any weakness of the lungs. See article on deep breathing.

CONSUMPTION OR PULMONARY PHTHISIS.

Character.—Tubercular phthisis or true pulmonary consumption is that form in which the peculiar tubercular matter is deposited in the lungs in small masses or tubercles, varying in magnitude, but generally about the size of a mustard seed. Such tubercles become centres of irritation, inflammatory action and suppuration, or formation of abscess, and these processes end by destroying a smaller or larger spot of the lung-substance, and leave a cavity or vomica in the pulmonary structure.

Causes.—The disease is constitutional, and according to the researches of Dr. Koch, the celebrated Berlin microscopist, contagious, the whole malady being the result of development in the lung of a very minute bacterium, named by Dr. Koch the bacillus tuberculosis. In America it is usually developed between the time of puberty and the twenty-fifth year, and in nine cases out of ten seems to be primarily lighted up by a cold or some depression of the nervous system.

Early Indication.—Hemoptysis or spitting of blood, usually in small quantity and only serious as a symptom of very grave import, is often one of the earliest indications of pulmonary consumption.

Galloping Consumption.—Acute phthisis or galloping consumption is the most rapid form of this terrible disease, and has been known to prove fatal in the short space of six weeks. It usually commences with chills and fever of the hectic type. Cough, dyspnœa on very slight exertion and out of all proportion to apparent amount of disease in the lungs, is almost a characteristic of the complaint. The expectoration soon becomes profuse, and is frequently tinged or streaked with blood. This blood is never mixed throughout the sputum so as to give it the color of rusty iron, which is so indicative of pneumonia. The pulse is frequent and feeble, the tongue red and furred, the appetite poor or absent entirely, and there is often a tendency to diarrhœa.

2. In the rapid progress of the disease there is, after a few weeks, great exhaustion, profuse sweating, speedy emaciation and restlessness, amounting in persons of nervous temperament to delirium. Acute phthisis coming on in this way is almost without exception fatal, but in rare cases there may be a decrease in the violence of the symptoms, and the patient enjoys a temporary improvement, only, however, to pass into the ordinary condition of chronic consumption.

Treatment.—The treatment of some of the very few cases which have ever been reported as cured was that of rest in bed, a liberal supply of fluid nutritious food and stimulants, frequent application of iced cloths to the chest to subdue the fever, these being at once removed if there was any tendency to faintness thereby produced, hypodermic injections of atropia to check the sweating, and pills or powders containing two grains or quinine, a half grain of digitalis, and opium in amounts of from a quarter to half a grain, four, five or six times daily.

CHRONIC PULMONARY CONSUMPTION.

Symptoms.—1. The onset of chronic pulmonary consumption is generally gradual, and marked by one or more of the symptoms of progressive debility and by loss of flesh, chronic dyspepsia, diarrhœa, alterations in the voice, and in females suppression of the monthly periods. In more than half the cases spitting of blood occurs, and a cold or cough is apparently the starting-point in very many instances. A dull, aching pain just below the collar-bones in front or the shoulder-blades behind is very often complained of, even whilst the amount of tubercular deposit is small, and is probably due to little spots of pleuritic inflammation. Muscular pains in various parts of the frame are often present. The short, dry, hacking cough of early phthisis is usually referred to some irritation about the larynx or trachea, but is, in reality, due to irritation of the bronchial mucous membrane.

2. Weakness of the voice and hoarseness are very common, and a

purplish mark upon the edges of the gums, where they come in contact with the teeth, is often observable, and is thought by some physicians to have considerable diagnostic value. In at least fifty per cent. of the patients spitting of blood appears early, and recurs at various intervals, giving the first positive evidence of the existence of consumption. Very rarely, however, is the expectoration of blood in the early stage of consumption directly dangerous to life.

3. Among the other symptoms loss of strength is one of the most constant. The patient soon finds that slight exertion, such as ascending a little hill, or even a short flight of stairs, causes fatigue, hurries the breathing and often gives rise to palpitation. The uterine functions in women are apt to be disturbed, and the liver becomes congested and tender. The tongue gets red and irritable, and little sores called apthæ form upon its sides and on the mucous membrane of the fauces.

4. Hectic fever coming on toward evening and giving a deceptive appearance of the flush of health to the emaciated countenance develops. There is a total loss of appetite with great thirst, and the loss of flesh is almost visible from day to day. The hair grows thin and loses it attachment to the scalp. The debility is extreme and exhaustive night sweats make their appearance. In females there is a total cessation of the menses, which is a most discouraging evidence of failure in vital power. An unmanageable diarrhœa often sets in and conspires with the other causes of debility to utterly prostrate the unfortunate invalid. The lower limbs become very painful, and dropsical swelling of the feet and ankles appears, constituting what is vulgarly called the bloating consumption.

5. Toward the close, cough and abundant expectoration become, if possible, even more troublesome. Great nervous restlessness, cramps in the legs, pain about the loins, distress in passing water, utter prostration and the ever present difficulty of getting the breath, tend to render the last few nights of existence most agonizing.

Diagnosis of Consumption.—It is so important that the diagnosis of consumption should be made at the earliest possible period, when the chance of life by change of climate is greatest. After the disease is fully developed, and the abundant expectoration, great loss of flesh and strength, night sweats, and associated sore throat from laryngeal tuberculosis manifest themselves, there is often no room for doubt that consumption has developed, even without the aid of auscultation and percussion; but in the incipient stage just grounds for suspicion are furnished by the presence of slight hacking cough which has resisted the usual remedies, a little

35

spitting of blood, provided the patient can be sure that it does not come from the gums or from the back part of the nose, and marked dyspeptic symptoms with loss of flesh and strength out of proportion to the length and apparent severity of the illness.

Treatment.—1. The treatment of consumption consists in the palliation of symptoms and the administration of tablespoonful doses, thrice daily, of cod-liver oil, the phosphates or hypophosphites of iron, lime, and the alkalies; the internal and external use of iodine, and last but not least, of persistent counter-irritation over the diseased spot in the lung, generally near its top and just below the collar-bone, with tartar emetic ointment. Nearly all the cases of recovery from well-defined phthisis, coming under the observation of the writer, have been apparently due in large measure to this system of treatment.

2. In the second stage of consumption—that is, after the deposit of tubercular matter has begun to soften and before any large cavities have formed—the prospect of cure by this or any treatment is diminished; but even from the third stage—that of the formation of large cavities and extensive destruction of lung-tissue—recoveries occasionally occur.

3. The palliative treatment of consumption further consists in relieving the cough and pain in the chest by expectorants and anodynes, improving the appetite and strength by tonics and stimulants, controlling the diarrhœa with astringents and correcting the derangements of digestion with antacids and other anti-dyspeptic remedies.

4. Most patients afflicted with phthisis will find themselves for a time benefited by, first, a cough mixture composed of acetate of morphia, cyanide of potassium, syrup of squills, and syrup of wild cherry or syrup of tolu, as already suggested, used chiefly at night to promote sleep in the nocturnal hours and allow the expectoration necessary to relieve the lungs from their accumulated load of sputum to be carried on in the daytime; or elix. of terpen. hydrate and codeine; second, by a pill of two grains of quinine, half a grain of digitalis, and one-fortieth of a grain of strychnia, with the addition of half a grain of iron, should the condition of anemia exist and there is no tendency to spitting of blood to forbid its employment; third, by a mixture of a teaspoonful of syrup of krameria, five grains of prepared chalk, twenty drops of compound spirit of lavender and ten of wine of opium, to check diarrhœa when that appears; and fourth, by powders containing five grains each of bismuth, soda, charcoal and pepsin, or ten of lacto-peptine, with wineglassful doses of the infu-

sions of gentian or columbo, as may be found best adapted to the particular case as stomachics.

5. For patients with whom morphia or opium disagrees, codeia, lactucarium, chloral, bromide of potassium, or hyoscyamus may perhaps be substituted, and in some instances morphia, where illy borne alone, becomes quite acceptable to the stomach when associated with one one-hundredth of a grain of atropia, or with twenty grains of bromide of potassium.

6. When obstinate diarrhœa torments the invalid, the metallic astringents, such as half a grain of sulphate of copper, or one-quarter of a grain of nitrate of silver, thrice daily, are frequently useful, or ten-grain doses of subnit. bismuth succeeds in controlling the intestinal disorder when all other remedies prove unavailing. The profuse and debilitating night sweats may often be checked by sponging with finely-powdered alum and whiskey, by full doses of quinine, or by hypodermic injections of the sulphate of atropia.

7. Seeing, however, that the prospect of curing consumption by medical treatment is so mournfully gloomy, it becomes doubly important to urge that every patient whose circumstances will admit should resort to a change of climate. And this migration ought to be made with scarcely a day's delay after some amply competent authority has determined by thorough examination the necessity of such a change in the colder seasons of the year.

THE HOFF PRESCRIPTION FOR CONSUMPTION.

Professor Hoff, of Vienna, claims most beneficial results from the following formula:

Arsenic Acid ....1 part
Carbonate of Potash ....2 parts
Cinnamyllic Acid ....3 parts

Heat this until a perfect solution is obtained, then add twenty-five parts cognac and three parts watery extract of opium which has been dissolved in twenty-five parts of water and filtered.

Dose: At first take six drops after dinner and supper, gradually increasing to twenty-two drops.

As long as the patient shows signs of improvement the dose should not be increased. It is sometimes beneficial to reduce it.

Professor Hoff claims that the physiological action of this remedy is peculiar, in that it does not arrest secretion in the respiratory or intestinal tract, while it has marked power to control inflammation and irritation. It stops all unnecessary and injurious coughs, relieves the soreness, quiets the irritation and brings rest. He claims that the results are usually highly satisfactory, that the cough diminishes more or less rapidly, dreamless sleep follows, the sputum becomes looser and the appetite increases. He claims that it supersedes cod-liver oil in more ways than one, not the least of which is that it is palatable, consequently it does not disorder digestion or produce nausea. By its use the cough is at once ameliorated, the perspiration is diminished, the patient is strengthened, thereby enabling him to expectorate the loosened mucus with greater ease, and frequently the consumptive steadily improves and regains health.

Professor Hoff claims that mild cases have been quickly cured and partial cures have been effected in severe cases, the appetite and weight increasing steadily and there being a steady lessening of fever, night sweats, insomnia and asthmatic symptoms. He points out that in using the treatment the patient must keep the kidneys in order. The duration of treatment depends upon the condition of the patient. Professor Hoff declares that mild cases are sometimes cured in a few months while those more severe may require a year or two. It is essential that the solution be taken after eating, when the stomach is full.

PLEURISY.

This disease is an inflammation of the pleura, or delicate membrane which surrounds each lung.

Causes.—Pleurisy presents itself under two forms—the acute and the chronic. Its common cause is exposure to cold, but sometimes it arises from injury, as, for example, from the pleura being wounded by the jagged end of a broken rib; or, secondarily, adjacent inflammation, such as takes place around a nodule or tubercular deposit in consumption, or in the course of some other disease, for instance, Bright's disease or scarlet fever.

Symptoms.—1. The onset of acute pleurisy may be insidious, but generally, when arising from its usual cause, exposure to a very severe cold, it is rather sudden and marked by repeated chills. As soon as the patient reacts from these, the temperature begins to rise and thus furnishes a distinguishing symptom which often enables the complaint to be discriminated from pneumonia.

2. At the same time, or very soon after the rise in temperature, pain, cough and dyspnœa are observed. The pain is almost always referred to the affected side, a few inches below the nipple, and is sharp and darting, described as resembling a stab with a keen knife, especially on trying to take a deep inspiration or to cough. As a rule, the difficulty of breathing is slight and mainly due to the pain in the side and to the febrile excitement in the system. The cough is short, hacking, and accompanied with little or no expectoration; the pulse is quickened; the tongue is somewhat furred, the appetite impaired, but the thirst is increased, and the bowels are confined.

3. After a variable period, averaging, perhaps, between one and two weeks, the attack usually terminates in recovery, with or without a contraction of the wall of the chest on the affected side, according as the lung is able to expand after being compressed by the effused fluid; or the malady may end in the chronic form of pleurisy, or very rarely in the uncomplicated affection it may have a fatal result.

4. In chronic pleurisy the effused liquid remains in the pleural sac, without becoming absorbed. It is especially apt to become purulent in a short period in children, or in persons whose health is impaired from any cause. When this degeneration takes place there is always more or less febrile disturbance of a hectic type set up in the system generally. The skin of the affected side after a while becomes, over the seat of the effusion, reddened, tender, swollen and dropsical. The finger nails are often clubbed, as in consumption, and night-sweats are not infrequent. Cough is apt to be troublesome and may be accompanied by an expectoration of muco-pus, which in rare cases possesses a putrid odor.

Diagnosis.—The diagnosis of pleurisy without the aid of auscultation and percussion, must often be difficult, at least for the first few days of the attack, but it can sometimes be made from pneumonia by the lower grade of fever, the small amount of dyspnœa, and the total absence of rusty expectoration. It can be distinguished from bronchitis by the small amount of cough, and the sharpness of its pain, and from acute phthisis by the strength being but slightly diminished.

Treatment.—1. The treatment of pleurisy in the first stage, when acute pain is the most prominent symptom, is bleeding, leeching or cupping over the affected side, if the patient is robust and previously in good health. In persons of feeble constitution it is better to apply ten or twelve dry cups, and then use hot poultices with laudanum for the further relief of pain, than to deplete the system, or turpentine and sweet oil. If suited to the patient, hypodermic injections of morphia are of great service. After the second day free watery purgation by a tablespoonful of rochelle salts, epsom salts, or a bottle of citrate of magnesia, and a restriction of the amount of fluid taken into the stomach, are advisable, in order to limit the tendency of effusion into the pleural sac as far as possible. If the febrile movement runs very high, veratrum viride or aconite, in three to five-drops doses of its tincture, may be given to reduce the pulse and heart's action, but this is rarely necessary.

2. In the second stage after effusion has occurred, the chief indication is to reduce the amount of this serous liquid as speedily as possible, and for such a purpose diuretics and saline purgatives or elaterium, in quantities of half a grain every three hours, or so as to cause abundant watery discharges, may be given; counter-irritation by iodine and small blisters being kept up over the diseased side of the thorax. If the liquid is effused in large amount and causes much interference with respiration, it may be necessary to draw it off by means of an aspirating apparatus.

Diet.—As the cure progresses tonics, good nourishing food and early exercise in the open air in suitable weather, are highly important.

Hydrothorax.—This is the name applied to that diseased condition where there is an accumulation of water or serous fluid in the cavity of the chest. It may be the result of pleuritic inflammation, but not unfrequently occurs in dropsy without inflammatory action. Sometimes it increases to an enormous amount, pressing on the lungs and displacing the heart, with such great interference to the respiration and circulation as to prove the immediate cause of death, unless removed by aspiration, or exhaling the breath through an opening in the pleura.

Pneumothorax.—This is the term applied to the morbid state in which air has entered and partly occupies the cavity of the pleura, compressing the lung in the same way though less forcibly than does a watery effusion. This accident sometimes occurs from the rupture of the vesicles of the lung through the pleural membrane into the cavity of the pleural sac. At other times it results from some injury to the chest, such as a gun-shot wound or the fracture of a rib. Where closure of the aperature by which this air found an entrance can be secured, it may be necessary, in order to relieve the oppression of breathing, to pump out the air by means of the aspirating apparatus.

Emphysema.—This is the accumulation of air under the skin in the subcutaneous connective tissue; it is a curious result occasionally met with from wounds of the pleura, such as those produced by compound fractures of the ribs and other causes. This distension of the integument with air may progress until all semblance of humanity is lost and yet entire recovery takes place. It may almost always be prevented by proper attention to the primary injury.

Other Diseases of the Pleura.—The membrane of the pleura may be affected with cancer, simple tumors, tubercle and parasitic growths, but these are very uncommon, except as secondary manifestations of extensive disease of the same kind in other portions of the body, in which cases the latter are consequently the proper subjects of whatever treatment becomes needful.

CAISSON OR COMPRESSED AIR DISEASE.

This is a disease occurring among laborers, engineers or any person compelled to work for any length of time in tunnels, jetties, foundations for bridges, etc., where it is necessary for a caisson to be used containing compressed air. It is, therefore, not a germ disease, but causes sickness among laborers by the constant breathing into their lungs this compressed air.

The latest theories in regard to how this compressed air affects the system of healthy persons are that the tissues and fluids of the body become saturated with the gasses of the atmosphere to a degree which depends upon (1) the amount of pressure of the compressed air in the caisson; (2) the length of time they are exposed to it; (3) the activity of the circulation and the ability of the individual's tissues as regards the rapidity with which the gases are absorbed.

No matter how high the compressing of the air in the caisson is, symptoms do not occur until the man leaves the caisson and breathes the atmospheric air.

The disease is principally due to the formation of air bubbles (chiefly nitrogen) within the body brought about by decompression (meaning that the atmospheric air removes the pressure from the lungs when the person is relieved from the compressed air in the caisson. This relief takes place so rapidly that the gases formed in the blood cannot be carried to the lungs and thrown off as gradually as they entered; as a result, gases in the form of air bubbles, form in the blood and tissues and damage them by the force of their expansion.

When a man is in a caisson working under compressed air, the first effects he notices are more of a functional nature than the symptoms of caisson disease, they are practically mechanical due to the pressure of the contained air. He feels that the ear-drum membranes are forced inward, which cause discomfort, perhaps pain. They may rupture. Rise of temperature with sweating due to the heat caused by the compressed air. It is difficult to force the air out of the lungs. Whistling or whispering cannot be done, and the attempt causes a sensation of numbness in the lips, which also do not move. The voice is changed and is done through the nose. A sensation of well being and excitement is felt by the laborer. The skin does not change its color nor is the normal rate of the pulse altered.

The Symptoms of Caisson Disease.—These never occur while the man is in the caisson, but usually come on in fifteen minutes to twenty-four hours after he has left the caisson and breathes normal atmospheric air. Pains in the knees and elbows are the most frequent symptoms; they also occur at times in abdomen. The pains in the knees cause the person to bend his knees and the attitude has been termed "the bends." Dizziness occurs and is spoken of by the laborers as the "staggers." Nausea and vomiting may come on. Difficult breathing develops in some men and is spoken of as "chokes." Prostration and collapse occur rarely and the patient becomes unconscious. These symptoms have been followed by death. Itching of the skin occurs, supposed to be due to the presence of air bubbles in the sweat glands in the skin.

Workers in compressed air who have followed such labor for years are usually apt to suffer from deafness, "bends" or severe pains in the knees. Temporary or permanent paralysis of the legs and arms are a rare complication.

Treatment for this Disease.—There is, of course, no home treatment. Most of the large contractors who builds tunnels, bridges, etc., have their own physicians at hand to treat all laborers overcome upon removal from the caisson. Special treatment is necessary under the care of specialists in this disease.

There is no method of preventing this disease as long as men must work under compressed air. It attacks the healthiest of men who are free from disease and well nourished at the time of going to work.

PART VII OF BOOK IV

Treats of the Digestive System and the diseases affecting the different parts, giving the best and newest treatments.

ILLUSTRATIONS

CURATIVE MEDICINE

PART VII.

DISEASES OF THE DIGESTIVE SYSTEM

In considering the maladies of the digestive system frequent references must be made to the anatomy of the alimentary tract, and to the physiology of digestion.

LIP DISEASES.

Among the common diseases of the lips are ulceration and fissure, which may often be induced to heal by light applications of nitrate of silver solution, in conjunction with diligent improvement of the general health. Cancer of the lip is not uncommon among men in advanced life, but is less frequent in females. It should be operated on in accordance with the rules already laid down, in discussing the subject of cancer. Hare-lip is a curious malformation, in which the upper lip has failed to develop in such a way as to unite in the centre previous to birth, and the child is left with a deep cleft, sometimes reaching all the way from the edge of the nostril. This malformation can generally be remedied by a surgical operation.

STOMATITIS OR INFLAMMATION OF THE MOUTH.

This is commonly met with in young infants, and is called "baby's sore mouth." It consists of an inflammation of the mucous membrane of the mouth and tongue.

Causes.—These may be:

1. Mechanical, chemical, thermal or parasitic.
2. Poisons, as mercury or lead.
3. In certain debilitating diseases, as consumption or diabetes.
4. It is most commonly found in young children, in connection with

digestive disturbances, due to artificial feeding and bad hygienic surroundings, especially during the summer months.

General Symptoms.—There are six chief subdivisions of stomatitis, and seven general symptoms common to all varieties. These are heat, pain and redness of the mouth, increased salivation, foul breath, restlessness and disinclination to nurse.

VARIETIES OF INFLAMMATION OF THE MOUTH (STOMATITIS)

I. ACUTE OR SIMPLE STOMATITIS.

This is the most common form in inflammation of the mouth, and is usually the result of the action of irritants. It is frequent at all ages and is especially common in unhealthy subjects suffering from digestive disturbances.

Symptoms.—General redness. There may be areas of marked congestion where irritation is most intense. Mastication is painful.

Treatment.—In infants the mouth should be carefully sponged after each feeding. Chlorate of potash and sulphite of soda as mouth-washes and gargles, of the strength of a dram to four ounces of water, are useful, or, in severe cases, a dilute solution of nitrate of silver (three or four grains to ounce) may be applied, and attention ought to be paid to improving the general health by the use of tonics, nutritious food, and so forth.

II. APHTHOUS STOMATITIS OR FOLLICULAR STOMATITIS.

This is characterized by the presence of small raised spots or vesicles, which may rupture, leaving small ulcers, surrounded with a red bole. This form of stomatitis occurs most frequently in children under three years of age. There are usually some digestive disturbances present.

Treatment.—Correct digestive disturbances; sterilize the milk; nurse at regular intervals, and cleanse the mouth with a linen rag after each nursing. Apply to mouth and gums three or four times a day:

Boric acid	15 grains
Glycerine	½ ounce
Water up to	2 ounces

If the disease does not yield to this treatment, touch the ulcers with solid nitrate of silver stick.

III. PUTRID SORE MOUTH OR ULCERATIVE STOMATITIS.

This variety occurs especially in children after the first dentition. It is thought by some to be infectious, as it at times occurs in widespread epidemics. It attacks both adults and children.

Symptoms.—It occurs with low condition of nutrition. The gums of the lower jaw are chiefly affected. They are swollen, red and spongy. There is increased salivation, the teeth become loose, the breath foul and mastication painful. In rare cases there is necrosis (decay) of lower jaw.

Treatment.—Correct the hygiene. Touch ulcers with nitrate of silver, and use as a mouth-wash a solution of chlorate of potash, fifteen grains to the ounce. The best remedy is chlorate of potash, given internally, in doses of two grains, three times a day, to a child, and double that amount to an adult.

IV. PARASITIC STOMATITIS OR THRUSH.

This disease is dependent upon the growth of an irritating fungus (Saccharomysis albicaus). The development of thrush over the whole lining membrane of mouth and throat is very common shortly before death in wasting diseases, such as consumption and diabetes. It may occur at any age, but is especially common in children.

Symptoms.—It begins on the tongue as slightly raised pearly spots, which spread and coalesce. The membrane can be scraped off, and is readily recognized under the microscope. It may spread to the pharynx, œsophagus or larynx.

Treatment.—Correct the hygiene; treat as any gastric disturbances. Tonics are often indicated. Locally, use sulphite of sodium, one dram to the ounce of water, or

Borax	1 drachm
Glycerine	2 drachms
Water	6 drachms

Apply two or three times a day to gums and mouth.

V. GANGRENOUS STOMATITIS, OR CANCRUM ORIS OR NOMA.

This terrible, but fortunately rare, disease is usually seen in debilitated children, between the ages of two and six years. It usually follows one of the specific fevers, especially measles and whooping-cough.

Symptoms.—The general symptoms of stomatitis are marked. The mucous membrane is first affected, usually of the gums or of one cheek. The process begins gradually. Externally the cheek is swollen hard, red and glazed, and inside the mouth is seen an ulcer with a great deal of proud flesh or slough.

Treatment.—Good hygiene; alcoholic stimulants; nutritious food and tonics, as iron, quinine and strychnia. Locally, there is nothing that will do much good, but the actual cautery applied to the surface is said to be of some use, as is the application of fuming nitric acid, followed by soda, the surrounding parts being protected with lint soaked with oil.

VI. MERCURIAL STOMATITIS OR SALIVATION.

This form is very seldom seen at present, except in those who work in mercury.

Causes.—It may be caused by the administration of mercury in any form. It is most commonly produced by large doses, or even small doses, of calomel in those who are especially susceptible.

Symptoms.—Those first noticed are tenderness of the gums, manifested by forcibly bringing the teeth together, redness of gums near the insertion of the teeth, a metallic taste and an increased flow of saliva. If the disease is not checked at this stage these symptoms will become accentuated, and there will be profuse flow of saliva, foul breath, redness, swollen and tender gums. In severe cases there may be ulceration of the gums.

Treatment.—The administration of mercury should be suspended as soon as there is the first symptom of salivation. Bowels should be opened by magnesium sulphate (half an ounce); best taken in half a glass of water before breakfast. Hot baths should be taken every evening, and alkaline waters should be taken in large quantities. Atropine sulphate, one one-hundredth of a grain may be taken twice a day, and iodide of potassium, five grains, three times a day.

DISEASES OF THE GUMS

These generally require the care of a dentist, and when connected with affections of the teeth, or their sockets in the alveolar processes, are usually so painful that prompt application to a dental practitioner is made.

Inflammation of the Gum.—This, when conjoined with ulceration at the root of a tooth, gives rise to horrible suffering which lasts for three or four days, when it is usually relieved by the discharge of matter or pus. This may be hastened by hot applications.

Treatment.—The pain can be somewhat mitigated by anodynes, such as ten grains of Dover's powder or one-sixth of a grain of morphia, and poultices, but the best treatment is the extraction of the offending tooth, or the perforation of the alveolar process to the seat of trouble by drilling a hole through the spongy bone.

ABSCESS OF THE GUM OR GUM BOIL.

This is sometimes followed by ulceration, which may be hard to heal unless the whole cause of the difficulty is removed, which can now be accomplished under nitrous oxide gas so quickly, painlessly and safely, that no time should be lost in resorting to it. One extremely skillful operator in Philadelphia has now administered the gas for operations on the teeth in over one hundred thousand cases without a single fatal result.

Hypertrophy and atrophy of the gums are sometimes met with.

DIFFICULT DENTITION.

Treatment.—A very common cause of diseases of the stomach and bowels, and also of convulsions in children, is to be found in the hardening or induration of the gums at the time of teething, and this blunder of nature's ought to be promptly remedied whenever the gums in infants at the time of the first dentition are found to be red, swollen, and hot to the touch, by the use of the lancet. This little operation of lancing the gums, which, simple as it is, has probably saved the lives of thousands of young children. After the incisions are made bleeding should be encouraged, but care must be taken by wiping it off with a handkerchief to prevent the infant from swallowing the blood. It is astonishing what relief is often afforded to the little sufferer by a timely lancing of the gums.

Gum Tumors.—Tumors of various kinds sometimes make their appearance upon the gums, the most common of those which are non-malignant being the fibrous growths called epulis, often apparently caused by the irritation of diseased and neglected teeth. They all usually require surgical operations for their removal.

Perforation of Palate.—Perforation of the hard palate or roof of the mouth is sometimes a malformation present from birth, and due to the same kind of arrest of development as hare-lip. At other times it may be due to venereal or scrofulous disease. A surgeon can do much to cure this deformity by operation, or to remedy the defect if incurable by surgical appliances, which substitute most ingeniously the deficient portions of the mouth.

DISEASES OF THE TONGUE

The Tongue is subject to almost all the diseases already spoken of as affecting the inside of the mouth, for which similar treatment is required. Troublesome little ulcers on the tongue can often be promptly cured by holding in contact with the sore a pinch of powdered borax for ten or fifteen minutes. Deeper ulcers may require touching with the solid nitrate of silver, and if dependent upon the constitutional taint of syphilis will be very difficult to heal without the use of internal remedies also.

CANCER OF THE TONGUE.

Canoer of the Tongue appears sometimes to have its origin late in life from the local irritation of the stem of a pipe in habitual smokers, or from the sharp corner of a broken or isolated tooth. Hence it is important to avoid these exciting causes as much as possible. The operation for removal of cancer when seated in the tongue is more justifiable than almost any other, because, if recurrence should take place in the glands of the neck, or still better, in some internal organ, death comes to the victim in a much less painful and horrible form.

TONGUE-TIE.

Tongue-tie is a malformation in which, from the prolongation of the little membranous band, called the frænum, underneath the tongue, the organ, even to its very tip, is in some cases tied down to the lower jaw. If, as occasionally happens, it interferes with a baby's nursing, it should be operated upon the next day after birth by nicking the band at the front edge, and then tearing it back to about the usual position. No cutting operation should be resorted to, except in this very superficial way, on account of a very active little artery which lies at the root of the tongue, and which, if wounded, might bleed so as to endanger an infant's life before the hemorrhage could be checked. On this account, if nursing is not seriously interfered with, it is better to wait some months before thus untying the tongue.

DISEASES OF THE THROAT

Sore throat, which may be considered as comprising inflammation of the mucous membrane lining both the fauces and the pharynx, as they nearly always occur together, is one of the commonest disorders. It is occasionally produced by attempting to swallow some irritating article of food, or poison, but is ordinarily the result of cold. It also occurs in the course of various febrile affections, such as scarlet fever.

Symptoms.—The symptoms are pain on swallowing, redness of the surface, and at first dryness, but after a day or two later excessive secretion from the mucous membrane. Subsequently to partial recovery from an acute sore throat, the condition may be one of relaxation, the membrane remaining loose and flabby, and often thrown into projecting folds. This state usually follows cold and sore throat, but may be induced by mechanical causes, such as severe, hoarse cough, screaming, shouting, or over-straining in reading or singing. It may also be brought on by excessive smoking.

Clergymen's Sore Throat.—One form of this malady, called clergymen's sore throat, is the result of excessive use of the voice in church service when the health is already impaired, especially when the air of the apartment in which such exertion is made has been rendered impure by overcrowding. In bad cases of sore throat, the inflammation may go on to ulceration, especially if neglected. The generally relaxed condition of the throat is partaken of by the uvula, or palate, as it is incorrectly called by many people, and this hanging down lower than it ought, may cause a hacking cough by tickling the epiglottis.

The above is a description of sore throat in general. The most common form of inflammation of the throat is tonsillitis.

TONSILLITIS OR INFLAMMATION OF THE TONSILS.

Causes.—The disease is most common in the young. It is rare in infants. Exposure to cold and wet with bad hygienic surroundings seem to be the chief exciting causes. Some writers claim that there is a close relation between this and rheumatism, but Osler has not found the rela-

 (*Continued on page* 564)

THE TONGUE

Figure No. 1.

1. Hyoides bone joining many muscles of the tongue.

2, 2. Muscles fastened at the corners of the jaw-bone to pull in the tongue.

3. Muscle formed by the outer edge.

4. Deep muscle which turns the tongue toward the side.

5, 6, 7. Muscles which facilitate the turning of the food in the mouth.

8, 8. Salivary glands.

9. Muscle of the bottom of the mouth.

10. Cross muscle formed by the lip.

Figure No. 2.

1, 1. Muscles which form the outer border.

2. Hyoides bone.

3, 3. Muscles which move the base of the tongue.

4, 4. Exterior insertion of transversal muscles.

5, 5. Junction line of the transversal muscles.

Figure No. 3.

1. Tonsils or glands of the throat.

2. Base of the epiglottis or valve to close the windpipe in swallowing.

3. Lateral arches.

4. Muscles joining the tongue to the epiglottis.

5. Blind apertures in the base of the tongue called "blind foramen."

7. Nerve endings like thread.

8, 9. Fungiform nerve endings.

10. Apex of the tongue.

Figure No. 4.

1. Exterior muscle of the tongue.

2. Apertures of mucous glands.

3. Apex.

4. Under muscles with the cover removed.

5. Periglottis turned back.

6, 7. Conduits at the base of the tongue.

8. Nerve endings at the base.

9. Salivary glands.

10. Muscles joining the tongue to the epiglottis.

11, 12. Depressions upon the periglottis.

Figure No. 5.

1, 2. Salivary conduits.

3. Wharton conduits.

4. Sublingual gland.

5. Branches or arms of the jawbone.

Figure No. 6.

1. Nerve endings of the tongue.

2, 2, 2. Submucous pellicle.

3. Muscular larynx (deep).

4. Band which joins transversal muscles.

5. Transversal bands of the muscles.

6, 6, 7, 7. Salivary conduits.

8. Muscles for pulling in the tongue.

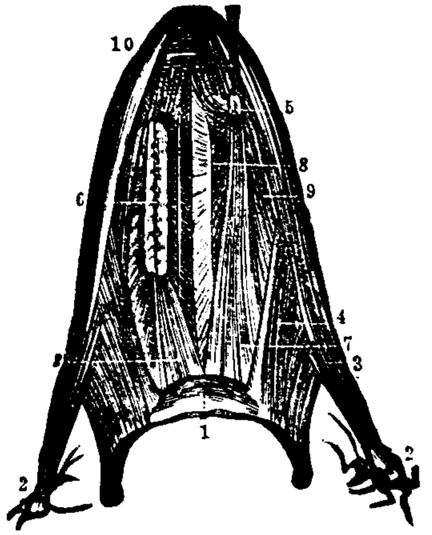


FIG. 1.—View of the muscles of the tongue—lower surface.

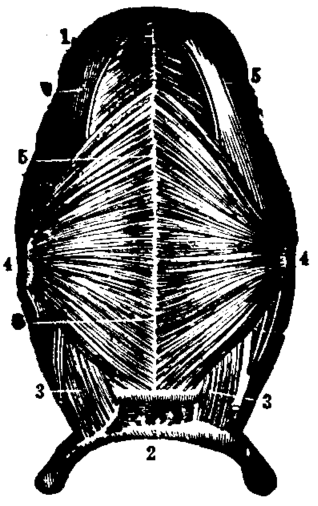


FIG. 2.—View of the under surface of the tongue with its muscles.

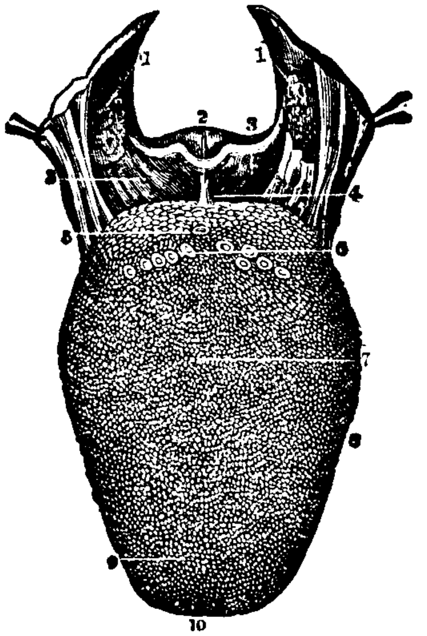


FIG. 3.—Front view of the upper surface of the tongue; as also of the arch of the bone of the palate.

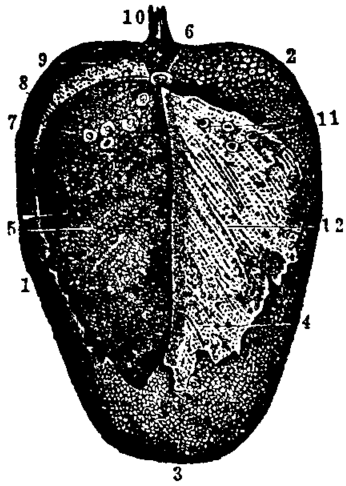


FIG. 4.—View of the back of the tongue, from which, by masceration, the periglottis has been removed and turned back on the right side.

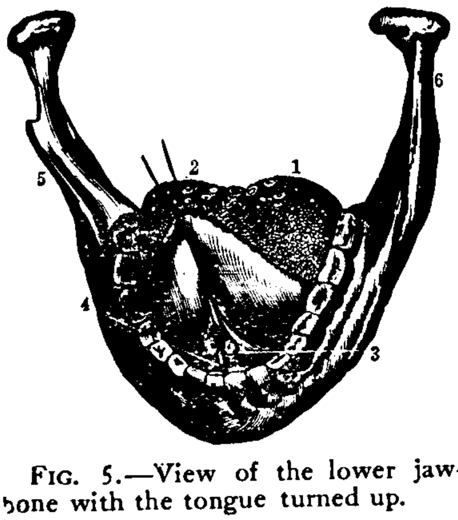


FIG. 5.—View of the lower jaw-bone with the tongue turned up.

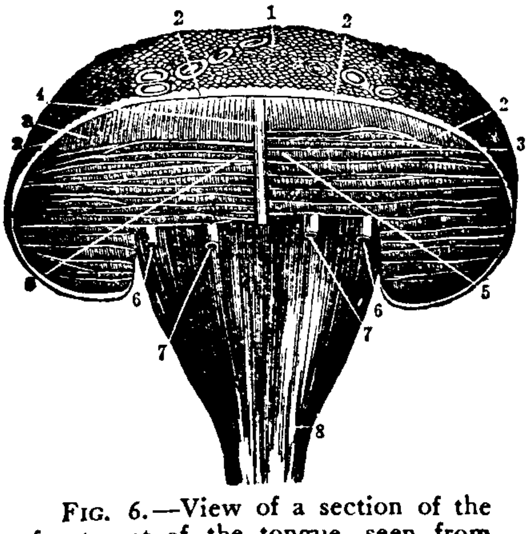


FIG. 6.—View of a section of the front part of the tongue, seen from behind.

THE TONGUE.

For an explanation of the illustrations see text on opposite page.

tion between the two very striking, except in one point, viz., "that an attack of acute rheumatism is not infrequently preceded by an attack of inflammation of the tonsils. Personal susceptibility and heredity play an important part in its productions. At times it runs through a family, or a community, with such rapidity as to suggest an infectious origin.

Symptoms.—In the mild forms there may be no other symptoms than redness and dryness of the throat with painful swallowing. The tonsils may be felt as hard lumps just behind the angle of the jaw.

Symptoms of More Severe Forms.—In the more severe forms it may begin with a chill followed by a rise of temperature which in children may reach as high as 105 degrees Fahrenheit. Pains in the back and limbs are not uncommon.

Local Symptoms.—The local symptoms are those of the mild form accentuated. If only one tonsil is swollen the uvula is drawn to the affected side.

Follicular Form.—In this variety white patches may be seen covering the tonsil. These are due to the accumulation of degenerated epithelial and white blood cells in the depressions, or cryps, in the tonsil.

Diagnosis.—The follicular form must be distinguished from diphtheria. The membrane of diphtheria is not in patches, but continuous over the surface of the tonsils, and extended up upon the pillars of the fauces and uvula, and is greyish-white in color. When this is stripped off it leaves a raw, bleeding surface, which is not the case when the contents of the cryps are expressed in follicular tonsillitis.

Constitutional Treatment.—Bowels must be freely opened with calomel, one-quarter grain every half hour, for six doses; followed by magnesia sulphate (epsom salts), one-half ounce, to be given one hour after last dose of calomel; ten grains of Dover's powder at bedtime. Salicylate of soda is often beneficial, and may be given as:

R.—Salicylate of soda	5	drachms
Iodide of potassium	2½	drachms
Syr. sarsaparilla	1½	ounces

Water sufficient to make four ounces. Take one drachm every four hours. The dose must be reduced in children to about half.

Local Treatment.—Gargles of borax, ten grains to the ounce, or salt and water. hot. The following will be found very serviceable:

R.—Tincture chloride of iron	....	1 ounce
Glycerine	....	1 ounce
Chlorate of potash	....	½ drachm

Shake well before using, and use one drachm of the mixture to one ounce of water, as a gargle. Clean teeth after using.

Sprays of glyco-thymoline or supra-renal extract are good; or swab throat with equal parts of tincture of iron and glycerine.

QUINSY OR ABSCESS OF TONSIL.

This disease is a cause of great suffering to some persons in youth and middle age, but is rare in childhood, and often ceases its molestations after individuals commence the decline of life.

Causes.—Exposure to cold and wet are its common exciting causes.

Symptoms.—In the catarrhal form of quinsy the inflammation is often superficial, and after causing much pain and difficulty of swallowing, subsides in three or four days without suppuration. In the severer variety an abscess or boil forms in the substance of the tonsil, attended with great pain and swelling, difficulty of swallowing, a good deal of fever, and some loss of strength. The patient often suffers from earache, and is somewhat deaf on account of the inflammation extending along the Eustachian tube. The breathing through the mouth is much interfered with, but the danger of suffocation is apparent only. The disease lasts on an average about seven days, but the abscess may break on the fifth day, or may linger until the tenth day, unless earlier opened by the lancet. The complaint is very apt to recur, and the sufferer from one attack rarely escapes without several every winter, until the tendency, which may be hereditary, is exhausted.

Treatment.—The treatment consists in an effort to abort the disease by leeching, externally, and the use of guaiacum in teaspoonful doses of the tincture four times daily, by the mouth. If these remedies fail, poultices of little bags of hops dipped in hot vinegar and sprinkled with laudanum, and hypodermic injections of a quarter of a grain of morphia, may afford some relief. When suppuration is established, the period of suffering can be abbreviated by lancing the swelling in the throat, provided the spot where the abscess points is high enough to be felt by the finger. The operation is performed by having a long, narrow-bladed knife wrapped with sticking plaster to within a quarter of an inch of its point, and then passing this down the throat, guarding it with the finger, and guided by the touch, as the patient can rarely open the mouth wide enough to admit of seeing, a small incision is made into the softened portion of the tumor. The relief afforded either by puncture in this way, or by spontaneous rupture, is wonderfully great. No after-treatment is necessary; but as before mentioned, the complaint is very liable to recur, and it often happens, that in persons who are strongly predisposed to it, the first imprudent exposure on venturing out will light up the disease in the opposite tonsil, with an almost exact repetition of the suffering, within two weeks.

DISEASES OF THE ŒSOPHAGUS OR GULLET.

Inflammation of the Gullet.—This is a rare affection, and usually due to swallowing some hot or corrosive liquid, although it may occur from the extension of simple or erysipelatous inflammation from the throat, or of the former variety from the stomach. Ulceration is also uncommon, although it does occur in connection with syphilitic complaints.

Stricture of Gullet.—This is the most frequent form of disease of the gullet.

Varieties of Stricture.—1. Spasmodic stricture is a narrowing of the tube, caused by simple contraction of its muscular fibres. This condition is especially met with in hysterical females, and, though alarming at the time, seldom proves fatal to life.

Traumatic Stricture.—2. This is the variety in which the constriction has been caused by irritation and inflammation due to an injury inflicted on the surface of the tube, in any part of its length, by the swallowing of scalding water or of some corrosive substance, or by a wound. The result of such a stricture is to render the act of swallowing always difficult, unless relieved by a surgical operation.

Simple Organic Stricture.—3. This is occasionally seen, in which there is a mere narrowing of the gullet, without any apparent tendency to ulceration. The most common and fatal form of stricture is that due to cancerous deposit and ulceration. It may cause death by producing a complete obstruction, so that neither food nor drink can enter the stomach, or by ulcerating into some of the adjoining vital structures. The surgical operations sometimes performed for its relief are of very doubtful benefit or propriety.

ACUTE GASTRITIS, INFLAMMATION OF THE STOMACH.

The simplest and most common form of inflammation of the stomach is characterized by active congestion and excessive secretion of mucus, a condition known under the name of gastric catarrh, and very similar to that so frequently met with in the throat and air-passages.

Causes.—The causes of this malady are indigestible food, especially in children, irritant poisons, or alcoholic excess. But it may occur in connection with gout or as a symptom in some of the eruptive fevers.

Symptoms.—The symptoms of acute gastritis are pains, which are often severe over the pit of the stomach, shooting through to the back, and increased by taking food, but temporarily relieved by vomiting. Tenderness over the pit of the stomach is always present, and nausea and vomiting are prominent symptoms, the vomited matter consisting of a glairy mucus, stained with bile of a greenish-yellow or bright green color. The tongue is coated with fur, whilst the edges and tip are frequently red and irritated. The bowels are apt to be confined, and the urine scanty and high colored. These symptoms often set in with chilliness, followed by restlessness, hot skin, headache, and other febrile symptoms. In bad cases there may be great prostration, with cold, clammy skin, a weak, rapid pulse, some difficulty of breathing, and obstinate hiccough. Generally, however, under proper management, these distressing symptoms subside after a time, although they sometimes pass into those of the chronic form of gastritis.

General Treatment.—The treatment of this disease is, in the first place, if consequent upon the introduction of some poison or irritating material, to get rid of the offending substance by means of an emetic, followed by a purgative, which is perhaps in most cases best administered by enema.

Diet.—The food should be entirely liquid, and given in very small quantities; in fact, most cases would do better if nutritive injections were depended on to sustain life for a few days or a week or two. The thirst may be relieved by sucking small pieces of ice, but iced champagne is sometimes borne by the stomach when everything else is rejected, and iced carbonic-acid water is often acceptable.

Medicinal Treatment.—With the exception of subnitrate of bismuth, in quantities of five grains, it is usually advisable not to provoke the irritable stomach with medicines, the hypodermic injection of morphia being used to relieve the pain, if the patient can take morphia, or morphia and atropia, in doses of one-eighth of a grain of the former and one one-hundredth of the latter in that way without nausea being produced. Thin and light poultices, as, for instance, of flaxseed meal and laudanum, laid over the region of the stomach, are frequently of service, or if the pain is very severe a one-grain opium suppository can be inserted in the rectum. Convalescence from this malady is generally slow, and requires great care in regard to diet and exertion.

DYSPEPSIA.

This affection, the great torment of civilized life, is to be considered rather as an unnatural functional difficulty than as a structural disease.

Varieties of.—Among its three chief varieties may be mentioned:

First Form.—The form due to sympathetic relations with other organs which are themselves in a morbid state, and which is therefore explainable as a reflex action. Of such a type is the nausea and occasional vomiting which attends irritation of the brain, lungs, liver or uterus. Sea-sickness is believed to be a form of this reflex dyspepsia.

Second Form.—This form is attributable to a scanty secretion of gastric juice, and is characterized by slowness of digestion, long retention of food in the stomach, prolonged distress after eating, especially with feelings of weight and uneasiness at the pit of the stomach, a tendency to decomposition of the food in the alimentary canal with the evolution of fetid gases and the appearance of undigested food in the evacuations from the bowels. The food may be considered to be delayed in the stomach when it remains there for more than two or three hours. Dyspepsia of this kind is often inherited, but much can be done to aggravate the tendency by mental over-exertion, prolonged and intense anxiety, especially if commencing directly after meals, sedentary habits, gluttony, and the use of alcoholic and other stimulants.

Third Form.—This form of dyspepsia appears to be owing to some abnormal quality of the gastric juice, and to diminished peristaltic movement of the stomach, so that food is not sufficiently mixed up with the digestive fluids.

Symptoms.—One of the most characteristic symptoms of this condition is pain at the cardiac end of the stomach, to which the name of cardialgia has been applied, on account of the distress being in such close proximity to the heart. Many dyspeptics, being also more or less hypochondriacs, imagine from this symptom that they are subjects of organic disease of the heart, and suffer intense, yet groundless, mental anxiety on that account. The names of heartburn, pyrosis and water-brash are applied to slight modifications of this symptom. Tobacco contains a poisonous principle which, in many persons, favors the development of dyspepsia, and some individuals suffer from smoking even a single cigar.

General Symptoms.—Inability to absorb liquids occurs in some varieties of dyspepsia, so that fluid which has been swallowed may be heard splashing around in the gastric cavity on any forcible agitation of the body, the stomach being usually distended to a great extent. As further aids in distinguishing between dyspepsia from deficient secretion of the gastric juice, and deficient motion of the stomach, it should be remembered that in the former neither flatulence nor constipation are generally present, whilst in the latter variety flatulence is one of the most characteristic symptoms and constipation is usually well marked. Some of the worst cases of dyspepsia from deficient secretion of the digestive fluid, in which pain after taking food and other symptoms are particularly severe, appear entirely free from flatulence. The tendency of the fermentation which goes on in the slowly digesting food seems to be of a kind in which gases are not evolved. In all these forms there is a loss of appetite. The tongue is usually broad, pale and flabby. The pulse is weak, soft and compressible, and palpitation of the heart frequently occurs. There may be dyspnœa on exertion and a short dry cough, the stomach-cough of the older authors. The general nutrition, of course, suffers, and the face is pallid and bloodless to a greater or less degree.

Treatment—Diet.—1. The treatment of dyspepsia must be chiefly diatetic, although medicines are not powerless in this complaint. In the first place all indigestible food, such as pork, veal and salt meats, and richly-made dishes, such as pastry of every description, ought to be avoided. In the acid forms of dyspepsia, which are connected with deficient muscular movement, pastry and saccharine substances are particularly harmful, and vegetables and fruit should be partaken of sparingly. In some instances an exclusive milk diet, persevered in for some weeks, has appeared to produce marvelously good results; but, except under such a regimen, water ought to be the habitual drink. Cocoa, deprived of its fatty ingredients, is often much to be preferred to tea and coffee, and those accessory foods, if taken at all, should be weak, cool and well diluted with milk. Rich or effervescent wines should be avoided, but the lighter Rhine wines or ale, or extract of malt, are often useful in atonic dyspepsia, with impaired movement of the digestive organs. In order to improve the general health all the agencies which favor the improvement of the nutrition and enrichment of the blood, such as abundant exercise in the fresh air, tepid or cool bathing, and warm clothing should be pressed into service. The successful prescription of a famous English physician to a rich and indolent patient who came to him complaining of the tortures of dyspepsia was, "Go and live on a shilling a day and earn it."

Medicinal Treatment.—2. In the medicinal treatment for dyspepsia accompanied by undue acidity, as evidenced by the frequency of heartburn, if the urine is scanty and lets fall an abundant deposit, alkalies, such as the bicarbonate of soda or potash in quantities of ten to twenty grains thrice daily, are useful, and are best taken three or four hours after a meal. In acidity with anemia and debility, mineral acids, such as the diluted nitro-hydrochloric in five-drop doses, serve the purpose better. Vegetable bitters, of which columbo in doses of a wineglassful of the infusion thrice daily generally proves the mildest, and nux vomica or strychnia are good digestive tonics, and in slow digestion benefit is sometimes derived from very minute doses of ipecacuanha.

A good prescription is:

R.—Tincture nux vomica	4 drachms
Tincture cinchona	2 ounces
Tincture gentian	2 ounces
Simple elixir	2 ounces

Teaspoonful three times a day.

For vomiting, besides the remedies already spoken of under gastritis, very small quantities of Fowler's solution of arsenic, in two-drop doses, or creosote mixture may be tried. For flatulence the aromatic carminitives, such as ginger and cardamon, and powders of two grains each of charcoal with bismuth, also counter-irritation by means of small blisters over the stomach are often of great service. When the secretion of gastric juice is scanty, pepsin or lactopeptine, in quantities of ten grains, frequently proves itself invaluable as an aid to digestion; or a prescription containing:

R.—Dilute hydrochloric acid	2½ drachms
Pepsin (soluble)	2 drachms
Glycerine	1 ounce
Elix. aromatica	2 ounces
Water, sufficient quantity for	4 ounces

Take one drachm of the mixture in water three times a day. Best taken through glass tube.

CANCER OF THE STOMACH.

The stomach is one of the most frequent seats of cancer, which is especially apt to attack this organ in men advanced in life who have subjected their digestive apparatus to more or less constant irritation. The tendency is very often hereditary. The cardiac end of the stomach is generally the seat of epithelial cancer, and the pyloric extremity of hard cancer or scirrhus. Its tendency is to extend around the organ, and hence it leads to an annular or ring-like constriction.

Symptoms.—The symptoms are those of gastritis or mere dyspepsia at first, but after a few weeks or months, in a majority of instances, a small amount of blood is vomited, and serves to indicate pretty clearly the true nature of the case. The blood in cancerous hematemesis of this kind being effused slowly and in small quantity is altered by the action of the gastric juice so as to present a brown color. This tint and the minute clots in which it appears have caused the expressive name of coffee ground vomit to be applied to it. Although not an infallible sign, it constitutes one of the surest early evidences we possess of the existence of cancer of the stomach. This disease is distinguished from gastric ulcer, which it most resembles, by its occurrence in advanced life instead of in the young; by the presence of a hereditary predisposition; by the character of the hematemesis; by the greater diffusion of the tenderness; by the constancy of the pain; by the cancerous cachexia, and, as emaciation advances, by the increasing tumor, which can be distinctly felt in most cases through the thinned walls of the abdomen. The average duration of cancer of the stomach is from six months to one year, and it always proves fatal.

Treatment.—The only treatment which offers any hope of recovery is surgical.

ULCER OF THE STOMACH.

Causes.—This remarkable disease is attributed to the corroding action of gastric juice on the very membrane which has secreted it, in consequence of the vitality of that membrane becoming impaired by thrombosis of some small artery in the wall of the organ. Disorder of menstruation may develop an ulcer, tight lacing or any occupation which necessitates constant leaning over, as in shoemaking or tailoring. It is more common in females than males, and is more frequent in young women than those of middle or advanced age. Traumatism or swallowing any corrosive substance may lead to ulceration. Anderson believes that alcoholism, syphilis or mental worry may lead to the condition.

Appearance.—A simple gastric ulcer is round or oval, about one-quarter to one-half an inch in diameter, with thin, clean-cut margins as if punched out, but deepest in the centre, like a shallow funnel, though varying in depth from a mere destruction of the mucous membrane to complete perforation of all the coats. It is usually single and most commonly situated at the back of the organ near its lower or pyloric orifice. The ulcer may happen to eat into some large blood-vessel, in which case serious or fatal hemorrhage is apt to occur.

Terminations.—The terminations of such an ulcer are the favorable ones of its healing up with or without puckering in the wall of the stomach, or, on the other hand, of perforation, which may occur with the escape of the contents of the stomach into the peritoneal cavity. Such an accident is generally followed by peritonitis and almost certain death.

Symptoms.—The symptoms of gastric ulcer are pain and tenderness over the pit of the stomach, this pain coming on shortly after taking food, and increasing until the organ is emptied by vomiting. Sometimes the distress seems to extend through into the back. The seat of tenderness coincides with that of pain, and is localized over a comparatively small surface. Vomiting of blood occurs in about one-third the cases, and though not so frequent as in cancer is much more profuse. It may be either in black clots or fresh blood, and not infrequently blood is passed by the bowels. Vomiting of food half an hour or an hour after eating is usual, and various dyspeptic symptoms are met with. The pain is often described by the patient as of a gnawing character, and is commonly made worse by condiments, animal food, saccharine substances and alcohol; whilst the pain in neuralgia of the stomach is frequently relieved by these articles of diet.

Medicinal Treatment.—The most successful treatment of gastric ulcer is perfect rest in bed and nourishment entirely by nutritive injections, for a period of from one to three weeks, or until the subsidence of the pain and tenderness indicate the healing of the ulcerated spot. Prussic or hydrocyanic acid and bismuth, as directed in gastritis, may be given to control vomiting, and morphia hypodermically, guarded if needful by atropia, to relieve pain. Stomach should be washed out twice a day. Small blisters over the stomach are frequently useful, and the first food administered should be lime-water and milk in very small quantities, gradually increased as the power of the organ to retain food is found to be restored. If vomiting of blood comes on, perfect rest, the quieting of the peristaltic motion of the stomach and whole digestive tube by full doses of a grain every two hours of opium, or one-sixth of a grain of morphia, and the use of acetate of lead by the stomach in quantities of two grains every three hours, tannic acid and gallic acid by enema, and five grains of ergotin hypodermically, are to be resorted to. Ice in small pieces may be given frequently, and cold cloths applied over the gastric region. Perforation is indicated by severe pain and shock.

Surgical Treatment.—If the patient grows worse in spite of medical treatment, if hemorrhage is profuse, if pain is severe, or if the tenderness is marked, surgical treatment must be resorted to and should only be done by a skilled surgeon. A number of cases of perforation and hemorrhage have been saved by a surgical operation.

PERITONITIS.

Character.—This dangerous malady is an inflammation of the peritoneum or serous sac covering the intestines, liver, spleen, and so forth, and reflected upon the inner surface of the wall of the abdomen. It is probably more liable to become quickly and violently inflamed than any other structure of the body. It may be either general or local. Local peritonitis may occur whenever any of the organs of the abdominal cavities become the seat of inflammation.

Causes.—1. Exposure to wet and cold.

2. Traumatism.

3. It may result from the perforation of an ulcer occurring in stomach, intestines or liver.

4. Inflammation of the uterus following confinement and constituting child-bed fever, which we see.

5. It may be secondary to some morbid disease as tuberculosis, rheumatism or Bright's disease.

Symptoms.—A chill with moderate fever, rapid pulse, intense abdominal pain, abdominal rigidity, painful respiration. The patient lies with thighs flexed, features are pinched, vomiting persistent and bowels are usually constipated.

Treatment.—Absolute rest is essential. Restrict the diet. Give frequent doses of opium, one grain, or morphine, one-quarter grain. Hot or cold applications to the abdomen. In non-perforating cases give saline purge. In perforating cases, which are the most frequent, a surgical operation offers the only hope.

ENTERITIS OR INFLAMMATION OF THE BOWELS.

Symptoms.—This disease is not very common, but may arise from taking cold, from the abuse of purgatives, from swallowing or inhaling irritant poisons, and from peritonitis. Its symptoms are diarrhœa with pain, often very severe, increased on pressure and most intense about the navel or in the right flank. The frequent discharges temporarily relieve the griping pains, which, however, soon return. The pulse is excited, generally full and strong and marked fever is present.

Treatment.—The treatment is by anodyne fomentations or poultices to the abdomen, such as the flaxseed poultice with laudanum, and grain doses of opium by enema or suppository. Rest in bed must be strictly enjoined.

COLITIS.

Acute dysentery, bloody flux, an acute inflammation of the mucous membrane of the large intestine, generally catarrhal, characterized by fever and sometimes followed by ulceration. The causes are summer and autumn seasons, sudden changes in the atmosphere, errors in diet, impure drinking water, etc.

Symptoms.—Begins gradually with diarrhœa, loss of appetite, nausea and slight fever, which continues for two or three days. When the dysentery symptoms develop, pain on pressure along the colon, colicky pains about the navel, burning in the rectum, and a desire to expel it or tenesmus, stools contain mucus and blood, urine scanty and high colored, duration about one week, patient emaciated. This may lead on to a chronic condition.

Treatment.—Patient should be confined to bed, even in mild cases. Discharges should be disinfected with chlorinated lime, diet should be bland and unirritating. Milk and lime-water, broths, egg albumen. Begin treatment with a dose of castor oil, or if fever is high epsom salts, two drams, or four drams of rochelle salts, until copious discharge, for the pain and tenesmus. Opium in some form, or one-half grain extract opium and two grains sugar of lead every two or three hours, or:

R.—Dil. sulphuric acid .... ½ ounce
Tr. opii. deod. .... 1 ounce
Spirits camphor .... 1 ounce
Tr. capsicum .... ½ ounce
Spirits chloroform .... ½ ounce
Brandy .... 1½ ounces
One teaspoonful diluted every two or three hours.

Twenty to thirty grains of subnitrate of bismuth is also valuable every two or three hours during convalescence. Cod liver oil, syr. of lacto phosphate of lime and the following are effective:

R.—Strych. sulphate .... ½ grain
Acid muriatic dil. .... ½ ounce
Tr. gentian co. ad. .... 4 ounces
Teaspoonful in water before meals.

APPENDICITIS OR INFLAMMATION OF THE APPENDIX.

Function of Appendix.—Appendicitis is the term applied to inflammation of the vermiform appendix. It is almost invariably the primary lesion of all those various conditions known as typhlitis or perityphlitis, terms which are well relegated to obscurity. The appendix is a small tube or diverticulum coming off from the postero-internal part of the cæcum or beginning of the large bowel, and has no function in man, but in herbivora and rodents is a functionally active organ. The position of the appendix corresponds about to a point two inches from the anterior spine of the pubis on a line down from the spine to the umbilicus. This point is known as McBurney's point.

Causes.—At one time it was supposed that foreign bodies, as seeds, pins, etc., were important etiological factors in the production of the disease, but Fits' statistics show that only twelve per cent. of cases are caused by foreign bodies. Appendicitis is a bacterial disease, usually produced by the bacteria which are nominally present in all parts of the gastro-intestinal tract, which have a powerful action when the vitality of the appendix becomes impaired from any cause, as when the deverticulum is bruised, obstructed, or in a state of catarrhal inflammation.

Where non-traumatic inflammation occurs the swelling of the mucous membrane occludes the tissues, obstructing the full communication between the appendix and cæcum, and the appendix becomes converted into a closed sac. Dieulafoy maintains forcibly that appendicitis is always caused by the conversion of the appendix into a closed cavity. Partial obstruction may be caused by calculi, which are composed of fecal material mixed with salts of lime or magnesia. These calculi are not formed in the colon but in the appendix. Pozzi believes that appendicular colic may be caused by bending of the appendix, and holds that pain may arise when there is no lesion of the appendix. A foreign body may produce immediate perforation, giving rise to a diffuse septic peritonitis. Where the lesion of the appendix is occluded it begins to swell and becomes very much congested, the blood supply becomes lessened or cut off entirely. The microbes multiply with great rapidity and the wall of the appendix may become gangrenous, or it may ulcerate and perforate. Interference with the blood supply of the appendix will predispose to appendicitis.

When the appendix becomes inflamed gradually, the peritoneum around it partakes of the process and adhesions are usually formed, thus walling off the appendix. In a case of this kind, if perforation should occur or the inflammation go to the formation of pus, the adhesion would protect the general peritoneal cavity from the poisonous materials.

Who Are Most Subject.—Appendicitis occurs most frequently in males, as the blood supply is more abundant. It is rare in infants, but occurs most frequently between the ages of sixteen and thirty years. Appendicitis that subsides may at any time recur, and the life of the patient is under constant menace. It always recurs after a second attack.

Varieties.—Appendicitis is divided into the catarrhal, obliterative, suppurative and gangrenous forms, but as a matter of fact appendicitis is always one disease which varies in intensity, and it is useless to divide it into a number of symptomatic groups.

Symptoms.—1. In what is known as appendicular colic there are colicky pains in the right iliac region most marked over McBurney's point, but radiating towards the umbilicus, nausea, vomiting and usually constipation, but no tenderness in the right iliac fossa or abdominal rigidity.

2. In a genuine case of appendicitis the patient feels listless and out of sorts for two or three days before the attack, loss of appetite, furred tongue, foul breath and constipation is the rule, but in exceptional cases there may be diarrhœa.

3. The onset is usually with colicky pains which at first may be general over the whole abdomen but most intense over McBurney's point. Circumscribed tenderness over McBurney's point and across may be felt.

There is moderate fever, and vomiting is usually present with constipation, abdominal muscular rigidity.

4. As the attack progresses the fever becomes more intense, radiating towards the umbilicus and the tenderness over McBurney's point recrosses. The pulse increases and fever rises, vomiting becomes worse, respiration more rapid and thoracic in character. The patient lies upon the back with right leg drawn up. The urine is scanty and highly colored. Any case may become suddenly desperately grave because of perforation or gangrene.

Terminations—Appendicitis may terminate in recovery, in death, or in a condition of lowered vitality, renewed attacks being certain to occur.

Treatment.—1. In appendicular colic apply a hot water bag over McBurney's point, give a saline cathartic and watch patient for further symptoms.

2. Many surgeons give a cathartic in undoubted cases of appendicitis, but the increased peristalsis and tension caused is liable to give rise to perforation.

3. In a genuine case of appendicitis perfect rest, liquid diet, ice bag to McBurney's point. Do not use opium in any form as it masks the symptoms. If the symptoms are not better in thirty-six hours, operate.

4. McBurney says, if six hours after the beginning of the attack the patient is no worse there is no pressing danger, if in twelve hours symptoms are not intensified they will soon begin to abate, but if in twelve hours the symptoms have become worse, operation is necessary.

5. It is always better to operate in the interval between the attacks than during an attack. It is not safe to delay operation in a pus case. It must be remembered that the mildness of the symptoms is no assurance that even in an hour or two gangrene or perforation will not occur.

A person of generally good health who suffers for some time with vague digestive troubles may find himself a victim.

Pain occurs in the right side of the abdomen between the ribs and the hip. It is accompanied by colicky paroxysms, more or less violent, which may or may not be followed by vomiting of food or bile. The colic eventually subsides, but a fixed pain continues, sometimes exactly limited to the point of the appendix and sometimes spreading more or less over the bowels. The muscles of the appendix region become hard. Usually there is but little fever.

Notwithstanding the general opinion of physicians that operation is necessary, there are many eminent medical men who are of the opinion that appendicitis is in many cases open to medical treatment capable of effecting cure. The following prescription is one of the best which has been compounded for this trouble.

Cascara Compound Pill.

Cascarin	3 grains
Aloin	3 grains
Podyphyllum	2 grains
Ext. Bella Leaves	1½ grains
Strychnine Sulph.	1/5 grain
Oleresin Ginger	1½ grains

Make into twelve pills.

Take one at night or night and morning.

All drastic cathartics must be avoided. The prescription just given should properly regulate the bowels. It is intended to remove all gases, sweeten the stomach and aid digestion. It is claimed on high authority that it will prevent appendicitis and surgical operation if it is taken in due time.

Rest is necessary and the intestines should be kept in a quiet condition. An ice cap may be applied over the seat of the pain. It is advisable that the patient go to bed and assume such position as will—so far as possible relax the abdominal muscles. Abdominal movements such as may be caused by sneezing, coughing, etc., should be avoided. The diet at first should consist only of small quantities of cold or lukewarm milk, oatmeal, bouillon, etc.; avoid meat and starchy foods. It is held by some that there is great virtue in the external use of kerosene oil in cases of appendicitis. If unfavorable conditions continue, or attacks are frequent, the appendix should be removed. We recommend consultation with physician without delay.

INTESTINAL OBSTRUCTION.

This term is applied to the obstruction of any part of the intestinal canal. It may be acute or chronic.

Causes.—Obstruction may be caused:

1. By a band, which, becoming looped or attached to one or more organs, forms a noose through which the intestine slips. This manner of compression is known as strangulation.

2. By one portion of gut slipping into another. This is known as intussusception or invagination.

3. By kinking of the gut.

4. By the narrowing of the lumen, by contraction of scar tissue or the encroachment of tumors.

5. By the pressure of foreign bodies large enough to obstruct the lumen.

Symptoms of Acute Obstruction or Complete Obstruction.—The active symptoms are usually preceded by a period of constipation, with a feeling of lassitude, furred tongue and foul breath.

1. Pain comes on abruptly, first colicky, then continuous and intense.

2. Vomiting quickly supervenes and is, first, of the stomach contents, then bilious, and finally fecal.

3. Abdominal distension occurs if the obstruction is in the lower bowel, but may not be present if the obstruction is high up. Constitutional symptoms are those of shock. Thirst is intense, urine scanty and highly colored.

Symptoms of Chronic or Partial Obstruction.—Symptoms appear gradually with the increase of the narrowing until there is complete obstruction, or the symptoms of acute obstruction occur from time to time.

Treatment.—Purgatives are contra-indicated. Food must be withheld and nutrition given only by the rectum. Give opium or morphine for the pain in doses of one grain of the former and one-quarter grain of the latter.

Accessory Treatment.—Washing out the stomach twice a day to control the vomiting. Distension of the bowel with gas or water should be practiced in doubtful cases and in intussusception. Senn recommends the infiltration of hydrogen gas. If these methods fail to relieve the obstruction a surgical operation must be done at once.

DYSENTERY.

This is a febrile disease, characterized by severe colicky pains, followed by straining, which results in scanty mucous or bloody stools, containing little or none of the natural fecal matter or excrement.

Causes.—It is especially prevalent in warm climates, and warm weather and bad hygienic surroundings play an important rôle in its production. Indigestion of irritating foods, exposure to cold or wet, certain debilitated states, as scurvy, Bright's disease, etc., seem to be predisposing causes and may alone produce the simple form. The tropical form is due to an animal parasite, the amœba coli.

Symptoms.—There is moderate fever, severe colicky pains in the abdomen, prostration, tenesmus or straining, constant desire to defecate with small mucus and bloody stools. These symptoms are aggravated during the night and early morning, and leave behind them the tormenting sensation that there always remains in the bowels something which has yet to be discharged. This sensation, which is technically called tenesmus, increases, and ultimately becomes the most striking feature of the disease. When the malady is fully established, the evacuations consist of bloody slime, sometimes tinged with bile, and containing shreds of membranous-like exudation thrown off from the interior of the bowels. They exhale an odor almost peculiar to dysentery, very offensive and yet quite different from that of ordinary feces. This complaint may prove fatal in consequence of the great loss of blood, but it more commonly causes death by wearing out the patient.

Other Symptoms.—When a fatal termination threatens, the symptoms assume a typhoid character, with great prostration, dry, brown tongue, hiccough and vomiting. In favorable cases improvement begins about the end of the first week, but convalescence is usually very protracted, and many cases stop half way, as it were, continuing to suffer for months or years with the chronic form of the affection.

Common to Children.—This disease is very common among young children, being especially prevalent and fatal among those who are cruelly kept in cities during the hot summer months, and it is the usual result of starvation or deterioration of food, especially if long continued and accompanied by hardship and privation, being then an extension of the diarrhœa which is apt to be first produced.

Treatment.—A mild laxative is indicated in the beginning as epsom salts, three drachms, or castor oil and laudanum might be selected. Bismuth is a valuable remedy. Absolute rest in bed and bland, non-irritating liquid diet. The following may be found useful:

R.—Sulphat of morphia	⅓ grain
Bismuth	40 grains
Creosote	15 drops
Simple syrup	2 ounces

A teaspoonful every three hours.

After the more violently acute stage has passed, laudanum injections, or opium by suppositories, with such astringents as two grains of acetate of lead, half a grain of nitrate of silver, and of sulphate of copper combined with small doses a quarter or half a grain of opium by the mouth, are generally beneficial, but care must be taken not to check the disease too suddenly by the use of these remedies.

Additional Treatment.—Flushing out the bowels with a saline solution may be tried, or starch water containing one grain of opium may be found beneficial. Hot fomentations over the abdomen may be used to relieve the pain. Injections of warm solutions of quinine, 1-5000 have been used in dysentery with advantage. Creolin, a drachm to the pint, has given good results.

Diet.—The diet, as pointed out before, should consist of the blandest and most unirritating substances, such as boiled milk with lime-water, beef essence, boiled rice, and if the debility is extreme, raw eggs beaten up with milk. Stimulants should not be administered unless absolutely necessary, on account of their locally irritating effect.

DIARRHŒA.

Causes.—In many cases this common malady is also rather a consequence or symptom of some morbid condition than itself a disease. The frequent discharge of loose or fluid evacuations from the bowels, without griping pain or tenesmus, is sometimes a wise effect of nature to get rid of some injurious or indigestible material, which has been imprudently swallowed into the stomach and has from there passed into the bowels. Diarrhœa may likewise be produced by some violent mental impression, or by exposure to taking cold, the bowels instead of the throat being often the weak spot of the individual. It also results from privation of food, food of poor quality, and many analogous causes.

Medicinal Treatment.—In the treatment of diarrhœa from indigestible food no attempt should, as a rule, be made at first to check it until the offending material, whatever it may be, is cast out of the system. In fact, a gentle and soothing laxative, such as a dose of castor-oil with a few drops of laudanum to hasten along the conservative action of emptying out the intestinal canal, is often of great service.

Stopping Evacuations.—After this is accomplished, however, each additional evacuation is an evil, which should be prevented by the use of five grains of bismuth or chalk, with three grains of tannic acid, or in a teaspoonful of either syrup of galls, or syrup of krameria, and a quarter of a grain of opium, or by opiates combined with carminatives like lavender, or ginger, and camphor, a good mixture being ten drops of laudanum, fifteen of compound spirits of lavender, and five of spirits of camphor, taken on a lump of sugar every hour or two until relieved.

Additional Treatment.—If the stomach is unsettled, as is frequently the case, the opiate and astringent may be administered with advantage by enema or suppository, and in patients who cannot, or think they cannot, retain medicines in either the stomach or rectum, hypodermic injections of the eighth of a grain of morphia may often be resorted to with the happiest effect.

Diarrhœa Mixture.—A good rule in taking a diarrhœa mixture is to use a moderate dose every two hours, provided the loose passages recur within that time, but if at the end of two hours there has been no liquid or semi-liquid evacuation in the interval, to wait until such a one occurs before resorting again to the remedy. In this way the blunder of so over-doing the good work of checking the diarrhœa as to inflict upon the system its opposite evil of constipation may generally be avoided. The patient thus gains from the remedy all the good with as little of the necessary evil, which lurks in the bottom of every cup of blessing, as possible, a desideratum which should constantly and persistently be kept in view in every kind of medical treatment, as well as all other affairs of life.

Other Remedies.—Among the various other valuable remedies often beneficial in this exceedingly common disorder, may be mentioned the tincture of kino, catechu and logwood, acetate of lead, sulphate of copper and sulphate of zinc, nitrate of silver, spirits of chloroform, tincture of capsicum, spirits of camphor, compound spirits of lavender, and so forth.

Accessory Treatment.—In cases of diarrhœa, where the tongue is white and coated, the pulse accelerated, the temperature a little raised, and some pain or soreness, increased by pressure, is felt in the abdomen, small doses of epsom or Glauber's salts, in conjunction with hyoscyamus and opium, and perfect rest in bed with the most rigid attention to diet, are necessary, lest the slight irritation of the mucous lining of the alimentary canal become aggravated into actual inflammation, and more serious disease, such as dysentery, enteritis or obstinate chronic diarrhœa result.

Diet.—The diet of a person suffering from diarrhœa must be very strictly regulated, and, in fact, nothing but tapioca, sago, boiled rice or milk-toast with boiled milk, twice-boiled water, beef-tea and table-tea should, as a rule, be put into the stomach. Even after the malady seems to be cured, much caution must be exercised about returning to the ordinary diet. This disease, like most others, indeed, exhibits as it passes away a singular analogy to a conflagration, which for days after it has apparently been extinguished is ready to break out again, if the remaining sparks happen to be fanned into a flame by the wind or any new fuel is supplied.

CONSTIPATION OR COSTIVENESS.

Definition.—This diseased condition, the direct opposite of the preceding one, may be defined as a retention of the fecal matters beyond the usual period, so that they are passed with difficulty and in a comparatively hardened state.

Causes.—The causes of constipation are almost infinitely various. Every form of impaired digestion may originate it; the existence of piles or hemorrhoids, a sedentary life, application to study, amenorrhea and uterine disease in females, all are apt to induce it, and almost every acute disease is frequently ushered in by constipation. It is more often met with among women than men, probably because the female sex fail to exercise sufficiently in the open air; and many articles of food largely contribute to establish the evil of habitual constipation.

Treatment of the Acute Form.—If the trouble be occasional and accidental, any of the milder laxatives, such as a tablespoonful of epsom or Glauber's salts, rochelle salts, castor-oil—which is the safest purgative, as a rule—ten or fifteen grains of rhubarb, senna, or the various purgative mineral waters may be employed. For some patients, injections of warm water, or soap and water, answer a very good purpose, and if administered with care are perfectly harmless.

Treatment of the Habitual Form.—Habitual constipation is best treated by the regulation of the diet, partaking of fresh or stewed fruits, bran bread and vegetables in season, in proportions sufficient to antagonize the torpor of the bowels; at the same time resorting to active exercise in the open air, and endeavoring to correct any faulty habit of life, which may be the primary cause of the trouble. If the difficulty had its origin in hereditary tendency, or other deep-seated modification of the organism, laxatives should be resorted to, because, in the writer's opinion, at least, the evils of constipation are far greater than those arising from the constant employment of these medicines.

Additional Treatment.—It is probable that for most persons saline laxatives such as rochelle salts, or purgative waters during the summer, and in cold weather pills of a grain of rhubarb, one-sixth of a grain of podophyllin and a grain of compound extract of colocynth, teaspoonful doses of the compound liquorice powder, or fid. extract of cascara sagrada daily will be beneficial. This acts as a tonic to the muscular coat of the bowels.

Relieving Constipation.—Obstinate constipation—that is, absence of evacuation for several days, or a week or two—is a dangerous condition, and should never be permitted to occur, since the large and densely-packed masses of feces may require the operation of drastic cathartics to dislodge them, and such medicines, in accomplishing their work, sometimes set up serious or fatal inflammation. Liberal potations of castor-oil, aided by large enemas, may first be tried in such a case; then senna, in teaspoonful doses of the fluid extract; then quarter or half-grain doses of tartar emetic, in conjunction with epsom salts, and if these fail, it may be necessary, under skillful advice of a physician, to resort to drastic cathartics, such as gamboge, calomel, elaterium and croton oil, provided no organic obstruction exists.

HERNIA OR RUPTURE.

Definition.—Hernia is the name usually applied to the protrusion of some portion of the bowel or any abdominal viscera through the wall of the abdomen.

Varieties.—We may have umbilical hernia or protrusion of the bowel at the navel, a form often seen in children; and hernia in the groin or inguinal hernia, which is probably a most common variety. It has been estimated that about one man in every seven is affected with hernia, but in most cases the intestine is kept in its place more or less perfectly by some form of truss. When a hernia can be pushed back it is called reducible. An irreducible hernia cannot be returned into the cavity of the abdomen, and is constantly in danger of being inflamed, by some accidental blow for instance, and so becoming strangulated.

Causes.—Hernia is sometimes produced or driven out under some treacherous truss, which should protect against such an accident, by very slight causes, all of which should be carefully guarded against by those who have any hereditary tendency to this disease. It may be forced out by a jerk, such as suddenly pulling open a door that sticks, or by a fall, by an attempt to lift a heavy weight or to raise a moderate one whilst in a constrained position, or any other act which tends to bring a strain upon the bowels, making them bear downward. It is also favored in its occurrence by overeating, by excessively exhausting exertion, and by severe effort at times when the body is enfeebled by disease. It is more common on the right than on the left side of the body.

Symptoms.—The symptoms of strangulated hernia are intense pain, not only in the neighborhood of the rupture but over the whole abdomen and especially around the navel, obstinate vomiting, and cessation of the passages from the bowels. At first there may be one or two evacuations of the fecal matters already below the seat of strangulation, but after that is cleared out the bowels cease to move, and if the strangulation is unrelieved the vomiting, which persists in spite of all remedies, results in bringing up fecal material through the throat. This is a very curious phenomenon, and seems to indicate that nature in her stupid zeal to get rid of digested materials, on finding that the usual avenue downward is blocked, soon reverses the normal peristaltic movement and tries to evacuate the bowels through the mouth. In accordance with this idea the importance of such stercoraceous vomiting, as it is called, in the diagnosis of strangulation of a hernia, or some similar obstruction, is very great.

Treatment of Strangulated Hernia.—When fecal vomiting occurs, if undecided before, not a moment should be lost in sending for the best medical skill which can be procured, and which even then may arrive too late. In the absence of medical assistance, reduction of an obstinate hernia on the point of becoming strangulated, or perhaps already compressed, may sometimes be accomplished by putting the patient in a warm bath, and so relaxing the system as already explained; or a full dose of opium or morphia, the former preferably by enema, may perhaps have the desired effect; or lastly, the administration of ether or chloroform, by one who is accustomed to giving these anesthetics, by still more fully relaxing the system, may happily allow the endangered fold of the intestine to be pushed back into its proper place. If the hernia cannot be reduced an operation is absolutely necessary and is attended with but very little risk in the hands of a skilled surgeon.

Treatment of Reducible Hernia.—In this form of hernia the contents of the sac can be reduced into the abdominal cavity. The treatment may be palliative or radical.

Palliative Treatment.—Prevent constipation, avoid sudden strains and violent exercise and order a truss. The continual employment of a truss, especially in young persons, may bring about a cure. The day truss should be applied before rising in the morning and be removed after lying down at night, when a light truss may be substituted. A truss is always uncomfortable at first, but a person soon grows used to it. It should be kept perfectly clean, and it is well to dust borated talc powder upon the skin under the pad at least once a day. A truss which does not keep the hernia up increases pain and does harm. Too strong a spring tends to enlarge the hernial opening and thus aggravates the cause.

Radical Treatment.—This is operative and the sac is completely closed and a new canal formed. These operations show a very small percentage of recurrences.

INTESTINAL WORMS.

The intestinal canal is often the home of parasites, commonly called worms, and in many parts of the country nearly all children between the ages of one and seven years, as well as many older persons, are troubled with these pests.

Varieties.—1. In childhood the usual inhabitant of the bowels is the round-worm or ascaris lumbricoides, a creature attaining the size of a large earth-worm, which it resembles in appearance, except that it is whitish or brownish, and stiffer and harder in its structure.

2. Children are also often infested with the oxyuris, commonly called the thread-worm, pin-worm, or seat-worm. This parasite is sometimes found in great numbers about and just within the fundament. In size they are very nearly that of a very small pin or piece of thread about half an inch long, but by their number and activity they often contrive to prove very troublesome guests to their unwilling host.

3. The third common parasite which preys upon the human species is the tænia solium or tape-worm, of which some account has already been given. These parasites are always introduced into the system from outside, either with food or drink, and hence one great reason for the good cooking so strenuously urged in a former chapter. They are a great source of irritation as long as they remain, and in childhood, by the reflex irritation their movements in the intestines are capable of exciting, constitute one of the common causes of convulsions. Exactly what articles of food convey the eggs of the round-worms and the pin-worms into the human system has not yet been discovered, but the tape-worm is known to find its entrance into our bodies by the eating of raw meat, generally beef or pork.

Symptoms of Round-Worms.—The symptoms are often absent. When present there are usually symptoms of dyspepsia, diarrhœa, with mucous stools, colicky pains in abdomen, voracious appetite which it is almost impossible to satisfy. There is anemia and often reflex nervous phenom-

-na such as "night terrors," grinding of the teeth, itching of the nose and anus, twitching of the face and limbs and there may be convulsions.

Treatment.—The diet should be restricted before the remedy is administered. The most effective remedy is santonin, which is best given with calomel, as in the following:

R.—Santonin	5 grains
Calomel	5 grains
Sugar	20 grains

Divide into ten powders, and take one powder morning and evening.

Fluid extract of spigelia, one to three fluid drachms, often proves very effective.

Symptoms of Pin-Worms.—These chiefly affect the lower colon and rectum, and produce severe itching of the anus and adjacent parts.

Treatment.—Flush out the bowel with water, then inject infusion of quassia chips twc or three drachms to the pint of water.

Symptoms of Tape-Worm.—These are frequently absent. There may be dyspeptic symptoms, colicky pains in abdomen, loss of flesh, capricious appetite and at times reflex nervous phenomena as vertigo, palpitation, "night terrors," convulsions, itching at nose and twitchings of limbs and face, especially the latter.

Treatment.—A light diet for a day or two previous to the administration of the remedy, so that the worms will be hungry enough to feed upon the drugs administered. After an unsubstantial breakfast administer one of the following efficient remedies: Pumpkin seeds, two to three ounces, oleoresin of aspidium, one to two drachms; pomegranate, one drachm.

Auxiliary Treatment.—Before giving any of these the bowels should be thoroughly emptied by a good purge, and about twelve hours after the administration of the remedy another purge, preferably castor oil, should be given. The treatment is successful only when the head is passed, so the stools must be watched carefully. If not successful the first time try again in a day or two.

COLIC.

Colic is an acute spasmodic affection of the bowels without diarrhœa or much fever, but attended with severe cramps of the abdominal muscles.

Causes.—Its most common causes are indigestible food, reflex irritation from the uterine or ovarian disease, and lead poisoning.

Symptoms.—The great characteristics of colic are the griping, twisting pains, radiating from the navel and relieved by pressure. Care must be taken not to mistake these pains for those of strangulated hernia, or the converse, which would be a much more serious blunder.

Treatment.—The treatment is to relax the spasm by opiates, and remove the offending material if there is any in the bowels. For the former purpose twenty or thirty drops of laudanum by enema or hypodermics of one-eighth of a grain of morphia, and for the latter a tablespoonful of castor oil or a Seidlitz powder answer very well in most instances.

HEMORRHOIDS OR PILES.

Hemorrhoids or piles are exceedingly common and troublesome complaints, consisting of little tumors which form at the edge or just inside the fundament, and give rise to intense suffering, especially when the bowels are evacuated.

Varieties.—There are three varieties: external, internal and mixed.

Causes.—Their production is favored by constipation, sedentary habits, hard seats, and some forms of liver complaint.

Symptoms.—The inflammatory enlargement is detected and is tender and inflamed. Pain on evacuation of bowels. The external variety does not bleed. Very often their surface, which in the internal variety is composed of the distended mucous membrane, exudes blood, in which case they are called bleeding piles. When seated outside the margin of the fundament they are not so apt to bleed, and receive the name of blind piles.

Treatment.—They may generally be prevented from developing by proper attention to the bowels, non-stimulating diet and rest, and, whilst small, an ointment of ten grains of extract of belladonna, thirty grains of tannin, and twenty grains of powdered opium in an ounce of simple ointment, will usually relieve them.

Auxiliary Treatment.—Injections of cold water into the rectum, bathing the parts with cold water after each bowel movement, or an ointment of

Chrysarobin	15 grains
Iodoform	5 grains
Extract belladonna	10 grains
Vaseline	4 drachms

Apply three times a day.

Apply this night and morning after carefully cleansing the part. Extract of hamamelis is a valuable application for external piles. When the acute symptoms subside use lead water and laudanum. If the internal piles prolapse and inflame use, in addition to the above, Allinghour's ointment on the parts. If the piles are protruding and reduction cannot be affected put the patient to bed, give a hypodermic of morphine sulphate one-fourth grain and apply hot poultices.

Surgical Treatment.—If hemorrhoids do not yield to the above treatment surgical operation is necessary, which is accompanied with very little danger. It may be done under local anesthesia, but general anesthesia enables an operator to accomplish his task with more thoroughness.

FISTULA IN ANO

Causes.—Fistula in ano is a very painful disease, in which a communication at the side of the fundament is opened through the flesh into the rectum, or lower bowel, above the sphincter or muscle which ordinarily keeps it closed. It is usually the result of an abscess at the side of the intestine. There are several varieties of fistula, in the worst of which the fecal matters from the intestines constantly leak out through the hole or sinus, and besides causing great irritation and pain, render the sufferer disgusting to every one whom he approaches. Most of these different forms of fistula can, however, be cured by severe surgical operations.

Fissure of the Anus.—This is another painful affection, in which a slit or crack appears in the side of the fundament, often the result of a small ulcer at the edge of the opening. As it must be torn apart every time the bowels move it is very difficult to heal. Sometimes fissures of this kind can be cured by touching the sore with caustic, and using laudanum injections to keep the intestine in a state of comparative rest, but if these fail a surgical operation is the only remedy.

Prolapsus Ani, called also falling of the bowel, is the coming down of the rectum, which protrudes outside of the body sometimes to the distance of three or four inches. It generally results from constipation, and is especially apt to occur in weakly and neglected children. The protruding portion of the intestine should be carefully and gently pushed back to its place with the fingers covered with a well-oiled silk handkerchief, and suitable apparatus obtained from the instrument makers to keep it in position. Sometimes an operation is necessary.

DISEASES OF THE LIVER

JAUNDICE.

Jaundice is rather a symptom of disease than a separate malady.

Causes.—It may be due to a suppression of the secretion of bile by the hepatic cells; or, again, by an over-activity of these elements, and a superabundant supply of bile in the system; or, thirdly, by obstruction to the outflow of bile, and reabsorption of its elements into the blood.

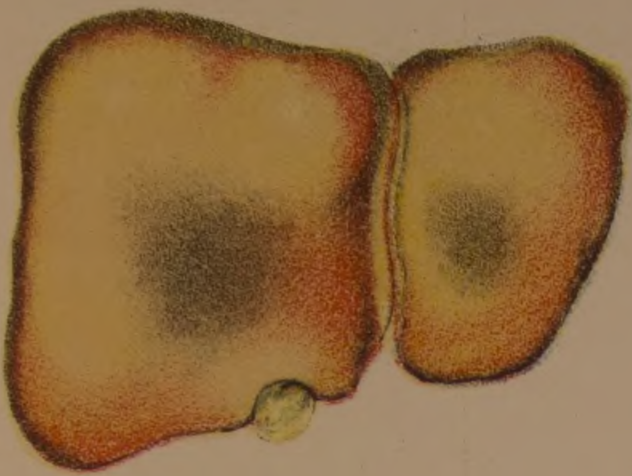
Symptoms.—It consists of a morbid yellowness of the skin, the white of the eye and other parts; but in bad cases this yellowness may become so intense as to appear olive-green, brown or even black. The urine is also of a yellow or saffron color, but the discharges from the bowels are pale and devoid of the natural brownish-yellow tint, sometimes having the bluish-white of potter's clay. Troublesome itching of the skin, slow pulse, low temperatures, debility and a tendency to hemorrhage from the mucous membranes are frequent in jaundice.

Diagnosis.—The most important practical point is to determine whether the gall-ducts are obstructed or not. If they are closed, so that the stools contain no bile, the jaundice speedily becomes intense and the swollen gall-bladder can sometimes be felt below the edge of the ribs. When not obstructed, the reverse is the case. Jaundice which comes on suddenly is probably due either to a gall-stone or to nervous disturbance. Intense jaundice which has developed very gradually probably results from pressure outside of the gall-duct, such as would be produced by a tumor or cancer.

Gall-Stones.—Intermittent attacks of jaundice point to gall-stones in old people, and to catarrh of the bile-ducts in children. Paroxysmal pain preceding jaundice points to gall-stones; following jaundice, to cancer of the liver. Jaundice with great enlargement of the liver, if the latter is painful and tender on pressure, indicates cancer; if painless, it suggests the waxy or lardaceous condition of the liver. When jaundice accompanies ascites, it is usually due either to cancer or cirrhosis. The danger of life from jaundice, unless it does indicate some fatal disease like cancer or cirrhosis, is small; but in its severer forms it is often very obstinate, lasting for weeks or months.

Treatment.—The treatment consists of small doses of calomel or blue

LIVER COMPLAINT.



Normal or healthy liver

Diseased liver

KIDNEY DISEASE.

Healthy kidney

Bright's disease

pill followed by a saline purge for a few days, avoiding salivation. The mercurial medicine may be substituted or aided by five grains of extract of taraxacum; podophyllin and leptandrin, in quarter-grain doses, and bicarbonate of soda in quantities of ten grains. Later on in the attack, five-drop doses of diluted nitro-muriatic acid may be administered with advantage, leaving a few days' interval between the last dose of any mercurial and the acid remedy. The phosphate of soda is also useful.

Jaundice of Infancy.—It is very common to observe jaundice commence in the first or second day after birth. Usually of no importance. Probably due to diminished pressure in the portal system or to poteut ductus arteriosus. Recovery takes place in a few days or weeks. The severe forms may depend on septic poisoning with inflammation of the umbilical vein, congenital inflammation of the liver due to syphilis or congenital absence of the hepatic duct.

CONGESTION OF THE LIVER.

Causes.—Acute congestion of the liver may result from cold, from over-eating, or from the abuse of alcohol.

Symptoms.—Its symptoms are enlargement of the organ with tenderness on pressure, and a feeling of painful tension on the right side just above the edge of the ribs, often radiating to the right shoulder, slight jaundice, furred tongue, loss of appetite and scanty, high-colored urine are present, and the whole group of symptoms constitues the condition commonly designated as "being bilious."

Treatment.—It is generally relieved by a small blue pill, or small doses of calomel followed by a saline purgative, and attention to diet for a few days. If neglected this form may run on to chronic congestion or lay the foundation of inflammation of the liver.

ABSCESS OF THE LIVER.

Abscess of the liver is the formation of pus in the substance of the organ. There may be one large abscess cavity or many small ones.

Causes.—1. It may be due to injury.

2. The presence in the liver of the amvela culi of dysentery.

3. Foreign bodies, gall-stones and retained bile.

4. Septic emboli which may come through the hepatic artery but usually through the portal vein from other diseased viscera and produce a purulent inflammation of the vein.

Symptoms.—The fever is of the hectic variety, high in the evening and low in the morning. Chills are sometimes present; pain is variable and may be felt in back of right shoulder. The liver is enlarged, painful and tender. Marked jaundice is rare. There may be bulging, and fluctuation is sometimes detected.

Treatment.—There is only one treatment, which is surgical.

Degenerations of the Liver.—Acute atrophy of the liver, waxy liver, and fibroid deposit in the liver are various forms of degeneration for which little can be done by medical treatment and which are fortunately rare. Not so, however, as far as regards infrequency, with cirrhosis of the liver, called also drunkard's liver and hob-nail liver, because of its origin in the abuse of alcohol and the peculiar contracted form which it presents. The process which the liver undergoes is a condensation of the substance and destruction of the secreting cells, with thickening of the connective tissue. The whole liver gradually contracts, ceases in great measure to manufacture bile and, becoming an obstruction to the venous circulation, produces ascites or abdominal dropsy, under which the sufferer generally succumbs.

LIVER OR HEPATIC COLIC (GALL-STONES).

Gall-stones are hard concretions which form within the gall-bladder, and when they attempt to pass out through the gall-duct often give rise to the most excruciating agony which the human being is capable of suffering.

Symptoms.—This pain is called hepatic colic, on account of its griping, tearing character, and may generally be distinguished by its coming on and passing off suddenly; by its frightful intensity; by being deep-seated instead of superficial; by being accompanied with vomiting and by the pulse being rapid and feeble. The onset may be marked by a chill and fever. It may last from a few moments to several days, and is often so severe that strong men will sometimes writhe and roll around on the floor, screaming in their agony. It seldom comes on before middle life. and women are much more frequently attacked than men. The pain is chiefly in the upper part of the abdomen on the right side. If a gall-stone remains in the duct for more than twelve hours, it is usually followed by jaundice coming on two or three days later. The affection terminates either by the stone slipping back into the gall-bladder or passing out through the duct into the bowel, in which latter event it may be found in the evacuations during the next week, and should always be searched for. The stone usually varies in size from that of a small shot to an inch or more in diameter, and in color from yellowish-white to dark-brown. If single, it is usually oval or rounded; but if two or more have been formed, the first one is marked by impressions of the others, and thus the prospect of future attacks can be estimated. Notwithstanding the alarming suffering the danger to life is small, and death rarely eventuates from hepatic colic.

Treatment.—The treatment is by thirty-drop laudanum enemas or hypodermic injections of a quarter of a grain of morphia and one-one-hundredth of a grain of atropia, with chloroform or ether by inhalation, if the pain is unendurable. Hot fomentations, or hot baths, sometimes afford partial relief. In order to prevent the recurrence of hepatic colic, small doses of carbonate of soda, alkaline mineral waters, or a mixture of chloroform and turpentine have been highly recommended.

Value of X-Ray.—The use of the X-ray was found valuable in the diagnosis of gall-stones.

ASCITES OR DROPSY OF THE ABDOMINAL CAVITY.

Symptoms.—The prominent symptom of ascites is the distension of the abdomen, which sometimes becomes enormously swollen, and by the pressure upward of the diaphragm gives rise to distressing dyspnœa.

Treatment.—When possible endeavor to remove the cause. Purge freely with concentrated salines, compound jalap powder twenty to thirty grains, elaterium one-eighth grain. Increase the action of the kidneys by infusion of digitalis two drachms, citrate of caffeine three to five grains, diuretin fifteen to thirty grains.

Auxiliary Treatment.—If the effusion is large and does not yield to the above treatment tapping is indicated, which is a procedure accompanied by very little danger. No anesthetic is required, and it gives almost immediate relief to the dyspnœa. Care must be taken not to draw off the fluid too rapidly, as this might cause collapse.

LIVER COMPLAINT.

Causes.—A congested state of the liver which may depend on an obstruction in the portal and hepatic venous system, in which there is a deficiency of tone in the veins which prevents the normal ascent of the blood from the lower parts of the body, thereby distending the vessels and causing an accumulation of blood. This inability of the blood to ascend against gravity is found in a great variety of chronic diseases. A very frequent cause of disease of the liver is the indulgence in alcoholic stimulants and the eating of too highly seasoned food.

Symptoms.—1. Perhaps there is no disease in the whole human frame in which symptoms assist less. In some of the more acute forms of the disease the symptoms are urgent, but except in a few instances they convey little or no information with respect to the nature or progress of the disease, and in the more chronic forms irreparable mischief is often established before the patient even suspects that there is anything wrong. There are, however, certain general symptoms which, when present, enable us to pronounce pretty positively as to the existence of liver disease, though they will not assist in determining its nature. These are dropsy, indigestion and jaundice. The tongue is generally coated and commonly furred. A disagreeable, bitterish taste is felt in the mouth, and eructations take place, sometimes bitter, cutting, acrid and even excoriating the lining of the throat. The skin may be hot and dry-parched and rough, or it may be too relaxed, giving rise to cold, clammy sweats.

2. There is no excretion, not even excepting the bowel evacuations, which is more frequently deranged in diseases of the liver than urine. Thus, bile may be detected in the urine when no other irregularity is present by the application of muriatic acid.

3. Not unfrequently a patient has lost the power of assimilation, not from any well defined organic lesion of the liver or alimentary canal, but rather because of a stagnation of want of proper secretion through the ducts of the liver. When these become deficient in secretion the healthy action of the liver is arrested and various disorders immediately begin to be manifested. The bowels do not move freely; the bile, instead of getting excreted by the intestines, is taken up by the blood. In consequence the internal organs suffer and a bilious attack follows. After frequent attacks the skin becomes sallow, rough and yellowish, and you are affected with headache, constipated bowels, coated tongue, pain in the right shoulder and side from the poison left behind in the blood. Here is the first seat-origin of pulmonary consumption.

4. The so-called biliousness, indigestion, capricious appetite, pain after food, eructations, acidity, flatulence, irregularity in the bowels, whether as constipation or diarrhœa, point almost always to this disturbance, and it is a most potent factor in causing and inviting other diseases.

5. The modern liver is a degenerate organ; the average digestion far below the standard of old, and its function abnormally feeble and slow. Gout and uric acid congeries prevail to a remarkable extent, and the ailments, directly or indirectly attributable to malnutrition, meet the busy practitioner at every turn, The bilious attack of olden time, for which mercury was a specific, and that of to-day are alike. The former was almost always the invariable penalty of a "surfeit," brought on by inordinate indulgence in the pleasures of the table, in an age when the "three-bottle man" was a hero of every convivial gathering, and the appetite on the morning following a "night out" usually unequal to the most exacting demands of a bountifully-spread board, without the aid of the seductive but dyspepsia-breeding cocktail. The latter-day biliousness, on the other hand, comes on insidiously, often without apparent cause, and follows the most trifling indiscretion in diet. The digestive organs being weak to begin with, a slight excess of intestinal decomposition is easily provoked, and the whole system becomes gradually saturated with its poisonous products. This condition, therefore, is not amenable to the mercury treatment.

Treatment.—1. The successful treatment of the modern form of the disorder is but just begun when all putrescent elements of ingested food have been carried off by purgation. The condition remaining, in which there are large amounts of slowly accumulated deposits in the system which the unaided efforts of nature are impotent to remove.

A pill composed of aloin, may-apple and nux vomica, an eighth of a grain of each, may be taken at night, or night and morning, until the bowels become regular. By their judicious use the digestion will be improved, also the general health, thereby avoiding those principal sequences which attend the constipated condition.

2. Medicines should be "arms of precision." The physician cannot push his remedies to the limit of safety unless he has perfect confidence in their purity and accuracy. This combination accomplishes this in a threefold manner. The may-apple increases the healthy action and secretion in the ducts of the liver. The nux vomica, by its stimulating and tonic effect on the stomach, enables it to better assimilate and digest the food; while the aloin completely cleanses the walls of the alimentary canal.

Through their combined action the system is restored to its normal standard. This is the secret of their curative power in the treatment of liver disease. This secret is one of immense power. They not only stimulate the brain by their action in generating more gray matter, but in some mysterious manner vivify the great sympathetic nerve which covers the bowels and energizes the eighth pair of nerves which supplies the liver. They speedily affect the liver, restore the gland to its pristine activity, and the bowels become regular, the complexion clear, the breath sweet and the whole body seems rejuvenated, proving that the liver has renewed its normal function.

When the bowels do not move freely the liver becomes congested, and the bile, instead of being excreted by the intestines, is taken up by the blood. In consequence the internal organs suffer and a bilious attack follows. After frequent attacks the skin becomes sallow, rough and yellowish, and you are troubled with headache, constipated bowels, coated tongue, pains in side, and your whole system feels out of sorts. For this condition take three pills on retiring at night.

For an aggravated attack of biliousness or chronic liver disease take one pill three times a day for one week. Take one pill each night at bedtime for two weeks, after which take one pill twice a week for about three weeks.

For a slight attack of biliousness, indigestion, and so forth, take two pills on retiring and one pill each night afterward until five have been taken.

Auxiliary Treatment.—When suffering from this disease the diet should first be considered. Light gruel or toast water and buttermilk or skimmed milk can be taken. Light mutton or chicken broth, after removing the greasy portion from the top. Food should not be eaten between meals, of any kind. Alcohol or malt liquors, as also tobacco, are to be avoided. For the relief of pain in the side over region of liver apply a hot hop poultice, or, what is preferable, a hot-water bag should be placed over this region and replenished so as to keep up constant heat. In severe cases the tension may be relaxed by a mustard plaster or an application of spirits of turpentine well rubbed in. This acts as a counter-irritant and often gives speedy relief. If the patient continues to vomit, a little lime-water and milk—a teaspoonful of lime-water in a cup of milk —or a mustard plaster made with the white of egg and applied to pit of stomach will frequently give immediate relief. Regarding diet, it should bland and unirritating.

PART VIII OF BOOK IV

Treats of the diseases to which the Genito-Urinary System is subject.

CURATIVE MEDICINE

PART VIII.

DISEASES OF THE URINARY SYSTEM

The Urinary Organs.—The important group of organs which makes up this system comprises the kidneys, two glandular bodies about four inches long, and of the peculiar shape of a kidney-bean, with their outlet pipes communicating with the bladder, and its exit tube the urethra, opening in both sexes in conjunction with the organs of generation.

Office of the Kidneys.—The office of the kidneys in the animal economy is to secrete the urine which passes from each gland down its separate ureter into the bladder, where it may be stored to the amount of half a pint or a pint, and from which it ought, at suitable intervals of from four to six hours, to be evacuated. The ingredients of the urine being waste material, poisonous to the organism if retained in the blood, it will readily be understood why the suppression of the renal secretion, in certain morbid conditions, or its retention in consequence of any obstruction to its outflow, in the narrow ureters or urethra, may give rise to some of the most horribly painful and fatal diseases which mankind is ever called upon to endure.

Function of the Kidneys.—The function of the kidneys is purely an eliminative one, and a full understanding of its performance could only be gained by a study of the intricate structure of the organs, too complex to be considered here. It is sufficient for the present purpose to state, that the blood entering each kidney by its large renal artery is purified by having removed from it the elements of a poisonous substance, urea, with uric or lithic acid, phosphoric acid, and sulphuric acid, variously combined with potash, soda, lime, magnesia, and probably other refuse matters in smaller amounts. These solid ingredients of the urine are dissolved in the forty or fifty ounces of water which is also during health taken out of the blood by the kidneys, and in this way the urine is manufactured. The purified blood, after giving up these deleterious matters in the renal organs, is returned to the general circulation by the renal veins.

Passage of Urine.—In perfect health a man of average size would pass in the forty-eight ounces of urine, which he should daily evacuate from his bladder, an ounce and one-third of urea, nearly an ounce of chlorides, sulphates and phosphates, and from eight to twelve grains of uric acid. If, for any reason, the amount of water filtered out of the blood is less than this, there is danger that some solid constituents of the urine may crystallize within the urine or bladder, and being, perhaps, washed into the ureters in the one case, or into the urethra in the other, block up these outlets and give rise to the horrible agony of nephritic colic, gravel or stone in the bladder; or, again, even slight inflammation in these small tubes may result in a contraction or stricture, which hinders the passage of the urine, and also causes great suffering to the unfortunate patient.

Guide to Kidney Disease.—The chief guide to diseases of the kidneys is, necessarily, therefore, a chemical and microscopical examination of the urine, with the sediments which fall from it, in each individual case, and this should never be neglected in any but the most temporary and insignificant derangements of the urinary apparatus.

ACUTE NEPHRITIS OR ACUTE BRIGHT'S DISEASE.

Nature of the Disease.—Acute Bright's disease, called also acute nephritis, is a malady in which the kidney becomes greatly enlarged and vascular, with its minute convoluted tubes, in which the urine is primarily manufactured, plugged up with epithelial cells. These epithelial cells in the form of casts of the renal tubules are voided in the urine together with albumen, and sometimes with blood. The obstruction to the outflow of the urine and the interference with the function of the kidney give rise to the most serious general symptoms.

Causes.—Acute Bright's disease is a rather common complication of scarlet fever, and is one of the dangers most to be dreaded in that malady. It also occurs in cholera, yellow fever, scarlet fever, erysipelas and diphtheria, and may be produced by alcoholic intemperance, or by exposure to cold and wet, particularly by sitting on a wet or cold object, such as a stone step. Certain poisons which are eliminated through the kidneys, as cantharides and turpentine. Pregnancy is also a potent factor in the cause of the disease.

Symptoms.—The symptoms are, first, in many cases, chilliness, followed by fever, some pain in the loins and across the lower part of the spine, scanty high-colored and albuminous urine, and in a day or two dropsy, or watery effusion under the skin, beginning beneath the lower eyelids or in the organs of generation, but soon becoming general over the whole body. Uremic coma may develop at any time.

The Urine.—Scanty always, and at times entirely suppressed. Smoky in appearance, high specific gravity, rich in albumen and throws down a heavy sediment, which, when examined microscopically, will be found to contain hyaline, blood and epithelial casts, and free blood and epithelium.

Treatment.—The treatment, which is successful in a majority of the cases, consists in keeping the patient in bed in a room with a warm, moist and equable temperature, purging gently with those laxatives which cause watery discharges from the bowels, such as small doses of five grains of jalap and thirty grains of cream of tartar, promoting free perspiration by the use of sweat baths, which are given by placing the patient in a tub of water at the temperature of 106 degrees Fahrenheit for twenty minutes. Give a thorough rub and place in bed between blankets with hot water bottles, or hot cans around, but not touching the patient. A blanket should be interposed between the skin and the hot cans. Allow free perspiration for an hour to an hour and a half. Sweating may be aided by giving from one-twelfth grain to one-eighth grain of pilocarpine. Guard against collapse by giving strychnine sulph., one-twentieth grain. Dry cups followed by hot fomentations over loins. In bad cases, with robust patients, cut-cups or leeches may be used in place of the dry cups, and acetate or citrate of potash in twenty-grain doses, with ten drops of tincture of digitalis or squills, and half a teaspoonful of sweet spirits of nitre are often given with benefit. Citrate of caffeine in one to two grain doses may be tried. Infusion of digitalis in one drachm doses is especially beneficial in children. Diuretin in from ten to twenty grains three times a day for adults, and two to five grains for children will often give good results. Bascham's mixture, two drachms thrice daily. Niemeyer recommends a pill if œdema is present, composed of blue mass, powdered digitalis, powdered squill, each of one grain. Take one of these thrice daily. The following combination may prove efficient in troublesome dropsy:

Spartine sulph.	....	4 grains
Caffeine citrate	....	20 grains
Lithia benzoate	....	40 grains

Divide into ten powders, and take one every three hours.

CHRONIC BRIGHT'S DISEASE OR CHRONIC NEPHRITIS.

Causes.—It may follow the acute, or may be chronic from the beginning. Males are most frequently attacked. Adult life, frequent exposure to wet and cold, alcoholism and congestion from heart disease and syphilis are the chief predisposing causes.

Symptoms.—The symptoms of well-defined chronic Bright's disease are albuminous urine, containing renal epithelial cells and tube-casts, more or less dropsical effusion, especially noticeable about the face and ankles, anemia, shortness of breath, a peculiar dryness of the skin, dyspepsia, headache and giddiness, together with a tendency to dimness of sight and inflammation of the retina of the eye, uremia or blood-poisoning from the retention of the urea, which ought to be removed by the kidneys in the circulating fluid, secondary inflammations, such as pneumonia and pericarditis and hypertrophy of the heart. Its presence can only be positively ascertained by thorough microscopical examination of the urine, and such examinations repeated from time to time are the best guides as to the necessary treatment. The variety is essentially chronic, running a course of months or years, with a tendency to temporary improvement under treatment, on the one hand, and to subacute exacerbations in consequence of unhygienic imprudences on the other. It almost always proves fatal in the end, however, by uremia with or without convulsions, by secondary inflammations, or perhaps by general debility. It is estimated that uremia causes death in about one-third the cases.

Treatment.—The treatment for chronic albuminuria is in the main hygienic. Residence in a warm and equable climate. A quiet life without mental worry, with gentle but not excessive exercise, is recommended. In addition the bowels should be kept regular, skin active by daily tepid bath with friction. Abundant pure water or some pleasant mineral water should be drunk. The underclothing should be wool or silk, and the diet non-nitrogenous, and in severe cases absolute diet of skimmed milk will prove beneficial, unless dropsy or symptoms of uremia require active remedies.

Further Treatment.—Should the former be very troublesome, and diuretics, as suggested when speaking of the acute form, fail to act, as frequently happens, recourse must be had to the hydrogogue cathartics, such as a quarter of a grain of elaterium, already spoken of, with hot-air or vapor baths to promote elimination by the skin, as a partial substitute for the inefficient work of the crippled kidneys. If marked symptoms of uremia appear, such as headache, drowsiness, involuntary muscular twitchings, sudden and violent vomiting and diarrhœa, recourse to the active cathartics should be had at once, without any preliminary trial of a diuretic, and if uremic convulsions or coma come on, full doses of elaterium or a drop of croton oil will probably be required immediately to avert death. During the convulsion chloroform may be given by inhalation to restrain the violence, and perhaps shorten the paroxysm.

Many cases of uremia are benefited and life prolonged by blood letting of from six to twelve ounces, depending upon the pulse, and followed by an injection of saline solution from one to two pints beneath the breasts, or in subcutaneous structures of the axilla, strength of solution about one teaspoonful of salt to a pint of distilled water, to be injected at about the temperature of 100 degrees Fahrenheit. Care must be taken to thoroughly cleanse the skin at the point at which the needle is to be inserted. Early in the case Bascham's mixture does good.

HEMATURIA OR BLOODY URINE.

This is more a symptom of other diseases than a disease in itself.

Causes.—Stevens gives as the causes thus:

1. Vicarious menstruation.
2. Traumatism applied to any part of the genito-urinary tract.
3. General blood dyscrasia as in specific fevers, purpura, malaria, scurvy, etc.
4. Congestion of the kidney from chronic heart, lung or liver disease.
5. Acute inflammation of any part of the genito-urinary tract.
6. Stone in any part of the genito-urinary tract.
7. Varicose veins in neck of bladder.
8. It may occur without obvious cause.
9. Parasites in genito-urinary tract.
10. Tumors and tubercle of the kidney.

The presence of blood may be suspected from the red, smoky or brownish color of the urine, and positively determined by a microscopical examination. If the blood is clotted it generally comes from the bladder, and if coagulated in long round strings, like earth-worms, it may have been effused in the urethra, from a rupture or ulcer in that membranous tube.

Treatment.—The most important thing is to discover the cause and treat that. If this cannot be done tincture of chloride of iron, which is especially useful in debilitated patients in twenty-drop doses every three hours, gallic acid in quantities of five grains, and ergot, or two grains of acetate of lead and half a grain of opium every four hours. The effect of the general remedies may be aided by the injection of a weak solution of alum in cold water, thrown into the bladder by means of a catheter if the case is urgent. Where a large mass of coagulated blood is formed in the bladder it may sometimes be gotten rid of by the injection of a solution of pepsin, which, if the ingenious plan succeeds, dissolves the clot of blood.

PYURIA OR PUS IN THE URINE.

Causes.—1. Suppurative inflammation of the kidney.

2. Calculus (stone) or tuberculosis of kidney.

3. Cystitis or suppurative inflammation of the bladder.

4. Urethritis. Inflammation of urethra.

Symptoms.—Urine is alkaline and has a cloudy sediment. There is usually frequent and urgent desire to urinate, especially if the pus is from the bladder or posterior urethra.

Diagnosis.—Diagnosis can only positively be made from microscopical examination. If from abscess of kidney flow of pus is intermittent. If from calculus or tuberculosis of kidney the flow is constant, as it is in cystitis or urethritis.

Treatment.—The treatment consists in removing the cause.

SUPPRESSION OF THE URINE.

Description.—This is an affection in which the work of the kidneys in secreting the urine is very defective or altogether abolished. There may be some pain in the back or irritability of the bladder, the patient becomes anxious and restless, then dull and drowsy, and finally after an interval of from three to eight days usually dies comatose. In other instances there is nausea and vomiting, hiccough, and the whole body exhales a urinous odor. Where the suppression is less complete, and depends upon some obstruction to its outflow in the ureters, bladder, or urethra, the mind remains clear for a long time, perhaps, and the unfortunate patient is fully conscious of the intense local suffering and general distress produced. The time during which the urine may be suppressed and yet the patient recover varies considerably.

Hysteria.—In hysteria, cases where no urine has been passed for ten days are reported, but such instances are not free from suspicion of possible deception on the part of the patient. Children when teething will sometimes for days together void only a few drops of urine at once, and that at several hours' interval. The urine passed at such times is extremely high colored, stains the linen, and is passed with great pain, the child crying bitterly, as it scalds the sensitive surface over which it flows. This disease probably arises, at least in some instances, from over-congestion of the kidney.

Treatment.—The treatment recommended is to place the patient in a warm bath, and give a saline diuretic, such as a teaspoonful of cream of tartar, or twenty grains of acetate of potash dissolved in half a pint of water, combined with a moderate laxative. The sweet spirits of nitre, in half teaspoonful doses, is also frequently useful. Digitalis leaves made into a poultice, or the tincture of digitalis added to a flaxseed poultice, have often proved beneficial, and the digitalis may also be used internally with advantage in the form of a teaspoonful of infusion every four hours, or Dover's powder, ten grains for an adult.

FLOATING OR MOVABLE KIDNEY.

The mobility of the kidney depends upon the relaxation of the surrounding structures.

Causes.—Females are most usually affected, probably due to the difference in dress between them and the males. Middle life. Any disease producing rapid marked emaciation predisposes to it. A congenital relaxation of surrounding tissues. Muscular exertion. Repeated pregnancies.

Diagnosis is made by feeling kidney in abnormal position.

Symptoms.—There is a dragging sensation in back. Kidney may become swollen and painful to the touch. There is a sense of uneasiness and attacks of neuralgic pains. Emotional disturbances are often excited by this condition.

Treatment.—Use abdominal binder or pad. Regulate diet. Avoid exertion. If the condition persists the only treatment is surgical.

RENAL OR NEPHRITIC COLIC.

Causes.—Since the ureters commence inside the kidneys as funnel-shaped tubes, it is obvious that any solid substance capable of entering the upper part and yet a little too large to pass the lower portion, will stick fast, and can only progress as the pressure of the constantly secreted urine behind it drives it along with sufficient force to dilate the pipe and allow it to move onward. This process of dilatation is horribly painful, and with that of passing a gall-stone, and of certain forms of neuralgia, makes up the worst physical suffering of humanity since the Spanish Inquisition was abolished. The little stones which cause such agony in this way are generally composed of uric acid, or less commonly of oxalate of lime, deposited from the urine inside the kidneys, and washed down from the seat of their formation by the outflow of that fluid. It is not positively determined whether they crystallize out of the urine because they are produced in too large quantity in the system, or because a deficient amount of water to hold them in solution is filtered out of the blood; but in either case, increasing the bulk of the renal secretion by drinking a larger quantity of water daily, is a most rational method for diminishing the tendency to their production.

Symptoms.—The first symptom of an attack of renal or nephritic colic is usually pain in the region of the loin on the affected side. This rapidly increases in severity until it becomes excruciating, and radiates downward toward the groin, the testicle on that side being drawn up, a symptom constituting in males—who are chiefly the subjects of this malady—an important diagnostic sign. With the pain, nausea and vomiting are apt to occur, and the body is covered with a cold sweat.

Treatment.—The treatment of nephritic colic is to relieve the pain, if only moderately severe, by hypodermic injections of morphia and atropia, or laudanum enemas, as advised in the article upon gall-stones; but if the suffering is intense, by the inhalation of ether or chloroform. In order to mitigate the pain sufficiently by these anesthetics, it is not usually needful to administer them to complete unconsciousness. A few whiffs will lull the distress so as to make it endurable for the time, and as this blessed influence passes off, it can be renewed by a repetition of the inhalation. Persons whose hearts and lungs are healthy, can thus be kept in comparative comfort with comparative safety, for several hours, or until the passage of the stone out of the lower end of the ureter into the bladder renders the anesthetic no longer necessary.

Passage of Stone.—It is probable that both morphia and ether tend, besides, to hasten the exit of the stone by relaxing the spasm, which no doubt is caused by the irritation of the angular corners of the cruel little calculus as it makes its way through the slender and sensitive tube of the ureter. After the passage of a stone of this kind into the bladder, it usually is voided with the urine, in the course of the next day or two, and in order to make sure that the enemy has been completely gotten rid of, it is best to carefully examine all the urine which comes away in the next few days after an attack. The character of the stone, when found, will afford some information as to the best mode of treatment to be adopted for the purpose of avoiding the formation of others of like structure.

Prophylactic Treatment.—Those who are subject to attacks of nephritic colic should live a quiet life, avoiding exertion as far as possible. The diet should be regulated as in gout. Diuretics should be taken and water in large quantities.

Sir William Roberts recommends what is known as the solvent treatment. Citrate of potash in doses of half to one drachm every three hours. Osler has not found this satisfactory. Piperazine in doses of five grains three times a day may prove useful as a solvent.

CYSTITIS OR INFLAMMATION OF THE BLADDER.

Symptoms of Acute Cystitis.—There is great frequency and urgent desire to urinate. The passage of very little urine at each act, accompanied by great pain above the pubis, and in the perineum radiating to the end of the penis and in the loins and sacral region.

The Urine.—The urine, at first clear, loses its transparency, becomes full of thick mucus and contains blood and pus. A rectal examination is very painful.

Treatment.—In treatment of cystitis remove the cause if possible. Put patient to bed, apply hot applications to perineum, give suppositories containing opium, one grain, and belladonna, one-sixth of a grain. Hips should be elevated and bowels opened by salines and glycerine enemas. An exclusive milk diet is often beneficial.

For the pain give a powder containing—

Extract hyoscyamus	4 grains
Extract cannabis indica	4 grains
Sugar	20 grains

Divide into ten powders, and take one every three hours.

Or five-grain doses of formin in half glass of water three or four times a day.

Suppositories of ichthyol, one grain, are often beneficial. All alcoholic stimulants must be avoided.

Symptoms of Chronic Cystitis.—In this condition there is frequent urination, but it is not so marked as in the acute form. The urine is ammoniacal, fetid and filled with tenacious mucus and pus; not infrequently blood. Constitutional symptoms rarely appear. Tuberculosis is a frequent cause of cystitis, and by careful straining and examination the bacillus tuberculosis can be found. This form is accompanied by pyuria (passage of urine) and pain.

Treatment.—1. If possible, the cause must be removed. Water is drunk in large quantities. Salol and boric acid, five grains each, every four hours, is very good.

2. Urotropin, five grains six times a day, catheterize twice a day, and irrigation of the bladder with solution of silver nitrate, one grain to a pint of water, or solution of permanganate of potassium (1-20,000). The bladder is washed out by attaching a glass nozzle to the catheter at one end, and to a funnel with rubber tube at the other. The funnel is raised to four or six feet above the patient, and bladder filled, and then fluid allowed to flow out. This is repeated several times until it returns clear.

CALCULUS, GRAVEL OR STONE IN THE BLADDER.

This is an extremely painful and annoying disease caused by stone or stony deposit in the bladder. When the system is healthy the ingredients forming gravel or stone are carried off without difficulty by the secretion of the kidneys. But when there is excess of uric or any other acid these particles sometimes unite and gradually grow and many find deposit in the kidneys or bladder.

It is supposed by some authorities to be in part due to the lime and magnesium contained in the hard water used for drinking in certain districts. It is more common in men than in women.

Symptoms.—Small gravel stones may pass off with the urine, sometimes with great pain, others remain to grow into stone. When the gravel or stone is too large to pass through the urethra the patient is subject to terrific spasms of pain, in groin, kidney, testicles, thigh and abdomen, but generally pointing to the direction which the stone seeks an exit; nausea and vomiting sometimes set in, and the pulse becomes weak and complexion pale. The patient is rendered uneasy by frequent desires to pass urine. The flow of urine is often suddenly stopped and then resumed upon change of position. This is due to the stone obstructing the passage of urine at the neck of the bladder.

TREATMENT.—The medical treatment is only palliative, and similar to that recommended in cystitis and solvent in nephritic colic. The surgical operation of opening the bladder and taking out the stone, called lithotomy, and of lithotrity or crushing the stone, if of suitable size and texture, within the bladder, by means of a very ingenious instrument, afford, when successful, as they are in a large proportion of cases, a complete cure.

In acute forms warm baths, suppositories of a grain of opium and one-sixth of a grain of belladonna, flaxseed tea and the use of salty purgatives are recommended.

In chronic gravel, teas or fluid extracts of buchu are often used, and in stubborn cases five-drop doses of diluted nitromuriatic acid, or salicin in five-grain doses, thrice daily, may be given.

Relief may sometimes be obtained from a mixture of two teaspoonfuls of powdered borax and five of cream of tartar, dissolved in a pint of water, the doses being two or three dessertspoonfuls four times a day.

To relieve intense pain the following enema may be used:

Thin-boiled Starch ....2 ounces
Laudanum ....30 drops

This injection must be retained in the bowels as long as posible. If pain is very severe, put in forty drops of laudanum. In place of this injection thirty drops of laudanum may be given internally every six hours, but the warm enema is better. Hot compresses over the abdomen and back are also useful.

STRICTURE OF THE URETHRA.

Causes.—Usually the attention is attracted by the circumstance that the desire to urinate becomes more frequent, and the force of the stream diminishes, so that the renal secretion dribbles away in drops, or runs off in a very fine stream not larger than a knitting-needle. There is more or less pain in passing water, and a good deal of straining is required to accomplish the operation, which begins to be dreaded from day to day, and even from hour to hour.

Treatment.—The treatment of stricture is purely surgical, as, being a mechanical obstruction, medicines can accomplish nothing for its relief.

The usual method is by gradual dilatation, using first a small steel rod bent at the suitable curve and highly polished. This is to be warmed and thoroughly oiled, and then carefully passed into the bladder through the urethra, scarcely any force being employed. The great danger is that some of the inflamed and softened tissues in the neighborhood of the obstruction may give way, and what is called a false passage being formed, the condition of the patient is rendered far worse than before.

Using the Steel Rod.—The largest size that can be used successfully having been introduced, it is allowed to remain a few minutes and then an instrument of a little greater diameter is employed, and so on until the urethra, not without considerable suffering, is stretched to the original magnitude. In most instances, however, this dilating process must be kept up for months, the patient himself learning how to use the proper instrument, and introducing it at longer and longer intervals for a year or two until completely cured Various other methods for relieving the obstruction of stricture have been devised, such as external incision, cauterization, and so forth.

Emergency Treatment.—In the emergency of an attack of retention of urine, in a man who is the subject of stricture, coming on whilst far from medical assistance, the first thing to do is to get into a warm bath, since this will often procure sufficient relaxation of the spasm, which always makes up part of the narrowing of an irritated stricture, to allow a little urine to dribble away, perhaps whilst bathing, and so relieve the distress of the patient. If this fails a laudanum and belladonna injection or suppository, or a full dose of twenty drops of laudanum, will frequently have the desired relaxing effect, or ten grains of Dover's powder.

Self-Use of the Catheter.—Care should be taken to drink as little fluid as possible, so as to diminish the amount of the renal secretion to a minimum, until the avenue for its escape is again partially unclosed. If a catheter can be procured, the patient should try to pass it himself, choosing the time when he is still partly under the influence of the opium, which dulls the excessive sensibility of the urethra.

Substitute for Catheter.—In the absence of a catheter it has been most ingeniously suggested by Dr. Levis, of Philadelphia, to use a piece of bell-wire, doubled and bent to the right curve, along the sides of which, if safely introduced, enough urine might flow to relieve the over-distended bladder.

DISEASES OF THE PROSTATE GLAND.

Causes and Cure.—Among the diseases of the prostrate gland the most important are chronic enlargement and calculus. This gland is situated just in front of the neck of the bladder, and encircles its outlet, the urethra. Hence its enlargement is apt to interfere with the outflow of the urine from the bladder as soon as it increases beyond a certain point. The difficulty thus caused in passing water is especially apt to affect elderly men, and would be very serious had not surgical science supplied a peculiarly formed instrument, called the prostatic catheter, by which the impediment can usually be overcome temporarily.

Inflammation of Urethra.—The urethra, which constitutes the final channel through which the renal secretion flows in making its exit from the body, is likewise subject to inflammation, and to obstruction from calculus, and, most important, to narrowing in consequence of inflammatory action. This contraction of the canal is called, as most people are aware, stricture of the urethra, and notwithstanding the numerous tales of accident producing this trouble, which are poured into the credulous ears of physicians, its true cause is, at least nine times out of ten, gonorrhea, which will therefore be considered in this connection. When a stricture is present a bougie should be used

GONORRHEA.

Character.—Gonorrhea, or, as it is vulgarly called, the clap is a specific inflammation of the urethra, the result of contagion and very seldom innocently acquired In the female it affects chiefly the vagina, and frequently extends to the uterus and ovaries.

Gonorrhœa is one of the most contagious diseases. It is caused by the germ called *gonococcus,* discovered by Professor Neisser. It spreads through illicit intercourse.

This disease is scarcely less dangerous, and is more prevalent than syphilis. It attacks all ages and spreads unchecked from one individual to another. It is a disease born of immorality and filth, and is a menace to the eyes of every child born of a woman suffering from the disease, or any person using or handling clothing, towels, etc., upon which the discharges from the penis (male) and vagina (female) have collected.

The danger of gonorrhœa and the main reason it spreads is due to the fact that the average sufferer thinks it a trifling disease, also that he delays treatment because he is ashamed or frightened to tell his father or mother or even the family doctor—the man he should go to at once. Thus treatment is delayed while the sufferer becomes worse, uses secretly the patent medicines advertised, the family towel, puts his wash in the family laundry, eats and works along side of you and me, sleeps in hotels, the berths of sleepers, ocean liners, etc., where innocent children and others may come in contact with the germs of this filthy disease.

It is a mistake for a sufferer from gonorrhœa not to consult his own physician for treatment, who will protect him (much as he doesn't want to), instead of going to a physician of doubtful reputation, for there is no disease from which the quack reaps such a harvest as gonorrhœa, and every one poses as a specialist in its treatment.

The dangers from gonorrhœa in the female are far worse than in the male, as it leads to complications in the womb, ovaries, etc., and causes peritonitis and is responsible for many deaths from blood poisoning following child birth. But innocent married women who suffer from gonorrhœa are the ones to be pitied and suffer the most, for they are ignorant of their condition, and if maimed wonder why they are ill with a filthy discharge and often must undergo painful operations. They fail to receive proper and early treatment for modesty holds them back and they blame the trouble on some other cause.

Symptoms.—The first symptom in the male is a slight uneasy sensation or tickling at the mouth of the urethra, which is generally felt between the second and seventh day after exposure to infection. On examination the organ is found slightly reddened, and the natural discharge of mucus a little increased, and more viscid than usual. These signs of irritation soon pass into those of inflammation, in which the redness, heat, pain and swelling, characterizing that process, are all experienced in an exaggerated form The discharge becomes thick, yellow or greenish, and the pain on passing water, which must be done frequently, is very severe. Erections are frequent and painful. The penis is bent downward. These erections are called chordee. Sweling and inflammation of the glands in the groins, commonly called a bubo, is common, but the irritation seldom goes so far as to result in suppuration and abscess. Orchitis or inflammation of the testicle is more frequently observed. The disease is apt to last under the best treatment for a period of from four to six weeks, and if neglected or badly managed may be months before it is cured.

Treatment.—The most important part of the treatment is rest in bed, but as this can seldom be secured the inflamed parts should be supported by a suitable suspensory bandage. At first the treatment must be that of inflammation elsewhere, that is by saline purgatives, such as a tablespoonful of epsom salts, low diet, and half teaspoonful doses of sweet spirits of nitre or ten grains of Dover's powder to promote perspiration. Wrapping the affected parts in cloths soaked in a mixture of four ounces of lead-water and two grains of acetate of morphia, and covered with oiled-silk is useful, and the injection of dilute solutions of the same medicines, made by mixing an ounce of this liquid with three ounces of water may be cautiously tried, or a one per cent. solution of protargal. In the first few days irrigation with a one to five thousand solution of permanganate of potassium. The scalding on voiding urine may be mitigated by drinking freely of flaxseed tea containing two drachms of acetate or bicarbonate of potash to the pint, and a belladonna and opium suppository at night, repeated in two hours if needful, will generally prevent much trouble from chordee. Internally globules copa-kava, one four times a day, are effective in acute or chronic conditions.

Diet.—The diet should be rice, bread with very little butter, milk, and, if necessary to keep up the strength, soft-boiled eggs. Meat, alcoholic and malt liquors, acids and condiments, are particularly objectionable.

Secondary Treatment.—After the first violence of the inflammation begins to subside the injections, such as silver nitrate, one grain to six ounces of water, or copper sulphate, one-half grain to the ounce, or acetate of lead and sulphate of zinc, each three grains to one ounce of water, may be made stronger gradually, allowing them to be of sufficient activity to produce a little smarting, lasting not longer than five minutes, each time they are used. They should be employed directly after each passage of urine, provided that does not occur oftener than once in two hours. At this period the administration of balsam of copaiba is usually commenced, and a good article of oil of sandalwood appears to be even more efficient in checking the remaining discharge, two capsules of either remedy being taken four times daily.

Third Treatment.—In the course of another week injections of acetate of zinc, sulphate of copper or nitrate of silver, one or two grains to the ounce of water, may come into service with benefit, but great care must still be exercised in regard to errors in diet, a single glass of malt liquor being frequently sufficient to bring on a relapse. If neglected or badly treated the malady may run into the chronic form, which is called gleet, and often proves exceedingly rebellious to treatment. Five-grain doses of salol, ten drops each of tincture of chloride of iron with tincture af cantharides thrice daily often, however, succeed in bringing about a favorable change, and the introduction of a bougie smeared with belladonna ointment three times a week is apt to contribute to the cure.

Formin Comp.—There are few who cannot recall the day of balsam copaiba and zinc injections. What a change in the treatment of disease—the antiseptic or germicidal treatment of the modern day! In the treatment of any disease of the genito-urinary tract the urine should be rendered sterile. Experiments made with formin comp. prove conclusively its value as a genito-urinary germicide, and the brilliant results obtained from its use place it foremost among the remedies of the genito-urinary specialist. In gonorrhea, acute and chronic, it serves to restrict the area of infection and prevent reinfection. Obstinate cases that have resisted other treatments should be placed on formin comp. in five-grain doses every three or four hours. It will clear up the urine without perverting its chemical reaction. The trouble with agents which make the urine alkaline is that they are incompatible with the gastric juice and must be given in doses large enough to more than neutralize the acid of the stomach. Formin comp. preserves the acidity of the gastric juice and produces an antiseptic irrigating fluid of the urine without interfering with the digestion or irritating the kidneys.

The Sanmetto Treatment.—We have also another agent possessing wonderful specific influence over the urinary organs when there is irritation or inflammation. It is called sanmetto, and is a combination of sandalwood and saw palmetto. It acts as a great vitalizer, increasing the strength of the reproductive organs, hastening their action, promoting their secreting power and increasing their size. The usual dose is a teaspoonful four times a day.

It is generally recognized by the profession that there is no disease which is so common and presents as many dangers to the human race at large as gonorrhea. The great danger lies in the fact that medical men are apt to be careless about the treatment. No man can pronounce his patient well and be sure that his urethra is free from the specific micro-organism unless he is able to make a thorough bacteriological examination of the patient's urine and of any discharge which may issue from his genito-urinary organs. The great source of general infection is the man who is told that he is "over his dose" because his discharge is apparently checked and he is able to urinate without using bad language at every dribble of urine. He is sent away with a host of virulent micro-organisms lying extant in his urethra.

Track of Gonorrhea.—The urethral inflammation commences at the meatus and travels slowly backward. There is no ulceration. The disease tends to limit itself and to become localized at the bulb, where the disease runs its course. Instead of getting well we have gleet, in which there is a certain amount of sticky fluid, often only a drop at the meatus in the morning continues to be secreted after gonorrhea, from altered patches of the urethra, or coming from the stretched and congested membrance behind a stricture. Gleet, then, is a symptom of two structural lesions, and signifies that there are patches of congestion in the canal, covered or not by granulations, or that stricture exists, and that the discharge comes from behind it. When an individual with a gleet is found to be gouty it is particularly advisable to enforce strict urethral hygiene.

Gonorrheal Complications.—Of the complications of gonorrhea we may have inflammatory phymosis, chordee, retention of urine and hemorrhage. The idea of aborting gonorrhea by the internal use of balsams has been abandoned. By abortive treatment is now understood the injection of any irritating soluble substance into the urethra for the purpose of inflaming the canal. Of these substances is nitrate of silver or argyrol, of the strength of half a grain to one ounce of water, the injection being carefully repeated every two or three hours until a trace of blood is seen in the discharges. Then all treatment must cease. The syringe used in the abortive treatment should never hold more than two drachms, and the fluid injected must be brought well into contact with every portion of the first inch and a half of the urethra

In true gonorrhea the abortive treatment will not avail after the disease is more than forty-eight hours old.

EPIDIDYMITIS OR SWELLED TESTICLE.

Swelled testicle (epididymitis) frequently accompanies or follows gonorrhœa and may appear at any stage of the disease, but it may result from several excesses without gonorrhœa, to the introduction of instruments into the bladder or to a blow upon the testicle. Usually but one testicle is inflamed though occasionally both are affected and sometimes the swelling switches from one to the other. Although a most painful affection the disease is seldom dangerous and usually there is a complete recovery.

Symptoms.—There is sometimes a dragging sensation in one of the groins, tenderness in the connecting cord and pain in the back a day or so before any actual discomfort is felt in the testicles. There is apt to be a chill or chilly sensations at the onset of the disease, but the unmistakable symptom is the swelling of the testicle and the accompanying severe pain. The swelling increases steadily and the pain correspondingly augments, sometimes being of an aching character and sometimes neuralgic, occasionally darting to the hips and back. Nausea and vomiting are frequently an accompaniment of the swelling. The influenced testicle may become swollen to the size of a man's fist and cause painful tension of the scrotum. The duration of the disease varies. The severe symptoms usually subside in four or five days, but the enlargement and tenderness may continue for some weeks. In some cases where there has been considerable inflammatory deposit, the convoluted portion of the seminal canal at the back of the scrotum, known as the *epididymus,* may remain in a hardened state for months or years.

Treatment.—The patient should remain in bed, the scrotum being elevated in such manner as to relieve the tension of the cord. This also tends to moderate the rush of blood to the testicle. If early in the case the scrotum be scarified with nitrate of silver in strong solution (40 to 60 grains to each ounce of distilled water) the pain will be alleviated and sometimes completely banished. When pain is unusually severe relief may be afforded by a hypodermic injection of morphine under the skin at the location of the cord. Half an ounce of muriate of ammonia and one ounce of alcohol in a pint of water makes a lotion which applied to the testicle with absorbent cotton, often gives gratifying relief. A thick, warm linseed-meal poultice also frequently abates pain. Other treatments are lead water and laudanum. The testicle should later be supported by a proper bandage or suspensory. Severe tension of the scrotum may be relieved by pricking the scrotum in such manner as to let out the serum, but this should not be attempted by anyone but a competent surgeon.

VARICOCELE.

Varicocele is a term used to designate a swollen or knotty condition of the spermatic or testicle veins. It occurs in about ten per cent. of males. The veins when felt by the fingers impart an impression as of a bunch of earth worms inside the scrotum and is generally on the left side. Among causes given are constipation, ungratified desire and excessive sexual indulgence. In some severe chronic cases there may be a washing away of the testicle.

The treatment is either palliative or radical. The former is simply in the use of some means of affording the patient temporary relief, which may be accomplished by use of a proper fitting bandage or suspensory, frequently bathing the part with cold water. The radical cure is by cutting or tying the vessels. Local applications are not of material benefit.

SYPHILIS.

Far-reaching Effects.—Directly syphilis is due to immorality of individuals and did it affect only the guilty, humanity in general would not be so much concerned, but owing to its nature the disease is such that it is easily communicated to the innocent. Not only may it descend to offspring unto the fourth and fifth generation, but it may be given to a mother or a sister by a kiss or may be conveyed by use of a towel or any other article which the diseased has handled. It may be conveyed in so many ways that it is almost impossible to give them in detail, and thus it is that humanity in general, whether innocent or guilty, are deeply concerned and should not only be on personal guard but should act unitedly to the end of isolating victims as if the case were small-pox and so eventually suppress the disease.

Cause.—It is a disease the result of a specific poison produced solely by direct implantation of the contagious material, usually the purulent discharge from a venereal sore in a previously diseased person.

Development.—About a month after it is in any mode implanted in the human system it appears to begin a development throughout the whole organism, and penetrating to every part of the body, affects especially the skin, glands and throat in the form of secondary symptoms, and still later the cartilages and bones as tertiary manifestations, until finally, if unchecked, it often proves fatal, after intense and prolonged suffering.

Local Symptoms.—The first symptom of this horrible disease is usually a primary sore or chancre, which appears as a small pimple or blister upon some part of the organs of generation, or point of contact, any time within two or three weeks after the infection is received. The great distinction between the syphilitic ulcer, or true chancre, and the chancroid, or nonsyphilitic sore, is that the former has a hardened base, but the most eminent surgeons admit that neither this nor any other criterion is infallible. The infecting pimple may dry up without ulcerating, but more commonly a cup-shaped sore from an eighth to three-eighths of an inch in diameter, and with raised edges, is formed, and unless modified by treatment lasts for a month or six weeks, when it heals up, leaving a hardened lump of a dark red coppery or bronze color, which is often several months in completely disappearing. The glands in the groins during the ulcerating stage of the primary chancre become swollen, hard and slightly painful, but seldom suppurate. After some weeks the other lymphatic glands partake of this enlargement, and gradually those in the armpit, in the neck and behind the ear give evidence of the general infection.

The Chancroid Sore.—The chancroid, sofe-chancre or non-syphilitic sore, generally develops in a few days from the date of infection, first as a minute vesicle, then a pustule, and later as an ulcer, round or oval in shape, with clean-cut edges, and without any hardening of the base. The floor of the ulcer is generally covered with a thick yellowish matter, which is virulent and contagious in the highest degree. The glands in the groins are often not swollen, but if affected are much more apt to suppurate, constituting a bubo, the discharge from which is also intensely contagious. It is therefore far more troublesome than the primary syphilitic sore, and yet infinitely to be preferred to the latter on account of the absence of any constitutional infection.

The following is a diagnosis between chancre and chancroid:

CHANCRE.	CHANCROID.
1. Appears two to twenty days after exposure.	1. The interval between exposure and appearance is much shorter.
2. Is usually single.	2. May be multiple.
3. Inflammatory phenomena comparatively slight.	3. Inflammatory phenomena, heat, pain, redness and swelling very marked.
4. Discharge is serous or bloody and readily inoculable.	4. Discharge, profuse, purulent, very irritating and readily inoculable.
5. Margins of preputial orifice are not markedly inflamed.	5. Induration, if present, is not marked.
6. Marked induration.	6. Buboes, if present, are usually on one side, and suppurative.
7. Buboes are invariably present, and in both groins; they rarely suppurate.	

Constitutional Symptoms; Secondary.—After a true or hard chancre has developed, and no matter whether it has healed promptly or is still open, there appears in about four weeks, on an average, from the first infection the first of the train of general or constitutional symptoms. These consist of the tumefaction of the lymphatic glands, followed after a few weeks more by fever, headache, rheumatic pains and soreness of the throat. About the tenth week after the dearly-bought pleasure its unfortunate purchaser usually finds a crop of eruption appearing upon his skin, sometimes slight and easily concealed, but oftener well defined and in a tell-tale abundance, which instantly reveals his guilty secret.

The Eruptions.—This eruption may be of pimples, pustules, or scales, the former being the most common and having a new copper-colored red or brownish-red tint, which, when well marked, is to the experienced eye very characteristic. It is apt to be especially abundant round the sides of the nose and angles of the mouth and eyes, the roots of the hair on the forehead and back of the neck, the centre of the breast, the inner side of the limbs, and around the armpits and groins.

Hand and Feet Eruptions.—An important diagnostic mark of the scaly, syphilitic eruption is its appearance on the palms of the hands and the soles of the feet. These manifestations are also particularly liable to appear as pustules among the hair of the scalp. In some cases the whole body is thickly covered. After persisting for periods varying from two or three weeks to as many months, these spots usually fade, leaving behind them brownish stains which are very persistent, but ultimately may give place to pale scars, somewhat like the pitting of small-pox in a very mild form.

Other Appalling Symptoms.—In a minority of instances the patient escapes any well defined symptoms, but suffers instead from one of the following manifestations of secondary syphilis, which often accompany the eruptions also: Alopecia or falling of the hair, which in bad cases may include not only that of the head, but also the eyelashes and eyebrows; flat whitish sores in the mouth and anus, called mucous patches, the discharge from which in the former situation may easily convey, by kissing, the whole vile disease to a perfectly innocent person; inflammation of the iris injuring or even destroying the sight; and local diseases of the generative organs.

Tertiary Symptoms.—The late or tertiary symptoms of venereal disease are disease of the cartilages and small bones of the nose and throat, producing the shocking disfigurement of the countenance sometimes seen, especially among sailors; disease of the bones of the skull leading to persistent and excruciating headache, and sometimes actually perforating the cranium; disease of the tibia or large bone of the leg between the knee and ankle; disease of the nails which may entirely ulcerate out; disease of arteries which, of course, is most apt to prove fatal, and peculiar new growths called gummy tumors, which may appear in all parts of the system.

Congenital (Birth) Syphilis.—Congenital syphilis generally shows itself between the third and sixth week after birth, by cutaneous eruptions, similar to those seen in the secondary period of acquired syphilis, and of most frequent occurrence upon the buttocks, abdomen, palms and soles.

Symptoms.—Congestion and subacute inflammation of the mucous membrane of the nose, with increased discharge, vulgarly called the snuffles, also appear, and the infant has usually a peculiarly shriveled, weazened aspect, like that of a prematurely old man. Mucous patches from about the baby's mouth may infect the mother or nurse, and keratitis or inflammation of the cornea of the eye is lamentably common. Early and active administration of mercury is very important lest the syphilitic cachexia prove fatal.

Local Treatment of Chancre.—The treatment of the primary sore, or chancre, is much disputed. Cauterization with nitric or trichloracetic acid, or the acid nitrate of mercury, and subsequent dressing with black-wash—a mixture of a drachm of calomel, and a pint of limewater—is much employed; but the application of iodoform is highly recommended. Complete excision of the sore, with its hardened base, in the hope of preventing secondary symptoms, has been tried without success, even when performed early. If the enlarged glands in the groins give rise to much discomfort, they should be painted over with the tincture of iodine or twenty per cent. ichthyol ointment.

Treatment by Caustic.—The prompt destruction of the chancroid ulcer by caustic, and the dressing with black-wash or yellow-wash, is advisable, and hope may be entertained of thus putting an end to the whole malady. If the glands in the groins go on to suppuration, however, very serious trouble may be anticipated before a cure is effected.

Constitutional Treatment.—The treatment of the secondary symptoms is by the use of mercury, which, although decried by some physicians, is considered by our best authorities as the only effectual remedy for syphilis. It may be administered by inunction of mercurial ointment, by fumigation, or in the form of half a grain of calomel, or blue pill, or one-third of a grain of the iodide of mercury thrice daily, or protiodide of mercury one-fourth grain three times a day. It is also given by hypodermic injections of the bichloride, one-third grain, once a week. The injection must be made deep into the muscles. Proper precautions must be taken to cleanse the needle and syringe before using, also the skin at point at which the needle must be inserted. This treatment should be kept up at intervals for a year or two after an apparent cure has been effected. To obtain its beneficial effects, which are often very marked and satisfactory, it is not necessary to induce severe salivation, which, probably, in former times, often aggravated the ultimate effects of the syphilitic poison.

Treatment of Third (Tertiary) Stage.—In the tertiary stage, iodine and iodide of potassium, in the form of the compound iodine solution, or the iodide occasionally in very large doses of fifteen or twenty grains, thrice daily, are the great remedies; but they may sometimes be associated with mercurials to much advantage. In a majority of instances, the development of well-marked tertiary symptoms may be prevented by judicious treatment in the second stage of the complaint, and even when a slight tendency to disease of the bones and cartilages is displayed, a combination of the iodides with mercury will often avert disastrous consequences, or the sirop Gibert.

Use of Tonics.—Throughout the whole management of the case the administration of tonics, such as iron, quinine and strychnia is very important, and strict attention to hygiene by promoting the best general health is an almost indispensable condition to securing a favorable result; also frequent hot baths.

Should Syphilitics Marry?—Professor Alfred Fournier, in a late instructive work on syphilis and marriage, formulates some valuable conclusions in regard to the very difficult problem, from a hygienic point of view, whether a syphilitic person ought to marry or not. He asserts that a man who enters upon marriage, with syphilitic antecedents, may become dangerous: first, to his wife; second, to his children; third, to the interests of his family. In the first place the wife is apt to be infected directly by contact with the pus of secondary lesions; and Dr. F. says: "I know from long experience that it is rare to see a young wife live with a syphilitic man, or conversely, without the health of the former being effected by the diseased one." It was this which caused a witty French observer to say: "The pox is partaken of by a married couple equally, just like the daily bread."

Syphilis Conveyed by Conception.—Secondly, a man may convey syphilis to his wife by causing conception, as when a young girl, pure and healthy, is married to a man whose venereal disease has not been thoroughly cured. The physician calls a few months later and finds her diseased with, for example, distinct secondary symptoms, such as cutaneous syphilides, mucous patches in the mouth, scabs on the scalp, swelling of the glands in the neck, headache, vague pains, lassitude, febrile attacks, loss of hair, and so forth—all this without a trace of chancre, and even without that faithful companion of a chancre, a bubo, which M. Ricord calls so aptly the posthumous witness of a chancre. In these lamentable instances, the wife-mother infected without having had any primary symptoms, and whose husband has long been freed from all external indications, is diseased, not from that husband, except indirectly, but from her child still within her womb.

Danger to Children.—As respects the danger to children: Although offspring may be begotten by a syphilitic father who enjoys good health, yet the hereditary influence of paternal syphilis is very far from being as innocent, minute or negative as has been maintained.

Development of the Inherited Tendency.—This inherited tendency may be developed in the three following modes: Either that, which is an exceptional case, by the transmission of syphilis to the fœtus; or that, which is sufficiently common, by the death of the child; or lastly, by the inherent degeneration of the germ, which ultimately reveals itself under a great variety of morbid conditions.

Worst Form of Danger.—But the worst form of danger to the family of a syphilitic father is that communicating the disease to the wife, the paternal and maternal influences will act upon the same side, and most disastrously conspire in unison against the fruit of any pregnancies which may result. In such sad cases we can predict that, with a few rare exceptions, either, first, and the child will die before birth; or, second, it will be born with syphilis, and with all the possible and serious consequences of infantile syphilis, which in many cases are equivalent to death itself; or finally, third, it may be born without syphilis, but with uncertain health, with a weak nature and a feeble constitution, which will probably expose it to a rapid death; with menacing morbid tendencies; with a predisposition to certain organic diseases—in a word, to a relatively speedy decay; this terrible fate being visited again and again upon successive innocent babes.

Transmission of Syphilis.—At the New Orleans meeting of the Public Health Association, Dr. Gihon of the Navy, as chairman of a committee on the subject, presented a valuable report, in which he remarked: "Every one instinctively shrinks from the touch of the sufferer with small-pox, but how few realize that a syphilitic is a leper also to be most scrupulously shunned? How few mothers are aware of the danger, to themselves and their children, from nurses and housemaids drawn from a part of the population in which every fifteenth person is thus diseased? How few parents suspect the peril to their daughter from her accepted lover's kiss, since he may be that one in about every five young men among the better classes who has a venereal disease, which there is one chance in two is syphilis."

Transmission of Syphilis by Kissing.—These are not mere speculations, for Professor Gross reports that he has seen many cases communicated by kissing; and he tells of fifteen women, nine children, and ten men diseased by a single midwife, who had a chancre on her finger, contracted in the exercise of her profession, and who had thus carried the disease from house to house.

Transmission by Cooks and Nurses.—Dr. J. Marion Sims says: "I have seen a cook and a chambermaid with syphilitic ulcers on their fingers; I have seen nurses infected by the children they had nursed, who were born of syphilitic parents, in turn infecting sucking babes, born of healthy parents; and I have known a drunken vagabond husband to contract syphilis and communicate it to his wife, who in turn gave it unwittingly to her four children, simply by using the same towels and washbowl."

Transmission by Towels.—One of this very committee adds the case of an estimable and venerable lady, who lost her eyesight that year, from a venereal affection arising from using a towel in her son's room, carelessly left by him upon the rack; and of another, the wife of a clergyman, who the preceding summer sought relief at a Virginia spring for a horrible affection contracted in domestic contact with her servant.

Transmission by Pipes and Cigars.—The present Surgeon-General of the Navy saw a number of cases of chancre of the lips among the smokers of one set of cheroots, of which the wrappers had been moistened by the saliva of a Manila cigar girl; and at Beyroot he learned that it was not unusual for syphilis to be contracted by using a *narghileh* that had been pressed by the lips of a diseased smoker. How many people would venture to eat Smyrna figs if they had seen the top layer of the choicest box pressed flat with the saliva-wetted thumb of the packer, who, there was one chance in ten, was a syphilitic?

Transmission by Exhalation.—A certain lady was terribly alarmed when told by her husband, a physician, that she had invited to her table a young man who, in the course of a physical examination that morning, he had found to have his mouth and tongue covered with mucous patches; and that her daughter was dancing in a public ballroom with another whose body was repulsive with syphilitic eczema.

Transmission by Instruments.—An editorial in one of our Philadelphia medical journals not long since stated: "It has happened to the writer to be recently called to see a man of most respectable surroundings, who bore an unmistakable venereal sore upon his lip, and subsequently manifested all the features of secondary syphilis. It was said that this sore had followed a trifling surgical operation upon the part affected for the removal of a slight deformity, during which the instruments or the hands of the surgeon had inoculated him with syphilis.

Ever-Present Dangers.—This energetic committee urged that it should be promulgated everywhere throughout the community, that so long as syphilitics are allowed to go unrestrained the spotless woman and the innocent child share the danger of this horrible contamination with the libertine and the courtesan.

The Various Ways of Transmitting Syphilis.—Let it be known by everyone, they exclaim, that this fearful pest may be communicated:

1. By the blankets of the sleeping car, the sheets, towels and napkins of the steamship, hotel and restaurant.

2. By the hired bathing dresses at a seaside resort, and the costumes rented for the fancy ball.

3. By the chipped edges of cups and plates, as seen at any hotel or eating house, and by the half-cleansed knives, forks and spoons of the same.

4. By public drinking vessels in a railway car or station, as well as the public urinal or water-closet.

5. By the barber's utensils, the comb and brush in the guest chamber, the hatter's measure, or the borrowed hat.

6. By the surgeon's and dentist's instruments, or the vaccinator's lancet.

7. By the broom or dust-brush handled by a parlor maid, or by the spoon or cup touched by the mouth of a cook or nurse.

8. By whistles and other toys sold to children in the streets by vendors with poisoned lips or fingers.

9. By playing or visiting cards which have been used, and especially by car tickets and paper money circulating in a city like Philadelphia, where 50,000 syphilitics are at large.

10. By the grasp of a friend's hand or the kiss of a betrothed lover, by the son to his mother and sister, the husband to his wife and unborn child, and by the latter to its mother.

SYPHILIS—A VEGETABLE TREATMENT.

Hematesene.—Under the former methods of treatment there was no remedy in the pharmacopœia which could be relied upon as a specific for syphilis, although there were many that had a very beneficial influence in aiding the disappearance of the symptoms. It was then, indeed, a question whether the disease could ever be effectually cured.

Mercury Not Relied On.—In former times it was thought that in mercury we possessed a specific against the disease, and when all sores were looked upon as syphilitic, and mercury was administered, a large proportion of supposed cures were recorded. In our modern times, however, the supposed success of the mercurial plan is not recognized.

The New Specific.—Recent investigation and research have brought to light a remedy called hemetesene, which is as much a specific for syphilis and blood-poisoning as quinine is for intermittent fever. Mercury and the iodides produce injurious effects if long continued, and should be avoided. Patients who have been treated by the old plan improve rapidly after taking hemetesene. In some patients an itching is produced; in others an eruption on portions of the body or limbs; in a few watery blisters in the palms of the hands and soles of the feet which require no particular attention except to cleanse them with water, adding a few drops of carbolic acid.

Comparison of Treatments.—This vegetable treatment is a certain antidote to blood-poison, and increases the number of red corpuscles in poor blood, while mercury and the iodides often produce a run-down condition of the system if taken for a length of time.

Effect of This Vegetable Treatment.—The effect of hematesene as a constitutional remedy rests, unquestionably, in its power of eliminating specific poison from the blood, and in its tonic power, increasing the proportion of red corpuscles in impoverished blood, thus enabling the system to throw off disease.

ANOTHER TREATMENT FOR SYPHILIS.

Salvarsan 606 Antisyphilitic Remedy.

Many observers at the present time are experimenting with this new remedy brought before the medical profession by Dr. Ehrlich, of Germany. The opinions of the profession at present vary as to whether we have a

40

specific for the cure of syphilis. At present it has proven successful in quite a number of cases, while some physicians have reported bad effects following its use. The following will give a resumé of the facts developed at this time, and also the mode of treatment. Of course, it should not be administered by anyone except a qualified physician. Syphilis is an infection of the system by *spirochœta pallida.* This is one of the protozoal type of organism, such as malaria, relapsing fever, etc. The pathological pecularity of organisms of this type is that they rapidly acquire immunity to the antitoxins developed in the body against them, and thus establish a more or less permanent residence in the body constituting a chronic affection. The protozoa also rapidly develops resistance to small doses of chemical poisons introduced into the system against them for curative purposes, as malaria is cured by quinine in large doses.

Mercury and arsenic are two chemical agents found to be especially destructive to the germ of syphilis. It having been found difficult to introduce enough mercury into the system to destroy the germs, without seriously injuring the patient, attention was turned to arsenic. By experiments Dr. Ehrlich announced to the profession that a combination of arsenic with soda would prove effective. This he has named Salvarsan, or 606.

Salvarsan is a light-yellowish powder, containing about thirty-four per cent. of arsenic; when dissolved in water forming strongly acid solutions, on account of this acid reaction, it must be neutralized before use. The preparation is administered only with great care by a physician, intravenous or by subcutaneous injection. Some observers have secured similar results by the use of cocodylic acid, a salt of the allotropic form of arsenic, by injections of one or two grains. It also appears that mercury, instead of being contra-indicated, at the same time may aid in a cure. It is hoped that all that is claimed for it will be fulfilled, and that humanity will be cured of this so-called great pox.

SPERMATORRHŒA OR INVOLUNTARY EMISSIONS.

As an appendix to the unsavory subjects discussed in this chapter, a few remarks upon spermatorrhœa and its usual cause are appropriate here. It would be impossible to estimate, with any approach to accuracy, the vast amount of anxiety and mental suffering needlessly endured in our community in regard to this disease. It is sad to think of the many men, young, middle-aged and those who are still young in age and strength, who suffer from one or more of the above conditions, robbing them of all that is precious and so important to them. Many men are mere pigmies of what they should be. Because of this decline they are backward and sensitive, unaggressive in their business, easily discouraged, weak and nervous, instead of being strong and vigorous.

The Disease and Results.—That the disease called spermatorrhœa exists, and in rare cases does result in the utter wreck of mind and body, which is painted by these designing quacks in such sombre colors, cannot be denied, but that nineteen out of every twenty young men who have become alarmed by the occasional or even frequent occurrence during sleep of what they have learned to control whilst awake, have no real ground for their agonizing fears is equally indisputable.

Causes.—The usual cause of spermatorrhœa, of course, cannot be freely discussed in a popular work like this, and yet enough may be expressed in veiled language, the meaning of which will be only or chiefly comprehended by those who need the lessons inculcated, to accomplish, it is hoped, much good. Many young persons of both sexes, after being made aware of the danger in which they were becoming involved through evil examples, perhaps, of school associates, have earnestly tried to escape the thraldom of bad habits or early indiscretions.

Treatment by Will Power.—Some of those who have succeeded, by the exercise of a resolution and strength of will, for which they deserve great credit, have overcome their enemy, but are yet haunted with the fear that they have been irreparably injured in the struggle. This fear is entirely unfounded, as time will infallibly prove.

Treatment by Exercise and Nutrition.—A second and larger class are still discouraged by frequently recurring evidence that they are not in a natural and healthy condition, and some may even be so disheartened as to feel almost hopeless. For such plenty of exercise in the open air, good nutritious food, chiefly vegetable, occupation of the mind in some study or suitable recreation, and the proper medical treatment, can with a continued exercise of the will power during the waking hours speedily accomplish a cure.

Treatment by Hygiene and Medicine.—To a third class, who find themselves still unable to overcome temptation, much aid will be afforded by adopting the plan of hygienic and medical treatment hereunder indicated, and by diminishing, as the drugs mentioned can do, the force of the impulse itself, they may so reduce its power that a little additional resolu tion will suffice to achieve a victory. In this struggle they may find some support in the grand old maxim, "He that ruleth his own spirit is greater than he who taketh a city." Among the best remedies for this condition is the pill cann-aven. This should be taken for some time.

IMPOTENCY IN MALES AND FEMALES.

Impotence means a lack of ability to properly perform the sexual act. It may be partial or complete.

In females it may be due to faults in the ovaries, absence of perfect development, displacements, inflammations or degenerations, faults in the oviducts or fallopian tubes, faults in the uterus, faults in external organs, etc. Morbid conditions of the vagina should be corrected and morbid conditions of the womb overcome. Hot injections and hot baths are of great service where inflammation is a cause.

In males impotency may be due to advanced age, disease of testicles, absent or defunct erection, spinal irritation, malformation, non-development of the organs, early abuses, loss of will power, sexual excesses, gonorrhœa, gleet, alcoholism, etc.

In all cases, whether male or female examination should be made by a competent physician (avoid quacks) in order to determine the actual cause. The general health should be looked after and a tonic treatment should be carried out, among the remedies used being damiana, strychnine, phosphorus, etc. A good pill is the cannabin comp. or compound damiana. A direct and useful remedy is cantharides in three-drop to ten-drop doses three times a day. Dilute phosphoric acid, phosphate of iron and ergot of rye are also valuable. These remedies may be used by either sex and should be continued for some time.

Apparent impotency in the male is frequently due to lack of confidence. A newly-married person who finds difficulty in this way should not become disheartened. A full understanding of conditions and a masterful reassertion of confidence will prove of more avail than medicines.

PART IX OF BOOK IV

Treats of the Urine in health and disease and gives a series of tests for urine which may be used in the home.

ILLUSTRATIONS

CURATIVE MEDICINE

PART IX.

URINE IN HEALTH AND DISEASE.

As a rule, in chronic diseases one of the first manifestations is a change in the urine, sometimes noticeable by appearance, but in other cases only discernible by careful examination. We shall first consider urine in normal condition and then the effects upon the same when the body is diseased.

Amount.—The normal quantity of urine varies from $2\frac{1}{2}$ to $3\frac{1}{2}$ pints in the twenty-four hours, the quantity being greater with men than with women. It is decreased by free perspiration and increased by chilling of the skin. The quantity of fluids taken is of course a factor. Different diseases affect the quantity in different ways, causing an increase in diabetes, in some nervous diseases, like hysteria and convulsions, also in apoplexy, convalescence from acute and inflammatory diseases and in enlargement of the heart. It is decreased by heat, in fevers, shock, stoppage due to heart disease, acute congestion of the kidneys, in diseases accompanied by purging and vomiting. In all forms of Bright's disease (with the exception of chronic diffuse and interstitial kidney trouble) and in all diseases before death, the decrease is due to obstruction in the bladder or the urethra.

Color.—The normal color is light amber, which deepens in shade if the quantity voided be decreased, and *vice versa*. The quantity of fluids drunk and the extent of perspiration also have effect on color. In disease it will be found pale, in diabetes, hysteria, interstitial nephritis and like disorders, the specific gravity usually remaining at or near normal with the exception of diabetes, where the specific gravity is very high, owing to the presence of sugar. It is high-colored in most other diseases and in acute fevers and inflammation. Reddish color indicates the presence of abnormal coloring matter, usually blood. A dark brown color may be a sign of hemorrhage of the kidney. Urine which turns greenish on standing contains bile pigments. In cancer the urine becomes almost black on standing, in typhus and cholera, blue. Both diet and drugs have effect on color. After taking rhubarb or senna the urine is apt to be brownish, santonin produces yellow and methyl causes a bluish color.

Odor.—There is a peculiar aromatic or urinous odor from normal urine, which becomes putrid and ammoniacal on standing. Fresh urine which has these latter characteristics indicates bladder trouble; a fecal odor indicates a fistule between the urethra and rectum. The odor may be changed by vegetables or drugs, turpentine giving the odor of violets, asparagus, turnips, cubebs, copaiba, sandalwood, etc., each producing their own peculiar odor. In diabetes the urine smells sweet. A particularly foul smell, as of sulphur, is given off when there is pus in the bladder.

Consistency.—The normal consistency is that of water, but it becomes thick and sometimes stringy on standing, more particularly after it has become alkaline. Where there is much sugar or albumin there is a tendency to frothiness.

Transparency.—Freshly passed urine in normal state is always clear, but after standing a faint cloud of excrete matter floats near the center and eventually settles to the bottom. This is increased in cystitis, prostatitis, urethritis and other catarrhal conditions of the urethral tract. It is more pronounced in women than in men. It may be distinguished from other cloudy substances by its tendency to float in the center and its precipitation by an excess of acetic acid. Bacteria, phosphates, or pus cause turbid urine. If due to bacteria, the turbidity is not cleared with acetic acid, whereas if due to phosphates, it will be cleared by a few drops of acetic acid. Urates cause a deposit to settle quickly, pus produces an opaque color which in a few minutes settles to the bottom.

Specific Gravity.—The normal specific gravity varies from 1.010 to 1.025. It is low when an increased quantity is passed and high when the quantity is diminished. Determination of specific gravity should be made by taking a small quantity of the total passed in twenty-four hours, care being taken that the vesel is absolutely clean before starting and that it is kept covered between the urinations. The specific gravity is increased at the beginning of acute fevers, after severe operations, at the commencement of acute Bright's disease and when the urine contains blood. It is exceptionally high in diabetes, sometimes reaching as high as 1.050. It is diminished in Bright's disease (excepting the first stage of acute above referred to), in all forms of impaired circulation due to heart disease, in hysteria and in chronic interstitial nephritis.

Reaction.—The normal reaction is slightly acid, excepting after meals, when it may be neutral or even alkaline. Acidity is increased by a red-meat diet and diminished by obstruction and inflammation of the urinary tract.

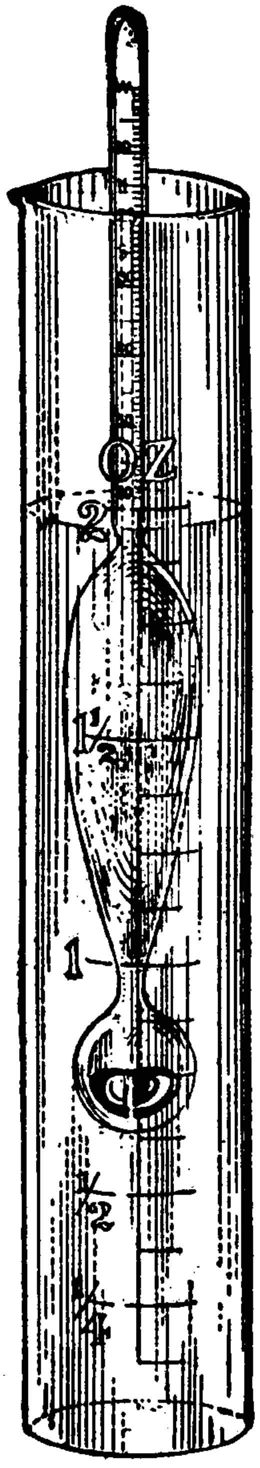
Constituents.—The most important organic and inorganic solid constituents held in solution are: *Urea,* from 308 to 617 grains daily; *uric acid,* from 6 to 12 grains; *urates* of *sodium, ammonium, potassium, calcium* and *magnesium,* from 9 to 14 grains; *phosphates* of *sodium,* etc., from 12 to 45 grains, and *chlorides* of *sodium,* etc., from 154 to 247 grains daily. The following table shows specifically the amount of solid matter contained in 1000 grains of urine of different densities.

Specific Gravity.	Solids.	Water.	Specific Gravity.	Solids.	Water.	Specific Gravity.	Solids.	Water.	Specific Gravity.	Solids.	Water.
1001	2.33	997.67	1011	25.63	974.37	1021	48.93	951.07	1031	72.23	927.77
1002	4.66	995.34	1012	27.96	972.04	1022	51.26	948.74	1032	74.56	925.44
1003	6.99	993.01	1013	30.29	969.71	1023	53.59	946.41	1033	76.89	923.11
1004	9.32	990.68	1014	32.62	967.38	1024	55.92	944.18	1034	79.22	920.78
1005	11.65	998.35	1015	34.95	965.05	1025	58.25	941.75	1035	81.55	918.45
1006	13.98	986.02	1016	37.23	962.72	1026	60.50	939.42	1036	83.88	916.12
1007	16.31	983.69	1017	39.61	960.39	1027	62.91	937.09	1037	86.21	913.79
1008	18.64	981.36	1018	41.94	658.06	1028	65.24	934.76	1038	88.54	911.46
1009	20.97	979.03	1019	44.27	955.73	1029	67.57	932.43	1039	91.87	909.13
1010	23.30	976.70	1020	46.60	953.40	1030	69.99	930.40	1040	93.20	906.80

The manner of using the above table is as follows: The density of urine passed in twenty-four hours having been ascertained, as hereafter explained under the caption "Examination of Urine," a glance at the table will show the proportion of solid matter and water in 1000 grains of the urine, then taking the weight of the whole quantity of urine passed in the twenty-four hours, the solids drained off by the kidneys may be determined by the simple rule of proportion.

Urine passed shortly after drinking excessively is pale and has a low specific gravity, varying from 1.003 to 1.009. That passed soon after the digestion of a full meal has a specific gravity of from 1.020 to 1.030. The best specimen of average density and nature of healthy urine is obtained in the morning before eating or drinking, and in perfect health should range from 1.015 to 1.025.

EXAMINATION OF URINE.



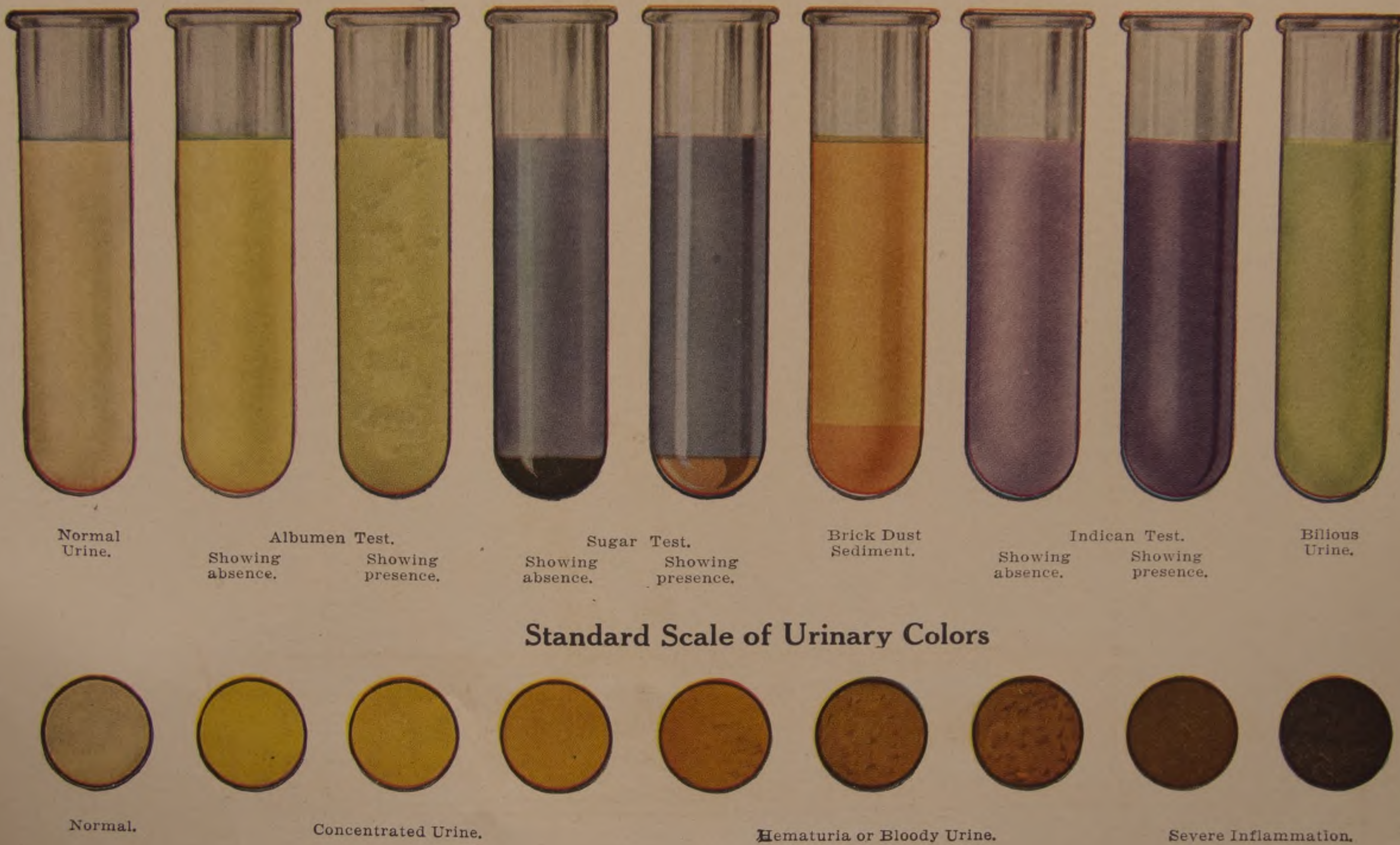
The Urinometer.

Different tests of urine are made for the discovery of different constituents, but in respect of all tests it is first necessary to determine whether the urine is acid or alkaline and to ascertain the specific gravity.

Acidity or Alkalinity.—Dip a piece of blue litmus paper in the urine and if on removing the color of the paper is changed to red or reddish-brown it will indicate that the urine is acid. If there be no change in the color of the paper then use yellow turmeric or reddened litmus paper. If the color still remains unaltered the urine is neutral, that is, it is neither acid nor alkaline, but if the yellow turmeric becomes brown, or the reddened litmus changes to blue, the urine is alkaline.

Specific Gravity.—For this purpose a urinometer should be obtained (see accompanying cut). It is also known by the names of hydrometer and gravometer and can be obtained at all surgical instrument houses and most drug stores. It is graduated in such manner as to show the different degrees of specific gravity and is utilized in connection with a small glass tube, also graduated, into which the urine is poured. When placed in still water the urinometer will sink to a certain point, and as all solids immersed in fluid displace a bulk equal to themselves, it follows that the urinometer will not sink as deep in a fluid which is denser than water. The instrument having been immersed in the tube of urine and come to rest, the number on the graduated scale which stands at the surface of the liquid plus 1.000 will represent the specific gravity of the urine. For instance, if the number at the surface be 7, the specific gravity will be 1.007; if it is 28, it will be 1.028.

HOME TESTS FOR URINE



How to Examine the Urine

Specific Gravity.—This should be done with a Urinometer. In health it varies from 1.012 to 1.025. In disease from 1.002 to 1.040. Determination should be made from 24 hours' urine.

Reaction.—Normal urine is slightly acid, and the test can be made with Litmus paper. If acid it turns the blue paper red or pink.

Transparency.—Normal urine freshly passed is clear, but on standing it becomes cloudy and finally there is a precipitate.

Consistency.—Normal is practically the same as water; becomes thick and stringy on standing.

Odor.—Normal urine has an aromatic or urinous odor; on standing becomes ammoniacal.

Albumen.—Test: Boil the urine and add a small quantity of nitric acid. If there is a precipitate and it does not dissolve albumen is present.

Sugar.—Test: Take a teaspoonful of Fehling's or Haines' Solution; boil and add a few drops of urine. If sugar is present there will be a reddish precipitate. If no sugar it will remain clear.

Indican.—Test: To a teaspoonful of hydrochloric acid add one drop of nitric and fifteen drops of urine and stir. In five to twenty minutes an amethyst color denotes normal amount present; a deep violet shows more than the normal amount.

PART X OF BOOK IV

Describes the many diseases which are peculiar to women, their causes, diagnoses, symptoms and various modes of treatment.

ILLUSTRATION

CURATIVE MEDICINE

PART X.

DISEASES PECULIAR TO WOMEN

List of Diseases.—The diseases peculiar to the female sex comprise those of the uterus (womb), ovaries and their appendages, the vagina, external generative organs and mammary glands (breasts).

Divisions of Woman's Life.—The life of a woman may be divided into five periods. They are infancy, puberty, maturity, the menopause and senility.

Period of Puberty.—Puberty is the period in which the child becomes the woman, this is the period when she begins to menstruate. It is the time when the breasts begin to assume a rounded form, her general contour becomes sharpened, and her generative organs have reached their full development. Maturity extends from puberty to the menopause, and is the period during which women bear children.

MENSTRUATION.

A Mother's Duty.—Menstruation or the monthly flow is characterized by a bloody discharge from the womb, and occurs at regular periods, usually every twenty-eight to thirty days. It is the duty of every mother to explain to her female offspring this condition of affairs, detailing when it occurs, how often to expect it, and the use of the napkin during this period. Too many mothers, on account of a mock modesty, allow their children to pass through the establishment of this function in total ignorance. Such practice, however, should be condemned.

Beginning of Menstruation.—I have often seen children run to their mother when the first drop of blood appeared, frightened beyond description. The first flow usually appears between the ages of twelve to fourteen. In the torrid zone it appears two or three years earlier, thus these children are capable of child bearing at so early a period.

Frequency of Menstruation.—Every woman is a law unto herself. As before stated, menstruation usually appears every twenty-eight to thirty days; some women, however, menstruate every four to six weeks and are in perfect health. A napkin should always be worn during the flow; surprising as it may seem, many fail to do so.

DISORDERS OF MENSTRUATION.

Suppressed Menstruation (Amenorrhea).—This is a term applied to the absence of menstruation, between puberty and the menopause.

Causes.—Pregnancy, and when nursing; anemia (impoverishment of the blood (is a very frequent cause; consumption, debilitating diseases, non-development of the generative organs; obesity and after the ovaries have been removed.

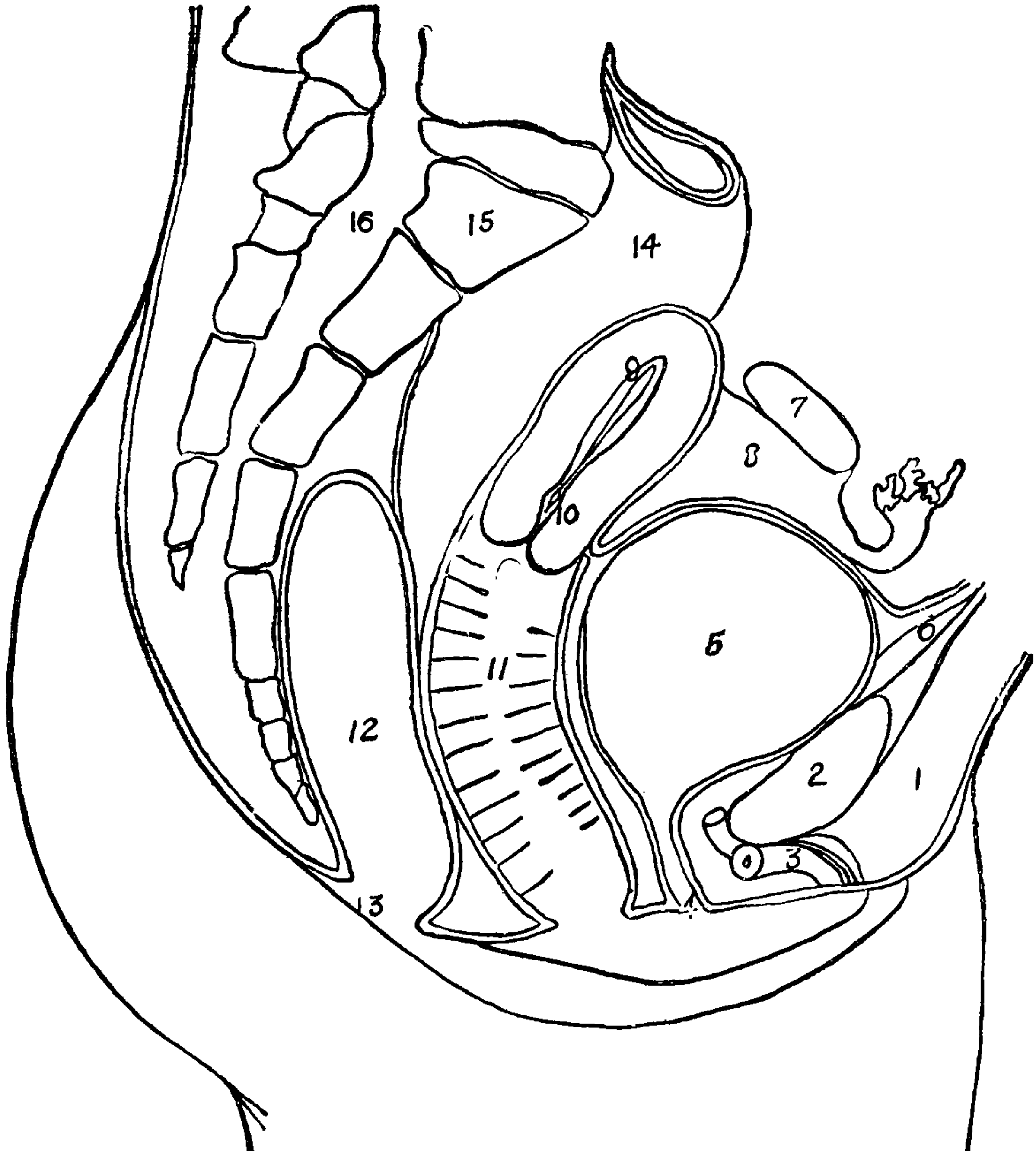
Symptoms.—Amenorrhea may come on suddenly or be of gradual development. The former variety is often the result of some violent excitement, fright or mental shock due to the setting in of some fever or other acute disease, or to that common and very dangerous cause, especially in young girls, imprudent exposure to cold or wet during the monthly flow.

Symptoms in Anemic Persons.—If due to anemia the patient has a pallor, and the margins of the lips will be pale, she will look "bleached out," shortness of breath, palpitation of the heart, swelling of the feet and ankles, headache and constipation.

Symptoms in Consumptives.—If due to consumption, cough and night sweats will be present, accompanied by marked emaciation (wasting away). When amenorrhea comes on gradually it is apt to indicate some serious chronic disease, which should be immediately investigated and attended to by a skillful physician.

Cessation of Menses.—When the cessation of the menses is part of such a severe malady as consumption or Bright's disease, it often appears to be only nature's method of economizing the failing strength of the invalid, so that any interference would be likely to prove positively hurtful. On the other hand, the natural reappearance of the menses after a stoppage in the course of a chronic malady may be welcomed as a favorable indication of a tendency toward improvement.

Symptoms Attending Stopped Menses.—The constitutional disturbance



1. Mons Veneris.
2. Pubic Bone.
3. Clitoris.
4. Urethra.
5. Bladder.
6. Urachus.
7. Ovary.
8. Broad Ligament.
9. Womb.
10. Neck of Womb.
11. Vagina.
12. Rectum.
13. Anus.
14. Rectum covered by Peritoneum.
15. Spinal column.
16. Spinal cord.

The above outline drawing will show the relative position of the Urinary and Generative Organs of Women, all contained within and surrounding the pelvis. This is shown by dividing the body directly through the centre from above downward. The various parts are plainly shown and designated by numbers, so that the position and shape of each organ can be readily seen.

from abrupt suppression of the monthly flow is generally very great. There is usually severe pain in the region of the womb, similar in character to that of colic, and hysterical excitement, or even convulsions, and mania, may be the direct effect.

Treatment.—When due to anemia, iron is the best remedy, given in the form of Blaud's pill, one four to five times a day. When taking iron it is always a good rule to take a dose of epsom salts once a week, in order to counteract the constipating effect of the drug. Other remedies are, a teaspoonful of the elixir of quinine, iron and strychnia, three to four times a day; the pill of the same ingredients, one four to five times a day; or the bin-oxide of manganese, two grains three to four times a day.

When to Avoid Medicines.—The possibility that absence of the monthly period may be due to pregnancy should always be borne in mind, in which case it would be dangerous and criminal to administer any of the usual remedies for restoring the flow.

Treatment When Due to Cold.—When due to exposure to cold and wet resort to hot mustard foot baths or hip baths, mustard plasters to the inside of the thighs, calves of the legs and ankles. A hot sitz bath is also worthy of trial. This consists of partially filling a "foot tub" with hot water, allowing the patient to sit in it, and covering her with a blanket. She should remain in the bath for five to ten minutes. The buttocks and thighs are then thoroughly dried, and she is put to bed. If constipated the bowels should be regulated. (See Constipation.) Vaginal injections of hot water are also to be employed. (See "How to Use the Douche.")

Treatment of Young Girls.—The treatment of delayed menstruation in young girls who have passed the age of puberty must be on general principles adapted to improving the general health, unless there are signs of the menstrual blood being retained inside the womb, a dangerous condition which should always be considered in such instances and relieved as early as possible by a surgical operation.

PAINFUL MENSTRUATION (DYSMENORRHEA).

Meaning of the Disease.—By this is meant painful menstruation. The pain may occur before, during or after the flow. Many varieties have been described, such as the obstructive, congestive, mechanical, neuralgic, and so forth, but it is very difficult at times to differentiate them.

Causes.—Usually due to the womb being out of its normal position, tumors, and inflammatory diseases of the womb and ovaries.

Symptoms.—A woman who enjoys health not only menstruates regularly, but does so with perfect freedom from suffering, but unfortunately there are very few members of the female sex who pass through the whole period of their sexual vigor without being called upon to endure more or less frequently attacks of dysmenorrhea.

Pain With the Flow.—Some women experience great pain with each flow, from the commencement of puberty, every month, until the change of life relieves them. With the majority, however, pain is only the exceptional accompaniment. With some women marriage effects a cure, whilst in others, especially when there is sterility, it either aggravates or originates the dysmenorrhea. Under no circumstance, however, would a physician advise a woman suffering with dysmenorrhea to be married in the blind hope that it would effect a cure.

Bearing-Down Pains.—Bearing-down pains, not severe, are often present, accompanied by a sensation of weight. The pains as a rule are cramp-like, and intermittent, varying in severity. At times the pains are followed by the expulsion of blood clots which oftentimes affords relief. Severe pains as a rule necessitate the sufferer going to bed, where she may have to remain for several hours to a day or two. As a rule constipation is present, again diarrhœa may be troublesome.

Nausea.—Nausea followed by vomiting adds to the severity of the attack. Headache is invariably present. The pains may extend from the lower part of the abdomen down both legs. Pain in the back is oftentimes quite marked, the sensation being that of the back splitting open.

Treatment.—The existence of dysmenorrhea depends upon so many conditions that the treatment employed in one case will seldom relieve the next. During the attack of pain, the patient should take a hot sitz bath, and if the suffering is very severe, may have a suppository of half a grain of opium combined with a quarter of a grain of belladonna. Under no consideration should a hypodermic injection of morphine be given, without a physician's advice. Again, a sitz bath may be given, followed by a turpentine stupe, and ten grains of Dover's powder. Tincture of belladonna five drops every three hours may be given; or the following: antipyrine five grains every hour until four doses are taken, then every three hours until relieved; acetanilid five grains in the same manner; tincture of gelsemium ten drops every three hours; bromide of soda or potassium twenty to thirty grains every three hours; or as a final resort, if the above-named remedies fail to afford relief, morphine, either by the mouth or a hypodermic injection, but only on the advice of a physician. Hot vaginal injections should also be tried, using at least a gallon of water.

Purgation.—Often when the attack is accompanied by constipation, a purgative dose of epsom salts or aloes will be of service.

Attention to the General Health.—Between the attacks attend to the general health. Employ the tonics mentioned in the treatment of amenorrhea. Take plenty of out-of-door exercise. Avoid undue excitement, straining or heavy lifting, the bicycle and dancing, as the time for the flow approaches.

Prevention of the Pain.—An endeavor should be made to prevent the pain if possible. The best drug for this purpose is tincture of gelsemium, five drops after meals, to begin ten days before the flow is expected. This is to be continued until the flow is well established, then cease until within ten days of the next period. It will prove advantageous at times to combine with the gelsemium five drops of the tincture of cannabis indica.

When Drugs Fail.—If drugs fail to afford relief, then it may be necessary to dilate and curet (scrape) the womb, an operation which, when properly performed, will give excellent results. This operation will only keep the patient in bed ten days, and at the end of the second week she will be able to resume her routine duties.

EXCESSIVE MENSTRUATION (Menorrhagia and Metrorrhagia).

Meaning of the Disease.—When the monthly flow persists longer than usual or is excessive in amount it is called menorrhagia. When there is a bloody discharge from the womb between the monthly periods it is termed metrorrhagia.

Causes.—Both may be due to obstruction of the general circulation of the blood, from disease of the heart, lungs and liver. Tumors of the womb, inflammatory disease of the womb, ovaries and tubes. The more frequent causes are, getting out of bed too soon after confinement, retained portions of conception, due to improper care during a miscarriage (see Miscarriage), polypus tumors of the womb and cancer.

Symptoms.—Anyone suffering from either of these conditions should be examined by a physician in order that he may ascertain the exact caues and remove it; otherwise delay due to home treatment, should the cause be a dangerous one, may prove fatal. In a woman otherwise having a normal flow, she will notice that the flow lasts a day or two longer, or may be excessive in amount, requiring a greater number of napkins than usual.

Excessive Flow.—The flow may be so excessive as to require rest in bed. When a large amount of blood is lost there will be pallor of the skin, dizziness, headache, extreme prostration, specks will appear before the eyes, she may feel as though she was falling through the bed. Or again, if the condition present is a menorrhagia, there will be a discharge of blood between the periods, which discharge, if it becomes excessive, will give rise to the same symptoms just mentioned.

Treatment.—In the treatment of menorrhagia there are two indications to be fulfilled, first to check the present hemorrhage; and, second, to remove the cause upon which it depends, and so obviate the certainty of its recurrence. To accomplish the first of these desirable objects, which should not, however, be attempted in any monthly period, until the usual amount of blood has been eliminated from the system, say until the second or third day of the flow, try half a teaspoonful of ergot every three hours. Rest in bed is, however, an important part of the treatment, without which all the good accomplished by skillful medical care may be speedily dissipated. Other remedies are, half a teaspoonful of hydrastis canadensis every three hours; half a teaspoonful of witch hazel every three hours; gallic acid, 5 grains every four hours. Stypticin in 5 grain doses. A very good prescription for bleedings of this kind is as follows:

R.—Ext. hydrastis fluid (colorless)	1 ounce
Ext. ergot fluid	½ ounce
Ext. hamamelis fluid	1 ounce
Aqua, q. s.	3 ounces

Sig. One teaspoonful every three hours.

Plugging the Vagina.—If these remedies fail and the case is an urgent one, it will be necessary to tampon or plug up the vagina with pieces of raw cotton, lamb's wool, or linen cloth, taking care not to employ an undue amount of force in introducing these materials. They should have a string securely attached to them in order to facilitate their removal. In no case should such a plug or tampon be allowed to remain longer than twenty-four to thirty-six hours, for fear of poisoning the system with the putrifying blood entangled in it. When the tampon has been removed, if the bleeding is not checked, tampon again.

Removal of Tumors.—If the bleeding is due to the presence of tumors it will be necessary to have them removed.

Further Treatment.—Frequently medicines and tampons fail to control the hemorrhages, especially when there is proud flesh in the womb, and when the muscles of the womb are unable to contract. In such an event the only procedure is to dilate and curet the womb, which operation will remove the source of the trouble. In some cases of dysmenorrhea enlargement and congestion of the ovaries appear to be the important factors in the production of the malady. Such attacks are apt to be very intractable, unless the disordered conditions of the ovaries are remedied, usually by an operation.

LEUCORRHEA OR WHITES.

Character of Whites.—This prevalent, troublesome and disagreeable condition, vulgarly termed the "whites," consists of a discharge of mucus or muco-pus from the womb, neck of the womb and vagina. It is very similar to that occurring from the nose during a cold in the head. In fact, the condition of the mucous membrane giving rise to leucorrhea is often one of catarrhal inflammation.

Causes.—It may be brought on by taking cold; by local excitement; by inflammation of the neck of the womb, the womb proper or the lining membrane of the womb; oftentimes the trouble is localized in the mucous membrane of the vagina; disease of the ovaries and tubes may also be at fault. It is frequently due to a "run down" system, yet women in perfect health may be affected; in the latter class it is probably nature's method of overcoming an excess in the richness of the blood.

Character of the Discharge.—The character of the discharge varies; it may be thick and tenacious, or it may be liquid, when it will run down the limbs in a stream and greatly soil the clothing. As ordinarily seen, it is not usually accompanied with much pain, but when very profuse, distress in the back and a dragging sensation in the lower part of the pelvis, often described as a bearing down feeling, are the symptoms most frequently observed. The discharge is generally more abundant a little while before, and for two or three days after the occurrence of the flow. In fact, when the leucorrhea is severe, this increase of the flow of whitish matter sometimes continues for a couple of weeks after the monthly period with increased violence, showing how greatly it depends upon a congestion of the parts concerned for its production.

Treatment.—The treatment of this rather intractable malady, besides the necessary attention to the general health, by the use of tonics and nourishing food, consists of the employment of astringent injections into the vagina. For building up the health the following pill will be found of service:

R.—Acidi arseniosi (arsenious acid)	1 grain
Ferri reducti (reduced iron)	10 grains
Quinia sulph. (quinine)	20 grains

M. Fiat in pil. No. XX. Sig.—One pill after each meal and at bedtime.

Additional Treatment.—If the leucorrhea is due to irritation of the ovaries, apply a cantharidal plaster over the groin on both sides. The best results, however, are attained by the employment of vaginal injections, such as a teaspoonful of creolin to two quarts of hot water; twenty grains of sulphate of zinc, or ten grains of sulphate of copper in the same quantity of water; thirty grains of alum to the pint; and a teaspoonful of lysol to two quarts of water are all worthy of a trial. A very cheap injection is made by adding one ounce of powdered oak bark to each pint of water, or one ounce each of tannic acid and glycerine to two quarts of water.

Treatment for Fetid Discharge.—When the discharge is fetid, permanganate of potassium should be used one-half drachm to one pint of water. This solution will stain linen, so be careful to avoid splashing it over the douche pan. (See How to Use the Douche.) Another very good drug to eradicate the odor of this discharge is bichloride of mercury. The druggists dispense a tablet containing seven and seven-tenths grains of the drug. One of these tablets added to two quarts of water makes a solution the strength of which is 1-4000. Such a solution should be used two or three times a day. All the injections above mentioned can be used night and morning, but if the discharge is profuse, three times a day will not be too often.

An Injection for Whites.—A very useful astringent injection for leucorrhea, whatever may be its cause, is the vaginal astringent douche tablet.

This tablet can be used night and morning and is effective and convenient.

Local Applications.—When the leucorrhea is caused by catarrhal inflammation of the cavity of the womb, as is frequently the case, injections into the vagina are, of course, almost worthless, and local applications made by a physician are very important, and should be faithfully persevered in, sometimes for many months.

HOW TO USE THE DOUCHE OR VAGINAL INJECTION.

Varieties of Syringes.—Before proceeding further let me describe the proper manner of taking a douche. First the varieties of syringes. These are numerous, but for practical purposes there are only two which are used to any extent. They are the Davidson, or bulb syringe, and the Fountain syringe.

The Bulb Syringe.—The bulb syringe is not to be recommended, because it is dirty, a great deal of muscular energy is required to work it, hence is tiresome and necessitates too much preparation for its use. It is very difficult to employ this syringe while lying down, and this is the only position in which a douche should be taken.

Using the Bulb Syringe.—In using this kind of a syringe generally a pint of the solution is placed in a basin over which the woman squats, and by squeezing the bulb forces the liquid into the vagina as fast as it runs out, thereby filling the syringe joints with the vaginal secretions, and returning to the vagina as soon as they flow away the impurities which have left it. If, however, a woman prefers this kind of a syringe, and insists on sitting over a bucket or other receptacle, then the solution should be placed in one basin, and that which is forced into the vagina permitted to run into the vessel upon which she is sitting.

Object of Using the Syringe.—The object of using the syringe is to bathe the vagina and neck of the womb. By sitting on a vessel the latter is prevented, for just as soon as a woman sits down, then the vagina is doubled on itself in such a manner as to prevent the solutions reaching the womb.

The Fountain Syringe.—The Fountain syringe is to be advocated, not only for this purpose, but for all-round family use. This syringe consists of a bag of soft rubber with a long tube and a series of hard rubber nozzles. The largest size is intended for the vagina. The "Alpha" is the best, because it has a valve at the opening which prevents the solution from running out at the top. This is a great advantage because the bag can be laid on the floor, a shelf or anywhere without spilling its contents.

Proper Way to Take Vaginal Injections.—The proper way to take a vaginal injection is as follows: First fill the douche bag, which should hold at least two or four quarts, with the solution which is to be used. Hang it on a nail, which should be driven near the bed. Then place the douche pan on the bed. A good douche pan should be large and capable of holding at least one to two gallons. They are made of tin and agateware. Then lie down in bed, placing the douche pan under you in such a position that the buttocks rest on the top of the pan, in order that the solution after leaving the vagina will run directly into the pan without splashing over.

Improper Positions in Douching.—This is the correct way to take a douche. The other methods of sitting over a basin, or standing over a vessel, are to be condemned. This is the only way in which the womb can be bathed with the solution used, and not less than one to two quarts should be employed when a drug has been added; and when plain hot water is used, four to six quarts will not be too many.

Temperature of Douches.—All vaginal douches should be as hot as the patient can stand, and under no circumstances should cold water be used, as it is injurious. In exceptional cases hot water increases the pain instead of relieving it, and is then advantageously replaced by lukewarm water.

What Women Should Avoid.—Under no condition should a woman endeavor to introduce the small nozzle into the womb, or endeavor to force a solution of any kind into the womb. This is an exceedingly dangerous practice, and many a woman by so doing has sown the seed of pelvic inflammation, which has only been relieved by the removal of both ovaries, and in some cases the womb.

CONSTIPATION.

Woman a Constipated Animal.—The eminent Dr. Goodell once said: "Woman is a constipated animal." While we do not desire to class the gentler sex as an animal, still this statement contains a great deal of truth, for by far the greater majority of women are constipated.

Causes.—This troublesome state can be attributed to a number of causes, the most frequent of which is leading a sedentary life; omitting daily exercise, which tends to excite the secretions of the bowels and liver to their proper activity. Another very frequent cause is laziness pure and simple, the patient failing to go to stool when informed by nature that such should occur.

A Very Frequent Cause.—Modesty is a very frequent cause of constipation in women, because a woman prefers to suffer rather than to go to a closet which may be somewhat publicly situated. Hereditary muscular weakness, hepatic torpor, lack of secretions in the lower bowels, backward displacement of the womb and lacerations of the perineum are frequent causes of constipation.

Symptoms.—General weakness, a feeling of languor and mental depressions are frequent symptoms; nervousness, headache, loss of appetite and a furred tongue may also occur. Individuals differ in this matter, one feels wretched all day without the accustomed evacuation, another is comfortable all the week except on the day which, by purge or enema, the bowels are relieved.

More Serious Symptoms.—When persistent the accumulation of the feces leads to serious symptoms, such as ulceration of the colon, perforation of the bowel, piles and inflammation of the bowels. The bowel contents may become dry and hard, forming large masses, which can only be removed by a physician with a great deal of difficulty.

Nausea.—In women who have been habitually constipated, attacks of diarrhœa with nausea and vomiting should excite suspicion, and lead to a thorough examination of the lower bowel.

Poisoning.—Part of the bowel contents may be absorbed by the system, giving rise to a general poisoning, which will recur at stated periods, until the constipation is cured. Costiveness is the recognized cause not only of hemorrhoids, of pelvic congestion, of inflammation of the womb and of disorders of the digestive apparatus, but also of the fecal poisoning just mentioned. For if diseases breed from bad drainage without the body, how much more from bad drainage and defective sewerage within the body! Feeble mothers beget feeble children—children who are carried from the womb to the grave, or who peak and pine under the heritage of ill health.

Other Causes.—Such then being the condition of the majority of American women, what is the cause? Probably no single cause has had so much influence in producing the peculiarly delicate condition for which women living in the country and in small towns in America are notorious, as the discomfort, inconvenience and frequent repulsiveness, and, I may add, indecent exposure, of their closet accommodations.

Insufficieny of Closet.—In the teeming tenement house of any of our large cities there is usually but one closet, and that is invariably a cesspool, wet and foul, reeking with filth, poisoned by noisome stenches, defiled by lewd couplets or by obscene cuts, indecent from thin partitions and wide chinks, or from being preoccupied by one of the opposite sex. Under such conditions what woman can avoid schooling herself into the habit of resisting the evacuation of her bowels?

Inconvenient Privies.—In the small houses of tradesmen and of mechanics the water-closet is rarely to be found, nor are the houses of the better classes always supplied with this luxury. The privy is then usually placed at the farther end of the yard, and approached by a long and unsheltered path. It is, therefore, almost inaccessible in bad weather or on dark nights, and is overlooked by the backbuildings of all the neighboring houses.

Risk to Women.—To a delicate woman the exposure to the weather is a serious risk; to one who is menstruating it is a constant menace; while to the refined woman the exposure to view compels the postponement of her physical duties to nightfall, or until driven to them by a sheer necessity which knows no law.

Country Closets.—Nor does the condition of the closets in the country present a more agreeable contrast. In many parts of the Southern and Western States a clump of bushes, the shelter of a rock, the nearest grove affords the only accommodations. But take the most thickly settled States, where is the small farmhouse whose privy invites rather than repels an operation of the bowels?

Privy a Misnomer.—The very name of privy is a misnomer. How seldom is the building hidden by clumps of evergreen, or a screen of lattice work. How often is it not an embarrassing distance from the house, at the end of a long trail, or, at least, of a long unkept path, which frequently runs parallel with a street or with a road.

The Outlandish Privy.—Where in the country, and for that matter in cities also, is not to be found the privy made up of rough boards rudely spiked together, with cracks wide enough to spoil all privacy, with a door without a bolt, and generally hanging by one hinge, with a crescent-shaped hole for a window, and with its sole object of furniture a barrel of rasping corncobs? When is it ever sheltered from the rude blasts of winter, or not poisoned by noisome stenches, acrid vapors and unclean flies? After such an unsightly but truthful picture, can we wonder that the calls of nature are looked upon as grievous dispensations of Providence, as hateful duties which are to be put off as long as possible and obeyed as seldom as necessary?

Repellant Conditions.—Imagine now broad daylight, with its busy traffic, a rainy or a dark night, the grass wet with dew, or the ground covered with snow, or the temperature, perchance, many degrees below zero. Under such circumstances what woman can respond to the calls of nature without putting herself to great discomfort, to great risk, indeed, if she be menstruating, or without blunting the edge of her womanly sense of decorum.

The Antidote.—I have told you the bane; now what is the antidote? Clearly such closets as a civilized Christian people—a people living in the twentieth century—are not degraded in using; closets that are decent, comfortable and accessible; closets that invite rather than repel those in which an operation of the bowels is not tantamount to being buffeted by Satan for a season.

Country Earth Closets.—In cities, and in towns which are supplied with water works and good drains, the use of the water closet ought to become universal. In the country, where such a luxury can be attained by the rich alone, the earth closet is the only substitute; I cannot too strongly urge its adoption.

Treatment.—Much may be done by systematic habits. Set a certain time of the day, and at that time go to the closet and endeavor to have an evacuation. Continue with this each day, and permit nothing to interfere with this duty at that particular time. The desire to go to stool should always be granted; when there is a desire, go by all means.

Treatment of Stout Women.—In stout women with flabby abdomens the muscles should have the support of a bandage. Exercise is of great value; by far the best being horseback riding at least an hour a day, or every other day. Massaging the abdominal muscles is also of value. Much good can be accomplished by the daily use of the "home gymnasium," or dumb bells and Indian clubs.

Diet.—The diet should also be regulated. Very often if a plateful of cracked wheat is used at breakfast each morning, and bran bread taken in addition, a chronic tendency to constipation can be removed. Milk is not to be recommended. Green or canned corn is of great service. Fruits also do good. Nothing is so good as a glass of cold water taken on arising in the morning just before breakfast; or if the cold cannot be borne, then a glass of as hot water as can be swallowed may be substituted. It must be remembered that strawberries, raspberries and blackberries are constipating rather than purgative. Coffee has a binding effect on some persons; brandy is distinctly constipating, whereas whiskey has no influence one way or the other.

Treatment by Medicines.—The use of drugs for the relief of constipation consists in those that unload the bowel, which has become filled, and those which will cure the tendency. Let us consider the first variety. For this purpose may be mentioned epsom salts, half to one tablespoonful, preferably taken in the morning on an empty stomach; mercury, in the form of calomel, one-fifth of a grain every hour until about ten doses are taken, then following with a bottle of citrate of magnesia; castor oil, half to one tablespoonful, or twenty grains of powdered rhubarb at bedtime.

To Cure Tendency.—Of the second class, half to one teaspoonful of the fluid extract of cascara sagrada at bedtime, or a dessertspoonful of phosphate of soda in one-quarter of a glass of hot water before breakfast. Rhubarb is not to be recommended for constant use, as it is astringent, and after the bowels have moved the constipation will be more pronounced than before. Mercury is exceedingly harmful if used continuously as a purge, and is the cause of much ill health, bad teeth, and digestive troubles. Castor oil is notorious for its tendency to ultimate constipation.

Very Best Drugs.—Of the curative class of drugs none compare to cascara sagrada, which should be used in the form of the tasteless fluid extract, or cascara cordial. This is the only drug which moves the bowels and at the same time tends to make the future movements more easy and regular; the dose is ten to twenty drops of the fluid extract every night at bedtime, or one to six teaspoonfuls of the cordial. If the fluid extract, in the doses above mentioned, fails to act, increase the quantity each night until at least a teaspoonful if necessary.

The following three prescriptions will be of value:

Aloes	20 grains
Extract of nux vomica	4 grains
Extract of physostigma	3 grains
Extract of belladonna	4 grains

Make into twenty pills. Take one pill at night or one night and morning.

Or,

Resin of podophyllum	2 grains
Extract of nux vomica	4 grains
Extract of physostigma	3 grains
Extract of belladonna	4 grains

Make into twenty pills. Take one at night or night and morning.

Or,

Aloin	2 grains
Extract belladonna	2 grains
Strychnine	¼ grain
Extract cascara	16 grains

Make into 16 pills. One at night.

Injections.—The employment of enemas, or injections, as a routine practice is to be discouraged. In cases where it is necessary to use them for temporary relief, and to get rid of the gas, a little soap, common salt, and a few drops of turpentine may be added to the water.

DISEASES OF THE EXTERNAL GENITAL ORGANS.

Vulvitis.—This is an inflammation of the vulva, the part so often referred to by women as their "person" or "privates." It is divided into several different varieties, which can only be distinguished by a physician.

Causes.—One of the most frequent is lack of cleanliness; irritating discharges from the vagina and womb, which trickle over the parts; tight fitting drawers, which rub and chafe; injuries, as striking against chair, or falling on an object; selfabuse; excessive or brutal intercourse; pregnancy; fevers; may follow a long and difficult labor; and is apt to occur during an attack of diabetes.

Symptoms.—General discomfort, sensations of burning which amount at times to severe pain; burning pain during urination; the parts are usually swollen and very red. In diabetic vulvitis the itching is intense and oftentimes is the first symptom of diabetes. Every woman who passes large quantities of water and suffers from intense itching of these parts should have her urine analyzed to see if it is due to diabetes. Owing to the fever and swelling the parts at first are dry, due to the lack of secretion; but as this increases the parts become raw and very painful.

Treatment.—Cleanliness is the first consideration. Warm sitz baths, hot vaginal injections of plain water, or water to which has been added creolin one-half a teaspoonful to two quarts, borax a teaspoonful to the quart, or a dessertspoonful of salt to the quart. Use these several times a day. After thoroughly cleansing the parts, they may be dusted with talcum powder, starch, or starch and bismuth, equal quantities, bismuth or borax.

Checking the Beginning.—Oftentimes the attack can be checked at the beginning by applications of lead-water and laudanum. The best way to apply this is to soak a piece of absorbent cotton, about the size of the hand, with it, and place it in between the legs.

Treatment by Injection.—If the irritation is due to worms, a rectal injection will usually remove them. If the itching is very severe try hot vaginal injections of bichloride of mercury, seven grains to the quart; salicylic acid the same strength; or a solution of hyposulphite of soda, one ounce to the pint of water. After the parts have been dried any of the following will be found beneficial: benzoated zinc ointment; iodoform ointment; solution of carbolic acid, half a teaspoonful to a cup of water; nitrate of silver, eight grains to the ounce of distilled water, and painted over the parts oftentimes affords the greatest relief. The bowels should be kept freely open.

PRURITUS (ITCHING OF) VULVA.

Definition.—By pruritus is meant itching; the privates are the one part of a woman most frequently affected with this troublesome condition. Pruritus is not a disease, but a symptom of other conditions.

Causes.—It is of frequent occurrence during pregnancy, and very often the result of uncleanliness; is invariably caused by irritating discharges from the vagina; may be associated with tumors of the parts, and is often present during the course of diabetes.

Symptoms.—Intense itching, the woman is almost driven to desperation, and scratches the parts until they bleed. The itching is usually aggravated by walking or becoming warm in bed. This condition may be so marked as to lead to melancholia. The intense suffering causes loss of sleep, exhaustion, and sometimes alarming nervous depression. The more the patient is compelled to scratch, the more the parts are irritated.

Treatment.—Remove the cause if it can be found. In order to remove irritating discharges sitz baths and vaginal douches, as described in the treatment of vaginitis, are used. After thorough cleansing of the parts they may be dusted with calomel, bismuth, starch or lycopodium powder. The calomel is generally preferred. Before applying the powder first dry the parts. Great relief is sometimes experienced from a gauze compress over the vulva, saturated with a solution of lead-water and laudanum, equal parts. This dressing should be frequently changed.

Auxiliary Treatment.—The intense itching which appears at night after retiring can often be prevented by applying to the vulva cloths wrung out in hot water. Ointments are useful from their soothing effects and, in addition, they protect the parts from the irritating discharges. These are iodoform ointment, sulphur ointment and zinc ointment.

HEMATOMA (BLEEDING) OF THE VULVA.

This term is applied to any hemorrhage which may occur in the tissues of the privates. It usually occurs on one side, rarely on both.

Causes.—The most frequent are falling on a sharp substance; very often while housecleaning a woman will stand on a chair which, should it slip, may cause her to fall in such a manner as to straddle the back of it; the insane may self-inflict wounds in this spot. Among other causes are intercourse, pregnancy, tumors and diseases of the blood-vessels supplying the affected parts.

Symptoms.—The symptoms are practically those of injury to any other part of the body. The bleeding may be very profuse, especially if there is a cut. If the parts are only bruised the bleeding will be more or less extensive, the blood simply pouring out into the tissues, causing a swelling of the parts. There will be pain of a sharp or tearing nature, which may be accompanied by faintness. If the swelling is large, it may press on the urethra, and cause difficulty in passing water.

Treatment.—The bleeding may be controlled by the application of ice or by using pressure or both. Simply take a clean napkin and hold it tightly against the injured parts. After the blood has been in the tissues for a few hours a hard blood-clot forms. If this is not absorbed within a few days the part should be lanced and the clot turned out. If the swelling is small lead-water and laudanum applied to the parts on pieces of gauze may cause it to disappear.

TUMORS OF THE VULVA.

The vulva, like any other portion of the body, is subject to the occurrence of tumors which may or may not be malignant. If such a tumor growth should occur a physician should be consulted, in order that he may diagnose its exact nature and institute the proper treatment. Too often innocent looking growths have been allowed to go unattended, which, when too late, have been found to be cancers.

SKIN DISEASES OF THE VULVA.

The skin of the vulva may be affected with various skin diseases, as eczema, erythema, acne, herpes, prurigo, scabies, pediculi and erysipelas.

Causes.—The various diseases are due to irritating discharges from the vagina or womb, menopause, vesico-vagial fistula, indigestion, diabetes, and in stout persons during exceedingly hot weather.

Scabies.—Scabies is due to the parasite acorus scabiei. This parasite may spread from some other part of the body. This itch-mite burrows into the skin and gives rise to intense itching, which increases when the body is warm. It is usually due to uncleanliness and coming in contact with uncleanly persons similarly affected.

Crabs.—Pediculi are often found about the external genitals. This is also a parasite, commonly called "the crabs." These parasites localize themselves in the hair, and can be seen clinging to it. They are generally contracted through intercourse with indecent women. Too often husbands thus affected bring them home and innocently cause a similar condition with their wives.

Treatment.—Hot vaginal injections, as advised for diseases of the vagina. Local soothing applications should be made, such as bismuth powder, ten per cent. solution of carbolic acid, benzoated zinc oxide ointment three to four times a day; powdered zinc oxide three to four times a day; acetanilid and chalk equal quantities, three to four times a day; carbolized zinc ointment three times a day, and lycopodium powder several times daily. If scabs are present wash them off with almond or other bland soap, after which apply any of the above ointments. Keep the bowels open daily, resorting to the treatment as advised for constipation.

Accessory Treatment.—If scabies are the cause take a warm bath with free use of soap, followed by dusting the parts with sulphur. Sulphur ointment has been highly recommended.

If due to pediculi, the best treatment is to shave the hair and thoroughly rub in a ten per cent. ointment of oleate of mercury three times a day, or blue ointment four times a day; bichloride of mercury, five grains to a pint of water, bathing the parts several times daily; or carbolic acid solution several times daily.

VAGINISMUS, OR CONTRACTION OF VAGINA.

Vaginismus is a painful spasmodic contraction of the vagina which more or less prevents intercourse.

Causes.—Very frequently due to an extremely sensitive condition of the remnants of the hymen, which will produce violent contraction of the muscles of the vagina. It may also be caused by a fissure of the vagina, erosions of the parts, fissures of the anus and an urethral carbuncle.

Treatment.—If due to a carbuncle it should be taken out, which operation will confine the woman to bed for five to seven days. When due to a thick hymen it will need the attention of a physician. Among the remedies which may be tried at home are injections of a teaspoonful of laudanum to a pint of hot water; an ointment of iodoform; or fifteen to twenty grains of bromide of sodium three to four times a day.

COCCYCODYNIA.

It consists of a very painful condition of the muscles at the very tip of the spine. Is most common in women who have borne children.

Causes.—Injuries during childbirth, blows and falls striking the tip of the spine, cold or exposure of the buttocks, and uterine or ovarian diseases.

Symptoms.—Severe pains in the region of the tip of the spine, increased by motion.

Treatment.—During the acute attacks it may be necessary for a physician to administer hypodermic injections of morphine to relieve the pain. As a rule an operation will be the only treatment to render a complete cure.

URETHRAL CARBUNCLE.

This is a small raspberry-like growth which is very sensitive, and to be found at the mouth of the urethra.

Causes.—These are uncertain. No definite cause has as yet been decided upon.

Symptoms.—It gives rise to severe itching and pain. During urination, as the water runs over it, the pain is more or less excruciating, so marked that women will oftentimes withhold from passing their water until they are further unable to withstand the calls of nature.

Treatment.—An operation is imperative, as no other treatment will afford relief.

DISEASES OF THE VAGINA

ATRESIA OF THE VAGINA.

Causes.—This means an absence of the vagina, or a closure of it. The child may be born this way, in which case it is due to improper development in the womb. Or, as is more frequently the case, it is acquired, due to caustic remedies carelessly applied, a long and tedious labor, extensive ulcerations, and a hymen which does not have an opening.

Symptoms.—In children born with this deformity it is often not noticed until puberty, when the child should menstruate. In fact, menstruation does occur, but owing to the absence of the opening in the hymen it is prevented from escaping and accumulates in the womb. Each month menstrual pains will recur, but there will be a failure of the blood to escape.

Treatment.—This is purely operative.

VAGINITIS.

Vaginitis is an inflammation of the vagina.

Causes.—A rundown system, anemia, systemic conditions producing congestion of the pelvis, such as pregnancy and tumors. May be due to friction produced by a badly fitting pessary, to irritating discharges from the womb, to excessive coition.

Symptoms.—Feeling of heat in the vagina; pain in the pelvis; at times a frequent desire to pass water; itching and burning about the entrance to the vagina; backache; loss of appetite and at times nausea; leucorrhea.

Treatment.—When the inflammation is acute keep quiet, not necessarily in bed. Keep the bowels open, and give a light diet, no meat. If there is much pain use a five-grain opium suppository. If the itching is severe take frequent warm sitz-baths and vaginal douches of hot water containing either of the following: Borax one teaspoonful to the pint, sugar of lead water one teaspoonful to the pint, or half a teaspoonful of creolin to two quarts. These injections should be used several times daily.

MALIGNANT TUMORS OF THE VAGINA.

The vagina may be the seat of cancer. It may begin here, or spread to this canal from the bladder, rectum or womb.

Symptoms.—Cancer usually appears from thirty to forty-five years. The important symptoms are hemorrhage, which often follows straining at stool, or after coition; a foul discharge, which is very repulsive; it may be thick, but as a rule is watery; pain, this is always present, but not as a rule, until after the disease is well developed. A physician should be consulted as early as possible.

Treatment.—The disease tissue should be removed, of course, by a surgeon. If the disease is well advanced before discovered, as a rule it is too late for operation. If such be the case the indications are to maintain the strength of the patient, relieve the pain and counteract the foul smelling discharge. The first may be accomplished by tonics and out-of-door exercise. These cases, as a rule, are not bedridden until a short time before death. To relieve the pain resort to opium. This is the only drug on which we can rely. Begin with a sixth of a grain four to five times a day, gradually increasing it as needed during the course of the disease. For counteracting the odor of the discharge the best drug to use is permanganate of potash, in a vaginal douche, five grains to two quarts of water. These douches should be used frequently during the day.

Auxiliary Treatment.—A woman suffering from this disease should always wear a napkin, which should be burned as soon as removed from her person. Allow plenty of fresh air to circulate in the room. Those who handle any cloths which come in contact with these discharges should wash their hands at once, using plenty of soap and warm water.

DISEASES OF THE UTERUS OR WOMB

INFLAMMATION OF LINING MEMBRANE OF WOMB (ENDOMETRITIS).

Inflammation of Lining Membrane of Womb.—This is an inflammation of the lining membrane of the womb.

Causes.—Often due to taking cold just before or while menstruating. The introduction of unclean instruments into the womb; the introduction of knitting needles and other instruments by women in an endeavor to produce an abortion. Gonorrhea is oftentimes at the bottom of the trouble. Inflammation of the womb often spreads to this membrane, or the inflammation may begin in this membrane and spread to the womb.

Symptoms.—There is a sensation of weight in the pelvis and slight pain. The discharge is at first profuse, thin and watery, but later becomes thick and tenacious, like the white of an egg. Menstruation may or may not be painful.

Treatment.—During the acute attack rest in bed, with an ice bag over the lower part of the abdomen, or if this is not comfortable, a hot water bag. The bowels should be well moved, preferably by a dose of epsom salts. The diet should consist of liquids, cornstarch, gelatine and the like. Large quantities of hot water should be used as vaginal injections three to four times a day.

Inflammation of the Womb.—A new and effective remedy for this disease consists of a mixture of five ounces of vaseline with three drachms of boracic acid. Make this into fifty suppositories and insert one in the vagina each night on retiring; or, if found more convenient, take a small piece of the mass, about the size of a cherry, and insert as above. This treatment serves also to correct irregularity of the menses. Hot water injections daily.

INFLAMMATION OF THE WALLS OF WOMB (METRITIS).

Inflammation of Walls of Womb.—Metritis is an inflammation of the muscular walls of the womb.

Causes.—The most frequent cause is getting out of bed too soon after a confinement; abortions; exposure to cold during menstruation will give rise to it, also sexual excesses and lacerations of the womb.

Symptoms.—The acute attacks usually begin with a chill, generally followed by a fever. Pain is more or less marked, and may extend down the legs, and be especially troublesome on the left side of the abdomen over the ovary. The monthly flow is apt to be accompanied by a great deal of pain.

Treatment.—The treatment is the same as endometritis.

FIBROUS TUMORS OF THE UTERUS.

Symptoms.—They give rise to pain, more or less severe at times, and to hemorrhages, which may cause death. The pain is especially severe during the menstrual period. The hemorrhages may occur several times between the monthly periods, or the monthly period itself may last for a week to ten days.

Treatment.—For the pain, morphine as a rule is the only drug which affords relief, one-sixth to one-fourth of a grain every four hours. Tincture of gelsemium, ten drops every three hours, may prove of service. For the bleeding try a teaspoonful of the fluid extract of hydrastis every three hours, or a teaspoonful of the fluid extract of ergot every four hours. If drugs fail to control the hemorrhage it may be necessary to pack the vagina with gauze, which pressing against the womb usually controls it.

The following is a very good prescription. which should be tried in all cases of bleeding from the womb:

R.—Extract of hydrastis fluid (colorless).........	1 ounce
Extract of hamamelis fluid	1 ounce
Extract of ergot fluid	½ ounce
Peppermint water, to make....................	3 ounces

M. Sig.—Teaspoonful every four hours.

Or, thyroides, one drachm. Make thirty capsules, one three times a day. Very often the fibroid can be removed with complete success.

POLYPUS TUMOR OF THE WOMB.

Character.—This disease, which is one of the most common causes of excessive hemorrhage from the womb at the monthly periods, is of considerable importance. The term polypus is employed to designate especially a tumor which is attached to the inner surface of the womb by a well defined neck or pedicle.

Symptoms.—The most important is profuse menstruation. After a time, as the tumor grows larger, and becomes more of an irritant, there are likewise frequent discharges of blood between the periods, often amounting to attacks of flooding. There is also a leucorrheal discharge which may be tinged with blood. Occasionally there are paroxysms of pain.

Treatment.—Unless the tumor is removed the case is hopeless. The operation simply consists in twisting the polypus off of its pedicle or neck. The patient is required to stay in bed ten days to two weeks.

ULCERATION OF THE WOMB.

Cause.—In a majority of cases inflammation of the neck of the womb is soon followed by ulceration. This appears around the neck of the womb, and just within the womb's neck.

Symptoms.—1. The inflammations and ulcerations mix and run into each other, resulting in raw places, granulations or pimply surfaces, and hardened parts. Sometimes the pimply patches become red and hard, the whole surface spongy, and bleeding will set in on the slightest touch.

2. As ulceration progresses it wrecks the mouth of the womb and eats deeply into the womb cavity, giving it an unsightly appearance. Pus or matter flows freely at times and at other times scantily. It may be thick and yellow, or thin and of lighter color. A sensation of heat and smarting exists and sometimes severe pain in the right side of the abdomen and in the back part of the head.

Menstruation.—Ulceration generally changes the character of the menstruation. Sometimes it becomes profuse and painful, at others scanty; and then it may be either frequent or tardy, giving rise to distress and pain in the lower part of the bowels and even in the groins and thighs.

Treatment.—1. A tea made of the white pond lily affords an excellent remedy. It should be used internally and as an injection; in the former case in doses of half a teacupful three times daily. The fluid extract may be used in place of the tea in ten- or fifteen-drop doses twice a day.

2. Tannic acid, or in place of it a decoction of oak bark, used as an injection night and morning, gives excellent results.

3. The application of tannic acid directly to the ulcers has effected many cures.

4. Half a teaspoonful of boracic acid to a pint of water, injected when warm, and repeated twice a day, is a highly recommended remedy.

5. A decoction of golden seal used twice a day as an injection has been found to give satisfactory relief.

Accessory Treatment.—Where injections are depended upon, their virtue can be increased by simple injections of warm water between times, and as often as every two or three hours.

CANCER OF THE WOMB.

Character.—The womb is the one part of a woman's body most frequently attacked by cancer. The disease may begin in the neck or the body of the womb. When situated in the neck of the womb it looks not unlike a cauliflower, hence the term "cauliflower cancer."

Causes.—It is more frequent among the whites. The lower classes are more susceptible than the upper. It is extremely rare that a woman who has not borne a child is ever affected with cancer of the womb. In unmarried women who have had cancer of this organ the confession of an abortion has often been elicited, showing that pregnancy had occurred. As a rule a badly-lacerated cervix (neck of the womb) is very prone to cancer, the disease invariably starting in such a state of affairs.

Heredity plays a more or less important rôle, especially when cancer existed in the mother, or the mother's side of the family.

Symptoms.—In the very early stages they are absent. As the disease progresses the following will appear: 1. Hemorrhages. 2. Uterine discharges. 3. Pain. 4. Visceral disorders. 5. Cachexia.

Hemorrhage.—This is usually the first symptom, and is generally due to ulceration and breaking down of the parts. Unfortunately it is attributed to the irregularities of the menopause, or to a return of the monthly flow after that period. Hence it is the bleeding of cancer is very often disregarded until it has progressed beyond the hope of a cure. The reappearance of hemorrhage two or three years after the menopause is strong proof of cancer and should receive immediate attention.

Examination.—Every woman who has passed the fortieth year, and has vaginal bleeding, or leucorrheal discharge mixed with blood, should at once consult a physician and insist upon an examination being made. Too often women through a mock modesty or for other reasons refuse to have an examination, and this stubbornness has cost many a woman her life. The symptoms of many of the diseases of the womb and ovaries are similar, and it requires a thorough examination, at times under an anesthetic, in order to ascertain the true condition of the pelvic organs.

Pain.—This does not appear early, but late in the disease, as a rule too late for an operation. As the disease progresses the pain will spread over the entire portion of the lower abdomen, especially so when the bladder and rectum become involved; the pain is excruciating and intolerable. This torture is constant and does not ease of its own account. A woman suffering from cancer of the womb truly does live a hell upon earth.

Visceral Disorders.—These are generally due to the extension of the disease, or to the pressure of the womb on the surrounding organs. The bladder becomes very irritable, there is a constant desire to pass urine, and the patient will strain and strain in an endeavor to squeeze out a few drops in order to obtain a little relief. As the ulceration progresses fistulæ may develop, the openings extending into the womb, the bowels or the rectum. Constipation becomes very troublesome.

Cachexia.—This is a characteristic symptom, and appears several weeks after the onset of the disease. It consists of a peculiar yellowish discoloration of the skin of the entire body. It is marked by emaciation, and the patient may waste away to "skin and bones."

Treatment.—If seen early and the disease is limited to the womb, this organ should be removed at once. If the disease does not return in three years then the woman is fairly safe. But if the disease is not limited to the womb and has spread into the surrounding structures, and an operation be performed, the cancer is very liable, and invariably does, return.

Use of Morphine.—If the woman refuses operation, or should an operation be performed and the disease return, there is only one drug that will ease the pain, and that is morphine. The patient must practically be kept under its influence. In short, she becomes an opium fiend, not through choice, but from necessity. This drug may be given, one-quarter of a grain three to four times daily, increasing the dose as required; but always by the advice of a physician.

Checking the Hemorrhage.—If the hemorrhage becomes troublesome it may be necessary to curet the womb in order to control it. Drugs have little or no effect on it. Packing the vagina with antiseptic gauze will at times prove beneficial.

Injections.—The discharge must be attacked with might and main. For this purpose resort entirely to vaginal injections, using permanganate of potassium, seven grains to two quarts of water, three to four times daily; bichloride of mercury, same strength and as often. These douches at times weaken the patient; in that case probably two a day will be sufficient, but never less than this. The odor of the room may be very disagreeable. In order to counteract this place around the floor in saucers, pure carbolic acid, and air the room as often as possible.

DISPLACEMENTS OF THE WOMB.

Character.—The womb, like every other organ of the body, is subject to deviation from its normal position. The womb is situated in the pelvis between the bladder and the rectum. The bladder is attached to the front of the neck of the womb while the rectum is very close to, but not intimately attached to the back of the womb.

When the womb becomes displaced the whole organ may turn forward (anteversion), or backward (retroversion). Or the womb may bend on itself. If the top of the womb falls forward then it is called anteflexion, or if it should fall backward then it would be retroflexion.

The symptoms and causes of the displacements vary more in degree than kind.

FORWARD DISPLACEMENTS.

Causes.—The most frequent causes are changes in the uterine tissues, following an abortion or confinement. Lack of proper muscular support plays an important part, also congestions, tumors, lacerations of the pelvic floor, tightly fitting clothing, and prolapse of the vagina.

Symptoms.—Dysmenorrhea and sterility are frequently present. Leucorrhea may be troublesome. When the displacement is so great that the womb presses on the bladder, this organ will become irritated, causing frequent irritation, and a more or less constant distress in the lower part of the abdomen. This irritation may give rise to inflammation of the bladder.

Treatment.—If the menstruation is painful use the remedies as described for dysmenorrhea. For the leucorrhea, employ the remedies advised for that condition. If inflammation be present local treatments with the hot vaginal douches are to be employed. If a tumor is the cause it should be removed. The ideal treatment is to replace the organ.

BACKWARD DISPLACEMENTS.

These include retroversion and retroflexion. These are the most frequent varieties, and are more or less easily controlled.

Causes.—General lack of muscular tone of the uterine muscles, improper care during confinement, wearing a tight binder too long after being confined, tumors, pregnancy, falls, blows, distended bladder and lacerations of the perineum.

Symptoms.—Painful menstruation, as a rule, the first day or two of the flow, frequent miscarriages, leucorrhea, constant dull aching pain in the small of the back, dragging pains in the lower portion of the abdomen and thighs, headache, constipation, the bowel movements are at times painful, the bladder may be irritable, and at times the urine may escape when the woman laughs heartily.

Treatment.—1. First of all the organ must be replaced in its normal position. If not fastened down by inflammation a physician can replace it; at times an anesthetic may be required. After the organ is replaced the physician will introduce a pessary to keep it in its normal position. A pessary is a rubber ring of various shapes. This instrument should be removed at least once a month, cleansed and replaced. While the pessary is in the vagina use a douche of lukewarm water once a day. If the pessary feels uncomfortable, or is painful on getting up or sitting down, it should be taken out and replaced; if still giving rise to trouble, it is in all probability too large, and a smaller one should be tried.

2. If inflammation exists, this is to be cured by local treatments and hot vaginal douches. For the leucorrhea, see description of that condition. For constipation, see constipation.

3. If the pessary maintains the uterus in its normal position, and relieves all the symptoms, then it is optional with the patient whether or not she will submit to an operation. If, however, the local treatments, and all other remedies fail to afford relief, then it will become necessary to open the abdomen, and perform one of the many operations for sewing the womb in its proper position.

4. If the uterus is fastened down by inflammation, local treatments will do no good, and an operation will be the only proper treatment.

PROLAPSUS (FALLING) OF THE WOMB.

Prolapsus of the womb is a descent of the organ below its proper position in the pelvis, better known as "falling of the womb," and may occur in two different degrees. The term prolapsus is applied to any falling downward of the organ, which is not so great that the womb passes outside the body; whilst the latter, called procidentia, is that condition in which the uterus escapes partially or entirely beyond the external organs of generation.

Causes.—Falling of the womb is more apt to occur after maturity is attained, and appears especially in those who have led laborious lives, or who have exercised themselves too much in lifting or carrying heavy weights. Hence cooks, laundresses, market-women and nurses, who lift and carry large and heavy infants, are especially liable to suffer from prolapsus. Women who have borne children are more frequently affected than those who are sterile, and lingering or instrumental labors, or getting up too soon after confinement, particularly predispose to it. Among the direct causes may be found congestion, hypertrophy or tumors of the uterus. Violent bearing-down efforts in labor, straining in obstinate constipation and forced respirations, such as occur in coughing, lifting heavy weights, and so forth, are also direct causes of falling of the uterus.

Symptoms.—The symptoms of this complaint are sensations of fullness and weight about the pelvis, wearisome backache, and leucorrhea. Menstruation is not usually interfered with and obstinate constipation is very common.

As the prolapse increases the bladder will be pulled down, which will interfere with its functions; such as frequent desire to void urine, the inability to completely empty it each time, resulting in an inflammation of its mucous membrane. The rectum will be dragged down in the same manner, giving rise to more or less difficulty in the bowel movements.

Treatment.—In the first stage, consists in the employment of a pessary to hold the womb up to its proper level. If the perineum is lacerated, this must be repaired, otherwise a pessary will drop out. The only satisfactory treatment for this condition, especially when the womb hangs out, is an operation, which consists in amputating the neck of the womb, sewing up the lacerations of the perineum, and opening the abdomen in order to stitch the womb where it belongs. Nothing else will afford relief.

This condition too often generates cancer of the womb, and if the women so affected would only consent to have this operation done they will be free from all the symptoms caused by this displacement, and oftentimes will be fortunate enough to prevent a cancerous growth of these parts.

DISEASES OF THE OVIDUCTS.

The oviducts are two tubes, one on each side of the womb, and convey the egg from the ovary into the uterine cavity each month. These ducts are subjected to inflammatory disease, which may terminate in a good recovery or develop into an abscess.

Salpingitis.—This is an inflammation of the oviduct. It may effect one or both sides.

Causes.—Usually due to gonorrhea, or poisoning following labor, catching cold during the menstrual period, and excessive exercise. A cause usually overlooked is disrobing and lying down in a draught after a prolonged exercise, when the body is very much overheated.

Symptoms.—This disease may be acute or chronic. During the acute stage there will be fever, a great deal of pain on the side of the inflamed tube. This pain is increased on walking or standing. The patient while lying on her back prefers to have the knees drawn up and the lower part of the abdomen is extremely sensitive.

During the chronic stage there is pain in the affected side, which is increased on walking, running up and down stairs, intercourse and sweeping. Menstruation as a rule is painful, coming on a few days before the flow.

Treatment.—Rest in bed during the acute attacks, and thorough purgation of the bowels. Copious hot water vaginal douches, at least twice a day. Ice bags over the lower portion of the abdomen are highly recommended.

DISEASES OF THE OVARIES.

The ovary may be attacked by inflammation, which may or may not form an abscess, tumors, benign and malignant, which may be solid or cystic.

Ovaritis.—By this is meant an inflammation of the ovary.

Cause.—A frequent cause in young girls is too close confinement in school, at work or overstudy. May be due to blood poisoning following a miscarriage or confinement, to gonorrhea, inflammation of the womb, salpingitis and using a cold instead of a hot vaginal douche, standing in a draught after being overheated, or while the body is in an overheated condition, jumping into a very cold bath.

Symptoms.—The pain is excruciating, and is situated low down in the abdomen, near the groin; this pain oftentimes shoots down the leg of the affected side. The pain may extend into the back and hip. The lower part of the abdomen is extremely sensitive, and the sufferer will not permit anyone to touch it. Even the weight of the bed clothing may give rise to so much distress that a prop will be necessary in order to prevent the bed-clothing coming in contact with the skin. Fever will be present, the height of which will depend on the severity of the attack. Voiding urine, and the bowel movements may be accompanied by more or less pain. These symptoms occur during an acute attack.

Treatment.—During the acute attack rest in bed is imperative. An ice bag should be applied over the affected ovary, providing the skin is not too sensitive to stand it. If this is not well borne, try a hot water bag, or flaxseed poultice. In addition to these, which always tend to ease the pain, opium should be given by the mouth or with a hypodermic needle. When the pain is so great as to demand opium, of course only a physician should prescribe it.

Accessory Treatment.—At times any of the following drugs may afford relief. Antipyrine, five grains every three hours; acetanilide four grains every three to four hours; or the two combined, giving two grains of each every three hours; or the tincture of gelsemium ten drops every three to four hours, in a teaspoonful of water; for reducing the fever tincture of aconite one drop every hour. The following prescription is often of value in all varieties of inflammation of the ovary, irrespective of the cause:

R.—Tincture of gelsemium .... 2 drachms
Tincture of cannabis indica .... 2 drachms
Peppermint water .... 3 ounces
One teaspoonful, repeat in two hours, then every three hours.

When the inflammation becomes chronic, local treatments should be persevered in for several weeks; combined with hot vaginal injections. If there be leucorrhea use the remedies advocated under that heading.

If the local treatments do not afford relief then it will be necessary to have an operation, which will consist in removing the ovary if badly diseased, or if slightly so then only that portion which is affected.

Pyosalpinx.—If an acute attack of ovaritis does not get well, or develops into a chronic condition, and pus forms, then it is called pyosalpinx, which means pus in the tube or oviduct.

Symptoms.—They will be those of ovaritis, only more so. Chills may also be present, due to the absorption of the poisonous material from the pus.

Treatment.—This consists in the removal of the ovary and tube, as no other procedure will effect a cure. Too often women suffering from this condition will delay operation until the last possible moment, which delay invariably costs their life.

Displacement of the Ovary.—The ovary may drop down from its normal position, in so doing it always falls back of the womb. This is called prolapsus of the ovary.

Prolapsus of the Ovary—Causes.—Generally due to enlargement of the ovary, which may be caused by inflammation or tumors. A sudden fall or misstep will at times cause an ovary of normal size to fall downward, which will invariably become inflamed.

Symptoms.—Pain located deep down in the pelvis, which may be of a dull aching character, or sharp and shooting. The bowel movements are frequently painful, due to the distended rectum pressing against the ovary. Intercourse is very painful and may be accompanied by nausea.

Treatment.—Local treatments and the use of the hot vaginal douche may afford some relief, but invariably it is necessary to remove the ovary, which operation will require a rest in bed of three to four weeks.

TUMORS OF THE OVARY.

The tumors of the ovary may be solid or cystic. The former may be benign or malignant. The solid tumors are divided into the fibrous, muscular and cancerous, the latter of which is extremely rare.

Cystic Tumors of the Ovary.—These cysts are divided in the small and large. The former attain the size of an egg or the fist, while the latter may grow to any size, holding many gallons of liquid.

Causes.—The immediate cause is very obscure; usually due to inflammation of the ovary, sudden amenorrhea, excessive intercourse and blows on the abdomen. These tumors may be present at any age, from infancy to advanced old age, but are most common during the period of sexual activity, between the twentieth and fortieth years. Strange to say they are most frequent in the unmarried woman and those who have not borne children.

Symptoms.—1. The woman may first notice that one side of the abdomen is larger than the other, and later on will be able to feel a lump on that side. This may increase rapidly in size, the whole abdomen becoming distended, and looking not unlike pregnancy. Indeed, the woman herself may suspect that she is pregnant. Later on, there will be a sensation of weight in the pelvis, the bowel movements will be painful and the bladder very irritable, due to the pressure of the tumor. Painful and profuse menstruation is of frequent occurrence.

2. As the tumor increases in size there will be pressure symptoms, swelling of the legs, due to pressure on the blood-vessels, the privates may become swollen, due to the pressure on their blood supply; when the tumor becomes sufficiently large to press on or near the diaphragm there will occur shortness of breath. Besides these the face will have a pinched expression, characteristic of this kind of tumor; there will be marked loss of weight and general debility.

3. Pain more or less constant will be present, and at times violent in character. This may be due to peritonitis, caused by the irritation of the tumor.

Treatment.—1. The only cure is, of course, operation. If the cysts are very small, about the size of a pea, they can be removed from the ovary, and this organ allowed to remain. But, on the other hand, if they are the size of a pigeon's egg or larger, then it will be necessary to remove the ovary with the tumor.

2. The old method of tapping the cyst and drawing off its contents is to be condemned as dangerous.

3. The operation of ovariotomy, or removal of the ovary, will necessitate the patient remaining in bed three to four weeks.

LACERATIONS OF THE PERINEUM.

Character.—This consists of tears of the anterior and posterior walls of the vagina, during childbirth. The laceration may extend through the posterior vaginal wall into the perineal body.

Symptoms.—1. When the anterior or front wall of the vagina becomes torn the support of the bladder is usually disturbed, and there will be more or less trouble in voiding urine. In addition there will be an inability to entirely empty the bladder each time, which may result in inflammation of the bladder.

2. When the posterior or back wall of the vagina is torn the

symptoms are more marked. This laceration as a rule extends through the muscle which is the main support of the womb from below, by holding up the pelvic floor, and in this way supporting the womb. These muscles are two in number, one on either side.

Treatment.—1. After labor the parts should be thoroughly inspected to see if a laceration has occurred. If so it should be sewed up at the time. When a physician tells a woman that she is torn—and it is no fault of his that such does happen—and desires to insert stitches, she should allow him to do so. Too often women will not permit it, and they regret it only once, and that is as long as they live.

2. If the tears are sewed right after the baby is born they will invariably heal and the parts will be restored to the same condition they were in prior to labor. If not the muscles and tissues do not heal together, and the woman will begin to suffer from all kinds of pelvic symptoms, such as forward and backward displacements of the womb, prolapse of this organ, prolapse of the bladder and obstinate constipation.

3. These lacerations are divided into complete and incomplete. The first consists of those in which the tear extends through the bowel, the latter a tear of any extent near, or down to, but not through the bowel. If these lacerations are not repaired at the time, then it will only be a question of time before such an operation will be necessary, so why not permit the physician to do as he thinks best at the time these lacerations occur.

4. If the laceration is complete there will be a loss of control of the bowels, and they will move without the knowledge of the woman. If the tears are not repaired at the time, it is useless to attempt it less than three months after labor, if so a poor result will usually be obtained.

GONORRHEA.

Character.—This is an inflammatory disease commonly called "the clap." Greater than any other danger, presented to woman, is sexual intercourse with a man who has gonorrhea or syphilis; the former is the more destructive. The attack of gonorrhea in the male at the time of intercourse may be acute, chronic, or one which had not been thoroughly cured.

A Serious Disease.—While gonorrhea in man in most cases is a trifling disorder, although there are exceptions in which it leaves a serious condition or becomes fatal, are not so very rare; in woman it is one of the most serious diseases.

Many an innocent and previously healthy woman, shortly after marriage to a man who supposed himself to have been cured of gonorrhea years before, may get a destructive gonorrheal infection.

Diseases Induced by Gonorrhea.—When we take into consideration that a gonorrheal infection in a woman may cause inflammation of the vulva, vagina, urethra, bladder, lining membrane of the womb, the womb itself, the tubes and the ovaries; that the inflammation of the tubes and ovaries as a rule result in abscesses, nay more, that too often both ovaries have to be removed, and oftentimes the womb with it, then you will realize the dangers of an attack of this disease in a woman.

Causes.—They have been mentioned, intercourse with a man who has had an attack of gonorrhea, or is still suffering from an old attack which has not been thoroughly cured, and yet his physician has probably discharged him as "cured." Very frequently you will hear a person say that it was contracted from a water closet; this is impossible, especially with a man, but, a woman, under very rare circumstances, may come in contact with pus which has escaped from the male on to the seat of the closet. I have never heard of such an instance happening; although it is possible it is extremely improbable.

Symptoms.—1. These consist first, of a burning and itching sensation in the "privates," followed in a day or two by a discharge, which in a few days generally becomes profuse. The pain in these parts then becomes more or less unbearable. Each time the bladder is emptied there is a burning, scalding sensation, due to the urine flowing over the inflamed parts.

2. If the inflammation spreads to the urethra and bladder there will be all the symptoms of cystitis (which see). If the disease extends to the uterus there will be all the symptoms of acute inflammation of the womb, which will necessitate the woman going to bed. As the disease spreads to the tubes and ovaries the pain in the lower part of the abdomen will become intense and the fever increase; both of which will become intensified if abscesses form.

Treatment.—This consists in vaginal injections of permanganate of potash, five grains to a quart of hot water four times daily; bichloride of mercury, seven and one-half grains to the quart, same as before; or applications to the vagina of nitrate of silver, thirty to forty grains to the ounce of water. The latter should be done by a physician. A woman who has the symptoms first mentioned may at once suspect she has gonorrhea, and should consult a physician immediately and place herself under his care.

DISEASES OF THE BLADDER.

The bladder may be irritable and yet not inflamed, so a special description will be made.

Irritability of the Bladder.—This may arise from purely functional causes and is of frequent occurrence in nervous women. Oftentimes present in diseases of the womb and vagina, and when the front wall of the vagina has been lacerated. Also present in displacements of the womb. It may follow abdominal operations and parturition (childbirth).

Symptoms.—Similar to those of cystitis. The urine from an irritable bladder is always clear, never contains pus.

Treatment.—Build up the constitution by the use of tonics. (See Anemia.) Regulate the bowels. The following may be tried:

R.—Atropine sulphate .... ½ grain
Distilled water .... 4 ounces
Five drops in water after meals.

If the woman is extremely nervous, fifteen grains of the bromide of potassium or sodium every four hours will prove of value.

Cystitis.—This is an inflammation of the mucous membrane of the bladder and may be acute or chronic.

Causes.—Acute cystitis may be caused by exposure to cold; gonorrhea; dirty instruments, particularly a catheter; pressure of the child during labor; inflammation of the peritoneum or pelvic organs; blows and falls when the bladder is distended with urine, and the improper use of certain drugs.

Chronic cystitis may be a continuation of the acute form, especially by pressure of the uterus during pregnancy, or large tumors.

Symptoms.—1. The acute form frequently begins with a chill, followed by fever, which is not very high. There is considerable pain in the lower portion of the abdomen, difficult and painful urination, and the urine is very cloudy. The desire to urinate at night may be very troublesome, and is apt to become more or less constant. There is a continuous feeling of pressure and weight over the bladder.

2. In the chronic condition the pain is not so severe, but constant desire to pass water, especially at night, is very distressing. When there is a desire to pass water the patient must go at once, being unable to hold

her water. If she should lift heavy weights or cough the water may dribble away.

Treatment.—1. All instruments that are introduced into the bladder should be thoroughly cleansed and rendered antiseptic.

The acute form is best treated by rest in bed and an ice bag over the bladder. If the latter is not tolerated, then try a hot water bag. A very good drink is flaxseed tea. If the pain is severe, one-half grain of opium suppository will afford relief, repeating in about three hours if necessary. The following prescription will be found very useful:

R.—Tincture of aconite	1 drachm
Sweet spirits of nitre	1 ounce
Liquor potassii citratis	6 ounces

A dessertspoonful every four hours.

All alcoholic liquors must be restricted, and the diet should consist of milk and broths.

2. If the disease becomes chronic the patient should be kept on a bland diet. Vegetables, such as asparagus and those containing salts, and all alcoholic liquors should be prohibited.

3. If the urine is highly acid it should be rendered neutral by the benzoate of sodium; if it is alkaline, it should be rendered less irritating by the acetate or citrate of potassium.

4. Salol, five grains, four times a day is an excellent drug for this condition. Mineral waters such as Bethesda, Vichy and Buffalo Lithia are to be taken, at least several glassfuls a day.

5. Great relief is afforded by washing out the bladder, of course this can be done only by a physician.

6. If the water constantly dribbles away, it may be cured by stretching the neck of the bladder. This will necessitate remaining in bed for about a week.

Stone.—Stone in the bladder of course requires an operation for its removal. There is a prevalent idea that a stone in the bladder can be dissolved by medicines and lithia water. This is a false impression and a great many quacks take advantage of it, generally to extort money from the sufferer.

DISEASES OF THE FEMALE BREAST

The breast is subject to inflammation, abscesses and tumors.

MASTITIS OR MAMMITIS, INFLAMMATION OF THE BREAST.

Causes.—This may be produced by blows on the breast, or to any of the usual causes of inflammation. It may occur at any age, and in either sex. An acute attack is more often found present in nursing women during the first week or month after delivery. If such happens it is invariably due to cracked nipples.

Symptoms.—At first only an uneasiness of the breast is noticed, then a chill occurs which is usually followed by fever. The gland becomes intensely swollen, red and exceedingly painful. The inflammation may be so great as to cause an abscess.

Treatment.—This consists in preventing an abscess from forming. To accomplish this wash the nipples thoroughly three to four times a day, and stop the baby nursing the affected breast. The breast should be emptied of milk, by the cautious use of the breast pump. Cloths saturated in a solution of lead water and laudanum should be applied several times a day, and over these lay an ice bag, or rub frequently with hot lard.

ABSCESS OF THE BREAST.

If the inflammation does not subside an abscess invariably results.

Treatment.—1. If it appears that pus is forming hot applications should be made, preferably flaxseed poultices, to be renewed as soon as they become cooled.

2. As soon as pus is detected the breast should be incised and the cavity drained.

3. Too often women refuse to allow their physician to lance the breast, thinking it will come to a head and be well in a few days. This is a great mistake. The breast should be freely opened, in order that the pus can easily run out. If necessary an anesthetic should be taken, in order that the physician may accomplish thorough work. At times it may be necessary to insert a drainage tube; depending entirely upon the time which has elapsed from the formation of the pus until the time it is incised.

TUMORS OF THE BREAST.

These may be benign or malignant. Tumors of the former type can be readily removed, and will not give rise to further trouble. On the other hand, those of the latter class, which are of a cancerous nature, are very apt to return, unless operated on early and thoroughly.

CANCER OF THE BREAST.

Character.—Very often a woman will strike her breast against a hard object, or may be struck by a fist. This blow may be followed by a lump, which in a few days may disappear.

Again, a woman while dressing may notice a lump in the breast, and think nothing further about it, or may try to cure it by rubbing in camphorated oil, or other household liniments.

These lumps frequently are the early stages of cancer, and the longer the delay the greater the risk. When a woman discovers a lump in the breast she should consult a physician at once in order that he may properly treat and watch it. If the lump continues to grow and remains hard then he will, or rather should, advise an operation. Under such circumstances these lumps are invariably a beginning cancer.

Treatment.—If the lump is small then it may not be necessary to remove the entire muscles, but simply the breast. On the other hand, if the lump is large and of long standing, or if the breast is immovable, that is, cannot be moved from side to side, then the breast, muscles and all surrounding tissue will demand removal. Recurrence may follow. Many women can be cured of cancer of the breast, providing they will consult a good physician early, which is, as soon as a lump is noticed; and if such does not become smaller or disappear in two weeks, submit at once to an operation or the application of the X-ray.

Beware of Quacks.—It is surprising the number of women who will scorn the advice of a physician, and place themselves under the care of a charlatan or a quack. This class has killed more women than any of the most malignant of diseases, and yet the State will sanction their existence. Beware of quacks, especially when a cancer exists. These deceivers and money extortionists advertise to remove these growths by the "roots." Such growths have no roots. And yet how many women will stand the torture of the acids which they apply to eat out the tumor, in preference to a clean-cut operation, under an anesthetic, which will keep them in bed only two weeks. While the "eating out the roots" process requires a torture of several weeks.

SOME INTERESTING FACTS OF GREAT VALUE TO WOMEN

Preventing Disease.—Education has a great influence in the development of diseases peculiar to women. During early childhood, when the pelvic organs are undergoing their development, the child must not be confined to the house and at school all day. She should be allowed as many hours recreation a day as feasible, in order that she may enjoy out-door exercise, and obtain all the fresh air possible, which is of so vital importance to her constitution. Too long daily practice at the piano or organ is also harmful.

What to Avoid.—Everything that causes an increase of blood to the womb and ovaries should be avoided. In this category belong sexual excitement brought on by reading suggestive novels; by looking at obscene pictures; by masturbation (self-abuse); sodomy and even normal coition if performed too violently.

Care of the Skin.—The care of the skin is of great importance. Baths, daily or two or three times a week, should be encouraged. The accumulation of dirt blocks up the sweat glands, and nature is unable to throw off the impurities through these vessels. The Jewesses from Russian Poland are very susceptible to disease, and their appearance conveys to one the idea that they never wash their bodies.

Overwork.—All work and no play is a fruitful cause of ill health. Every woman who has the cares of a household should indulge in open-air exercise, or daily walks. Golf, horseback riding, walks, gathering flowers and the like, are to be highly commended, because they combine exercise with open air.

Proper Food.—There is room for improvement regarding food. Many girls have a loathing for food in the morning, and often take nothing but a cup of coffee, and at times not even that, and go to school, and allow their brains to work for hours on an empty stomach. Such a practice is to be condemned in the strongest terms. It is not only a very bad habit, but it spoils the appetite, tends to cause a sour stomach, and impoverishes the blood, which leads to nervous disturbances. The same may be said of candy, the immoderate use of which among girls and women corresponds to alcoholic beverages and tobacco in men.

Mode of Dressing.—Some few suggestions regarding the mode of dressing may be of value. One of the most frequent causes of congestion of the pelvis is the "decollete" evening dress and the bell-shaped nether garments. High heels, when worn at an early age are apt to change the normal inclination of the pelvis, a cause of tedious and difficult labors.

Tight Lacing.—Of much more importance is the use of the corset. A loose corset at the best is more or less binding. Tight lacing, of course, should be avoided, it displaces the various organs in the abdomen, pushing them in all directions, excepting the normal, and causes a crowding down of the pelvic organs, hence a fruitful cause of diseases of women.

The Menstrual Period.—Neglect during menstruation is one of the most fruitful causes of female diseases. Dancing and skating during this period should not be permitted. Sexual intercourse at this time, to say the least, is a repulsive habit, yet it is not of rare occurrence. Such a practice is very apt to result in a pyosalpinx (abscess of the oviduct, which see).

Marriage with Disease.—Marriage with existing disease of the pelvic organs is a frequent cause of unhappiness for both husband and wife. Disease of such organs may prove destructive of all sexual desire or may prevent the possibility of conception. But if these should not ensue, there still remains the greater and more appalling danger of defective child development in the womb, or of the actual transmission of disease to offspring. Such calamities are all too frequent, and those who would enter the marriage estate should feel certain that their pelvic organs are free from diseased conditions.

Evil of Abortions.—Abortions, however brought about, play their part in causing inflammatory and nervous wrecks of women. They are the source of many serious and, ofttimes, permanent diseases. Causes of abortion are very numerous. Among those most common are displacement of the womb, ulceration of the neck of the womb, too much exercise, heavy lifting, jar from a slip or fall, strong emetics, powerful purging, etc.

Treatment of Abortion.—If the symptoms are slight, it may be that nothing more than a few days' rest will be required, keeping the body as much as possible in a horizontal position, taking occasional cooling drinks, and at bedtime a pill composed of one grain of camphor and two grains of sugar of lead. In addition, a mustard plaster may be applied to the lower part of the back to allay any pain that may be experienced. If the conditions are severe, and flooding should set in, accompanied with marked symptoms of miscarriage, a napkin wetted with cold water, or vinegar and water, should be laid upon the external genitals. **Rest in bed is important.**

If the symptoms are not thus allayed, recourse must be had to the plugging of the vagina with pieces of cloths soaked in a solution of alum or tannin; fill the vagina full and then place a fold of linen in the genital fissure and apply a bandage. Remove the plug in from five to ten hours, and replace if the discharge continues.

Conception.—Every young couple intending to enter the marriage relation should know what a terrible curse they are liable to transmit to their future children through ignorance of the vital principles which regulate reproduction. This attended to, it then remains with the mother to mold the infant growing within her by being herself at the time what she would like her child to be.

The physical obstacles to conception are chiefly those diseases which have been previously described. When it is dependent on the causes which produce painful menstruation, or profuse menstruation, or a suppression of menstruation, the remedies are the same as are pointed out for those complaints. If inflammation of the ovaries be the cause, a cure may be effected, provided the inflamed condition be removed. If inflammation or ulceration of the neck of the womb be the obstacle, the remedy may be found in the treatment recommended for these affections.

CHANGE OF LIFE (MENOPAUSE).

This is better known as the "change of life," also called the climateric.

Time and Character.—It comes on gradually, extending over a period of three to four years; it comprises the times when the monthly flow begins to be irregular, gradually diminishes and ceases altogether. As a rule in most women it begins about the age of forty-five, but invariably so between forty-five and fifty years. Those who menstruate early continue to menstruate longer than those who begin late, hence have a late menopause. Those who suffer from a chronic inflammation of the womb or are weakened by severe uterine hemorrhages begin to change life sooner than a healthy woman.

When the menopause comes on gradually the woman is not very liable to have severe disturbances, but if it comes on abruptly the discomforts are very bad, and the general strain of symptoms are marked.

Dangers of the Period.—This period is a critical point of a woman's life. Too often women while passing through this stage pay little attention to it, and every bad symptom is attributed to the "change of life."

This is the time of all others that cancer of the womb and breasts are prone to develop. Every woman with a lump in her breast, which develops during this period, should consult a physician at once. Whenever bleeding takes place from the vagina, after the menopause has ended, invariably signifies beginning cancer, and the woman should immediately submit to an examination.

Symptoms.—1. The first symptom of the menopause is irregularity in the menstrual flow, as regards the time and quantity. The intervals between the menstrual periods will become extended, say every five to six, seven or eight weeks. Sometimes, on the contrary, menstruation becomes more frequent. The periods last longer, say six to eight days. There will be congestion of the head, causing a red face, headache and indistinct vision, buzzing in the head and ears, dizziness, the sleep is disturbed by dreams, and at the time the flow should occur may have bleeding of the nose.

2. Besides the above, there may be catarrh of the stomach and intestines; congestion of the liver, rendering it torpid; the kidney disturbances generally appear in the form of a sediment in the urine. Leucorrhea may be very troublesome. An eruption of the skin of the face may occur, and there may be intense itching, burning or smarting sensations all over the body. The vulva may be the seat of most distressing itching.

3. A very disagreeable feature of the "change" is the fever and sweats; this consists in a rush of blood to the head, the body becomes very warm and then breaks out into profuse perspiration. This may occur at any time and place. When others think the room very cool, she will think it exceedingly warm.

4. The heart is often affected in the form of palpitations and shortness of breath. The nervous system also shows evidences of a general upset. Sometimes the limbs become very trembly. The temper is subject to great changes, and the sexual appetite may be greatly increased. She may become delirious, or even go insane.

5. The organs of generation undergo marked changes. The uterus, vagina, vulva, ovaries and breast all shrink and become greatly reduced in size.

Treatment.—1. Although this is a perfectly natural process, which is of normal occurrence in every woman's life, conditions will arise demanding interference.

Above all keep the bowels open. For the sediment in the urine it is well to drink Vichy or Seltzer water freely during the day; or to take half a teaspoonful of bicarbonate of soda in a tumblerful of water in the course of the day.

2. The congestion of the head and the disturbances of vision are relieved by hot footbaths, with or without mustard, and of the cold water eye douche five minutes three times daily.

3. Lukewarm general bath taken three times a week will keep the skin in good condition, which is of value.

4. Those women who have a tendency to stoutness should adhere to a restricted diet, such as fish, meat, green vegetables, lettuce, salad and juicy fruits. Milk and beer are prohibited.

5. The few women who lose flesh must be well fed, and have chocolate and plenty of milk to drink, providing they can digest them.

6. A sudden suppression of the flow during this period is particularly dangerous, hence she should avoid getting the feet wet, wet skin, and should not take a cold bath nor wash the privates with cold water. All these refer to when the menses are present.

7. If hemorrhages occur employ the remedies advocated for the treatment of menorrhagia and metrorrhagia.

8. If the bleeding is quite profuse, pack clean pieces of linen tightly in the vagina, and allow them to remain until a physician is consulted, which should be immediately. This method of packing the vagina will control the bleeding until the physician arrives and institutes more radical measures. A good uterine tonic such as the pil viburnum comp. often does much to relieve the nervous condition and allay pain and distress.

MISCARRIAGE OR ABORTION.

Meaning.—Abortion is the expulsion of the product of conception from the womb. It is also called miscarriage, by which name it is better known. Amongst the laity at large the term miscarriage is generally used when this accident happens without any violence on the part of the mother, whereas abortion is applied when attempts have been made to bring on this condition by the introduction into the womb of instruments.

Divisions.—Abortion has been divided into spontaneous or natural and accidental. A better division is spontaneous and artificial. The latter class is divided into therapeutic and criminal; therapeutic abortion is that in which it is done by the physician in the interest of the mother's life or health, while criminal abortion is without this or any other justification.

It is further divided into complete and incomplete; threatened and inevitable.

Complete Abortion.—By complete is meant that all the product of conception, fœtus and afterbirth, is expelled; incomplete, when only a part of it comes away, invariably the fœtus, the afterbirth or part of it remaining in the womb; when the symptoms of an abortion appear, and it can be checked, it is spoken of as a threatened abortion; whereas, if it is inevitable, when in spite of all that is done, miscarriage occurs.

Criminal Abortions.—The greater number of miscarriages occur in the first three months of pregnancy. It has been shown by statistics that criminal abortion is more frequent from the third to the sixth month than in the first two months. The explanation of this fact is due, that up to three months the woman hopes that there is simply a delay in the appearance of the flow, but when this hope fails she is ready to resort to any procedure to end a pregnancy which now becomes almost certain; on the other hand, when six months have elapsed the life of the child has become so manifest that she shrinks from its destruction. Movements of the fœtus in the womb make successful appeals to the mother's conscience, if not to her love also, for the salvation of the new life which dwells within her womb as its sanctuary.

Dangers of Abortion.—It is surprising the number of criminal abortions that occur yearly, and which fail to come to notice, unless the victim dies, when an exposé is made by the coroner. And even then many women die with the names of the abortionist and her seducer sealed upon her cold lips. Women do not for one instant think of the damage which is wrought to their generative organs, when they introduce some instrument or "what not" into the womb in order "to open it," so that a miscarriage will occur. Inflammations, displacements of the womb, and pelvic abscesses, and abscesses of the ovaries too frequently follow these foolhardy attempts. How many women have sacrificed their lives in this criminal and damnable manner?

Causes.—1. The causes of this unfortunate condition are numerous, they may be due to disease of the fœtus, placenta, womb or the mother. Then again the father may be at fault. For instance, men who are confirmed alcoholics, or suffering from consumption or syphilis will invariably have a serious effect on their offspring, in that if pregnancy should occur the fœtus dies within a month or so after conception. Abortion is of frequent occurrence in the wives of men who work in lead.

2. Violent exercise, as running, dancing, jumping, riding on a hard

trotting horse or over a rough road; lifting heavy weights, falls, blows, tight corsets, surgical operations, especially if on the organs of generation, are very prone to cause an abortion. Frequency of intercourse is not an unfrequent cause.

3. Among other causes which may be attributed to the mother, are infectious diseases, such as typhoid fever, during which she is very apt to abort; syphilis, this is one of the most frequent causes; backward displacement of the womb plays a very important part in this condition; a pregnant woman working in a tobacco factory is very liable to miscarry.

4. Again, violent sneezing or cough may be the cause. Tumors of the womb and malignant disease of this organ are also active factors; though as a rule a woman with cancer of the womb rarely becomes pregnant, the same applies to large fibrous tumors, and the smaller when located in the cavity of the womb. High altitudes will also produce an abortion, and it is asserted that in certain mountainous countries pregnant women descend to the valleys to escape the accident.

5. Medicines play an important rôle in the causation of this accident, such as active cathartics, laxatives and even emetics. The administration of quinine has been followed by miscarriage, although oftentimes it has been attributed to the disease and not to the medicine. But many of these drugs cannot be blamed for the accident, as there usually exists a tendency of some kind to a miscarriage.

6. The fœtus may be affected by the same diseases as the mother, which, if it should cause the death of the fœtus, will produce an abortion. Excessive distension of the womb due to plural pregnancy is apt to produce premature contractions of the womb, with a resulting miscarriage.

Symptoms.—1. There may be premonitory symptoms such as flushing of the face, alternate flushes, and of heat and chilliness, pain in the back, irritability of the bladder which may extend to the rectum.

The characteristic symptoms are hemorrhage and pains. These pains begin in the lower part of the abdomen and on both sides of the same, in the groin or just above it. As the condition progresses these pains extend to the back, and later on pass around to the front. The pains begin first, to be soon followed by a bloody discharge, or vice versa. Some cases have a gush of watery fluid early in the attack, which may be slightly discolored with blood; this discharge does not necessarily indicate rupture of the ovus and hence that miscarriage is inevitable, for it may occur from inflammatory diseases of the womb.

2. The flow of blood is very much greater than that which occurs

in menstruation; large clots are very apt to be passed, in which, if carefully sought for, the ovum may be found.

3. After seven or eight weeks of pregnancy the symptoms of abortion are quite plain. Prior to that time it may be mistaken for a case of painful menstruation.

4. If the pregnancy has advanced beyond three months the fœtus as a rule escapes first, soon to be followed by the afterbirth. If the afterbirth is not expelled the woman is liable to suffer from hemorrhages until it is removed. These hemorrhages may be so great as to cause a fatal result, providing the woman has not a physician in attendance.

Treatment.—1. If a woman is subject to repeated miscarriages she should exercise every care to place herself in the best surroundings during each pregnancy. At the regular time each monthly flow is expected she should remain in bed for a few days; this will give the body absolute rest and may tide her over to full time. If she has been in the habit of aborting at a special time, say the third or fourth month, when that period is reached she should go to bed several days before the time expected and remain there at least two weeks.

2. If the abortions are due to syphilis, a course of mercury and iodide of potash should be instituted. If due to a backward displacement of the womb, this should be corrected by placing the womb in its normal position and holding it there with a pessary, or by an operation if necessary. Sexual intercourse during pregnancy should be prohibited, as this is a very frequent cause of miscarriage.

3. When a pregnant woman feels pains in the lower part of the abdomen, soon followed by the discharge of blood, or sudden discharge of blood followed by pain, she has in all probability a threatened miscarriage. She should loosen all her clothing and lie down; her drinks should be cold; twenty drops of laudanum with half a teacupful of water should be injected into the rectum, or a half grain opium suppository may be inserted. If the symptoms are not abated in one hour the injection or suppository should be repeated, and again at the end of the second and third hours if needed. If the patient is very restless and nervous, twenty to thirty grains of chloral may be added to one of the opium injections; if such is done do not use warm water, but the yolk of an egg and some warm milk, in order to prevent the drug from irritating the bowel.

4. The opium may be continued from day to day as long as there is hope of arresting the abortion. Meantime once in two days the bowels should be opened by a warm water injection, or by a mild laxative.

Should the pain and hemorrhage cease it is better for the patient to remain in bed for three or four days after this cessation; when she gets up she should only gradually resume her usual habits of life, even then as an experiment, and be prepared to return to bed at the first recurrence of the former symptoms.

5. Unfortunately in the majority of cases the hemorrhages do not cease, or having stopped return, and the abortion is apparently inevitable, or the flow may be so great that it will be necessary to complete the abortion in order to save the life of the woman.

6. If the abortion is inevitable stop the bleeding and empty the womb. Hot water injections may be valuable to accomplish the former. If they do not suffice, then the vagina should be tightly packed with antiseptic gauze, antiseptic lamb's wool, or pieces of boiled linen or muslin. In order to hold the packing in place, a napkin should be tightly applied.

7. When an inevitable abortion is assured the physician may pack the vagina with tampons and allows them to remain for eighteen or twenty-four hours, and usually when removed the ovum (if it has not been previously expelled) and the afterbirth will be found forced out of the womb. If the afterbirth does not come away in twenty-four hours the woman should be placed under an anesthetic and the womb emptied of its contents. If not the discharge in a few days will have a very bad odor, and the patient develop blood poisoning.

Every woman who has a miscarriage should remain in bed at least ten days to two weeks after such an occurrence. The women who do not properly attend to this accident are the ones who later in after life pay the penalty, which either means chronic invalidism, or the removal of one or all of her pelvic organs, which may or may not result in death.

CONCEPTION.

Character.—A woman who has conceived is pregnant; pregnancy begins with conception and ends with labor, providing an abortion does not occur. It is normal when the uterine cavity contains the fecundated ovule or ovules; and abnormal, ectopic or extra-uterine, should it or they be outside of that cavity.

The Ovule or Egg.—Each month when menstruation occurs an egg or ovule, as it is called, escapes from the ovary. An ovule may come from the one ovary or from both, or two or more may come from the one, and so forth. Leading from the ovary into the cavity of the womb is a tube called the oviduct. When the egg or ovule drops from the ovary, it falls into the end of this tube, which by a wave-like motion conveys it to the cavity of the womb, where it remains until the next menstrual period, when it is carried off with the flow. A new one is then deposited. It is estimated that women during their menstrual age pass many thousands of ovules.

Twins.—If one ovule passes down and the woman becomes pregnant that month the result will be one baby; if there are two ovules and impregnation occurs, the result will be twins, and so on.

Ectopic Pregnancy.—On account of disease, or from other causes, the progress of the ovule or egg may become obstructed, then the egg or eggs will become lodged in the tube. Should it or they become impregnated while lodged in the tube, the pregnancy will be an extra-uterine or ectopic pregnancy.

How Pregnancy Occurs.—How does impregnation occur? When the male has intercourse with the female the semen of the male is deposited in the vagina of the female in such a position as to "bathe" the neck of the womb. The heat of the parts causes this gelatinous seminal discharge to liquefy. The semen is merely a solution to convey the spermatozoids. The spermatozoid is composed of a head, of a tail and of an intermediate segment, sometimes called the body. The entire length of the human spermatozoid is not more than 1-500 to 1-325 of an inch. The spermatozoids have an eel-like motion, the tail being the motile power. The spermatozoids move along until one of them comes in contact with the ovule, the head then enters the latter, and the tail drops off. Conception then occurs. Although there are thousands of the spermatozoids in each seminal discharge, it only requires one to fecundate the ovule.

Movement of Spermatozoids.—Their rate of movement varies. It has been estimated about three inches in three hours. They have been found alive in men who have been executed seventy and even seventy-two hours after death. In the human female they were found endowed with active movements in the neck of the womb seven or eight days after coition. In temperate climates boys of twelve years may have discharges simulating the seminal fluid, but it is unusual for spermatozoids to be found in these discharges before they are fifteen or sixteen years old. One careful investigator claims that about one-half of men between sixty and eighty years of age are capable of fecundation.

STERILITY.

Causes.—1. When a woman is unable to become pregnant she is said to be sterile or barren. At least one marriage out of every eight is childless. It is commonly believed that the fault is always, or nearly always, to be found in the wife, but modern investigation has shown that the husband is at fault in about one case out of every six. When the male is at fault it may be due to impotence, which is an inability to perform the sexual act to aspermatism, although he may succeed in getting an erection he may be unable to have an ejaculation of semen; or to zoospermia, the condition in which the ejaculated semen does not contain spermatozoids, and, therefore, has no fertilizing power. Or again the testicles may be improperly developed.

2. If the female is at fault it may be due to the absence of the ova. In chronic inflammatory diseases of the ovaries the ovule may disappear, or the end of the oviduct may become closed. If such be the case, the egg will drop into the general peritoneal cavity and be absorbed. Another cause is incapacity for sexual intercourse, such as absence of the female organs of intercourse, inflammatory diseases and tumors of the vulva and vagina. If the perineum is badly torn the seminal fluid will flow out, a cause of sterility.

3. A frequent cause is a very small opening in the neck of the womb, which is not sufficiently large to permit the spermatozoids to enter, and is termed stenosis. This should be dilated and is curable.

Treatment.—If due to inflammatory disease resort to the remedies described for the various inflammations of the generative organs.

If the end of the oviduct is occluded, and tumors are present, or should the perineum be badly torn, or a small opening in the neck of the womb be the cause, then an appropriate operation will be the only procedure which will tend toward future conception.

Lack of Orgasm.—A condition for which a physician is frequently consulted is lack of the normal feeling of the highest sexual excitement, called orgasm. With such the fault is probably due to some imperfection in the nervous system. The lack of orgasm may be found in otherwise healthy women, and not a barrier to conception.

In those who have never experienced the orgasm it is often incurable. With others the use of tonics, or pill cannabin comp. or comp. damiana will be found effective.

UTERINE PREGNANCY.

Nature's Most Wonderful Miracle.—It has been well said that every pregnant woman should be looked upon as a laboratory in which nature is performing that most wonderful of all her miracles, the fashioning of a new human being, and that nothing should be allowed in any way to disturb or derange this most important operation. Could such an idea be constantly kept in mind not only by mothers themselves, but by all those who surround or even momentarily approach the female who is performing the most sublime duty of her sex, that of continuing the race, and every effort made to aid her in accomplishing this great function in the most perfect manner possible, what vast improvements might be looked for, even in the next generation of mankind.

First Indication of Pregnancy.—The first indication of pregnancy is generally the stoppage of the monthly periods, and it is also one of the most reliable of the early indications. It should be remembered, however, that there is no certain sign of pregnancy, none which has not been found to fail, and lead into errors which were profoundly mortifying, if not worse, up to the time when the heart of the infant can be heard to beat through the walls of the mother's abdomen. This beat of the child's heart can seldom be positively identified before the fifth month, and often not until the sixth.

Failure of Signs.—In some instances pregnancy may occur and yet the monthly flow continue. This is quite common for one or two months, and less frequent for four or five. In fact, some mothers assert that the first intimation they had of being pregnant was quickening or feeling the motion of the child, which generally makes itself evident about four and a half months from the date of conception.

The Morning Sickness.—Morning sickness occurs with most females for the first few months of pregnancy, and some females when pregnant suffer intensely from it. It usually comes on whilst dressing, not being felt on first getting up, and when not very severe often passes off later in the day to recur, however, the next morning. It differs from other forms of sickness, such as those which are due to disease of the stomach itself, in that as soon as the vomiting is over the patient is often perfectly well again, and can take food immediately afterward. The sensitiveness of the stomach to odors and flavors, and the peculiar ease with which feelings of nausea are brought on by such impressions is a very significant sign, and rarely fails, if supported by the other usual symptoms, to indicate pregnancy when it is well marked.

Changes in Mammary Gland.—Changes which occur in the mammary glands are valuable corroborative signs. They consist in the enlargement and puffiness of the nipple, the darkening and increase of size of the areola, and occasionally the secretion of milk. These indications show themselves during the second and third months.

Quickening Period.—Quickening is the feeling of the movements of the child, which is so constantly noticed by the mother about the end of four and a half months, or just half way through the pregnancy, that it often helps to fix the time of the approaching confinement. The first sensation is described as being like the fluttering of a bird, or the creeping of an insect, but after a few weeks it becomes progressively more decided, and more perceptibly like the struggles of an infant with human arms and legs. The popular idea that up to the time of quickening the child in the womb is not alive is, of course, totally erroneous, because if the infant was not living from the very day of conception it would not grow and develop. It is only felt primarily at this period because before the date of quickening its struggles have been too feeble and made too deeply in the cavity of the abdomen to be perceptible.

Changes in Abdomen.—In the early months of pregnancy the abdomen is often even flatter than in the unimpregnated female, but after the period of quickening enlargement occurs, and in the latter months becomes so great as to cause, in many instances, a good deal of distress by mere pressure, distension and weight. The stretching of the skin necessary to render it capable of covering the uterine tumor generally gives rise to numerous cracks in its surface, which remain as whitish scars through after life.

Changes in Disposition.—Changes in temper and disposition, longings for strange and unsuitable food, drowsiness, toothache, heartburn, palpitation of the heart, and so forth, are less constant and therefore less reliable symptoms of pregnancy, some of which, however, occur in a large proportion of the cases.

Duration of Pregnancy.—This average date is usually considered for the fruit of the womb two hundred and eighty days, or forty weeks, or a week over nine calendar months, from the day of the cessation of the menstrual discharge when last seen at the commencement of pregnancy. In order to be able to make this calculation accurately it is a good plan for every married woman to keep upon a calendar a regular account of the

OVARY AND MAMMARY GLAND

Figure No. 1.—The ovary, showing the vesicular bursted and the large grums which fills its cavity.

Figure No. 2.—Change in the breast from pregnancy.
A. Nipple.
B. Sebaceous tubercles.
C. Spots in the branded areola.
D. Marks due to the enlargement of the skin.

Figure No. 3.—Lobes of a mammary gland.
A. Acinos.
B. Canaliculi or small canals.
C. Conduit formed by several small canals.

Figure No. 4.—Mammary gland.

Figure No. 5.—Mammary gland in a woman.
a. Nipple.
b. Areola.
c, c, c, c, c. The gland lobes.
1. Breast or enlarged part of one of the conduits which carry milk.
2. Extremities of the conduits which carry milk.

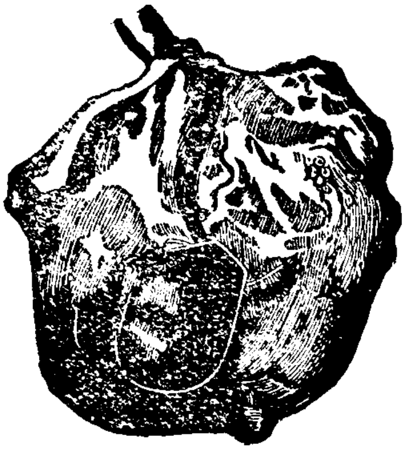


Figure No. 1.

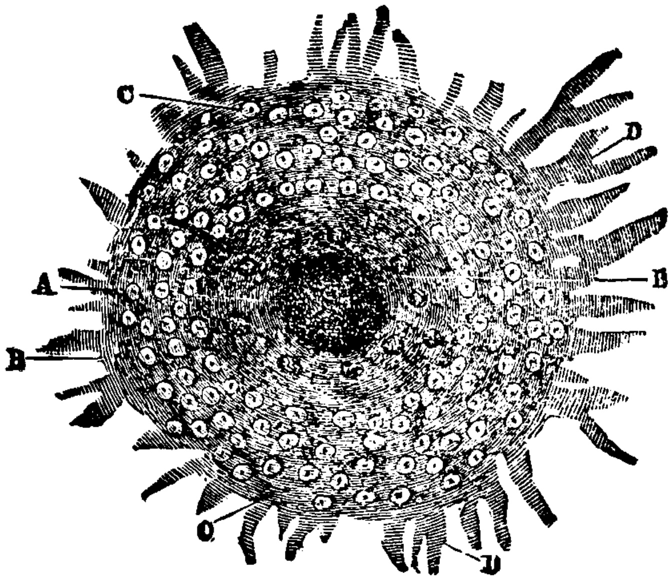


Figure No. 2.

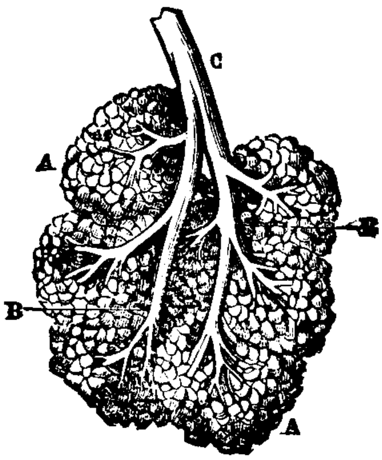


Figure No. 3.

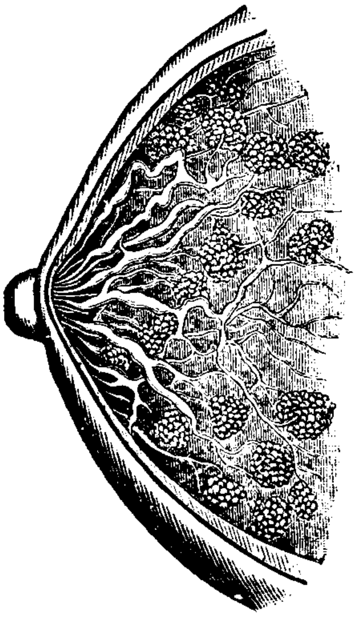


Figure No. 4

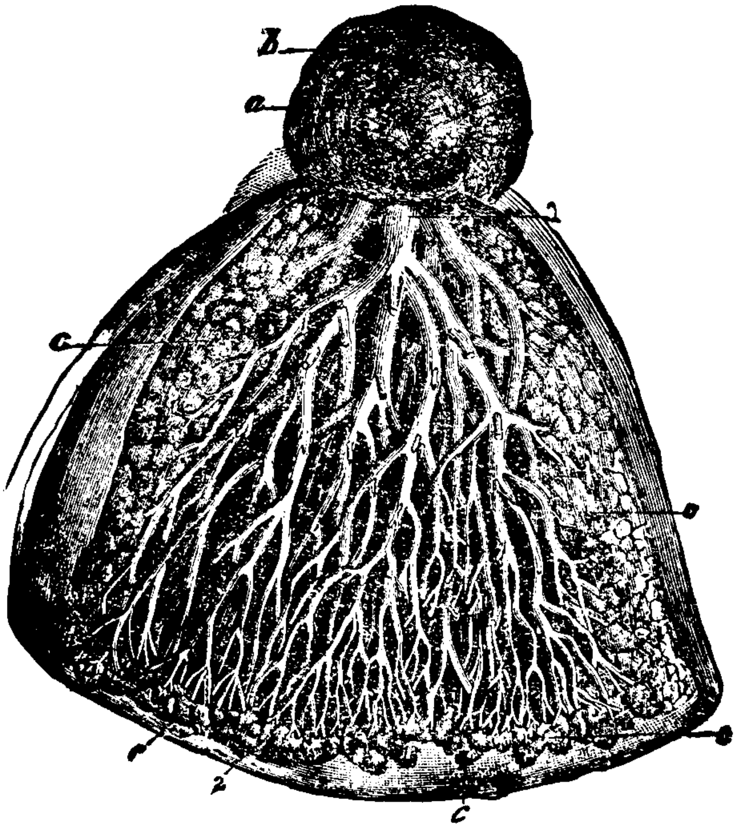


Figure No. 5.

OVARY AND MAMMARY GLAND

For an explanation of the illustrations see text on opposite page

day in each month when she ceases to be unwell, so that if at any time before the next period impregnation should occur, she may have at hand the precise datum upon which to base her preparations. The date of quickening, when that is a prominent symptom, as is the case in most pregnancies, ought also to be carefully noted.

Pregnancy Table.—The table given below is one which will prove reasonably accurate:

Jan	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Oct.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	*Nov.*
Feb.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				
Nov.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5				*Dec.*
March	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Dec.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	*Jan.*
April	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Jan.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4		*Feb.*
May	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Feb.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	1	2	3	4	5	6	7	*March*
June	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
March	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6		*April*
July	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
April	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	*May*
Aug.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	*June*
Sept.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
June	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7		*July*
Oct.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
July	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	*Aug.*
Nov.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Aug.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6		*Sept.*
Dec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Sept.	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	*Oct.*

Explanation.—Find in the top line the date of the last menstruation the figure below will indicate the date when the confinement may be expected. If the date of menstruation is April 8, then the date of expected confinement will be January 13.

Care During Pregnancy.—The pregnant woman should ask herself, before making even a trivial variation from habits of life, which have been proved by experience conducive to her individual health, "can this change produce any injurious effect upon the future, mental or physical, of my darling baby?" and unless the answer is unequivocally in the negative, it is her duty to refrain from incurring unknown risks by alteration of diet, exercise, sleep, clothing, and so forth, which, previous experience has taught her, contribute most effectually to the preservation of her perfect sanitary condition.

Food During Pregnancy.—The amount of food taken into the system during the early period of pregnancy, as intimated by nature in the broad hint of morning sickness, should be rather less and of a more easily digested quality than at ordinary times. But in the latter months, when the infant is rapidly developing and material must be supplied for muscles and bones in abundance, the quantity of aliment should be largely increased. It is better, however, to eat more frequently than to run any risk of over-loading the stomach at such time.

Exercise.—The amount of exercise should also be ample, since this is vitally important for the proper assimilation of food into the blood, whence it is transferred to the fœtus in the womb, and contributes, of course, every atom of the material composing the little body. Care must be taken, however, to avoid violent exercise of any kind for fear of bringing on abortion with all its dangers to the mother, and in the earlier months with certain destruction to the child.

Child Blemishes.—As regards the production of blemishes and deformities in the infant by mental impressions of the mother during pregnancy, there is a large amount of evidence that such an effect is produced, although many of the stories of such occurrences are grossly exaggerated or totally without foundation. At the same time a calm and equable frame of mind is greatly to be desired during the whole period, and anything which is likely to operate in the direction of causing mental shock, depression or excitement should be scrupulously avoided.

Vomiting.—1. Among the diseases of pregnancy are excessive vomiting, which may be treated with tablespoonful doses of lime-water, iced carbonic acid water, or iced champagne, ginger, bismuth, hydrocyanic acid, and two-grain doses of oxalate of cerium; heartburn, from which half a teaspoonful of bicarbonate of soda or ten drops of aromatic spirits of ammonia affords relief.

2. If the nausea is due to a prolapsed or backward displaced womb, the condition will be relieved by replacing the womb and inserting a lamb's wool tampon. A method which often suffices is to give the mother a cup of hot tea and a cracker about an hour before she arises.

The following prescriptions are advocated:

Tincture of nux vomica	2	drachms
Hydrochloric acid	½	ounce
Essence of pepsin	3	ounces

Teaspoonful after each meal and at bed-time.

Bismuth subnitrate	2 drachms
Tincture of nux vomica	10 drops

Make into ten powders. One powder every hour.

Carbolic acid or creosote	10 drops
Subnitrate of bismuth	2 drachms

Make into ten powders. One every two hours.

Excessive Vomiting, Treatment of.—The nausea and vomiting may be so pronounced as to be uncontrollable and is then called the hyperemesis of pregnancy. When this exists nothing will remain on the stomach, and the woman rapidly loses flesh and becomes very much exhausted. When blood appears in the vomited matter of these cases the termination, as a rule, is unfavorable.

The treatment consists of emptying the womb, in other words, producing an abortion, and is one of the exceedingly few reasons for which a physician is justified in producing an abortion.

Constipation, Treatment of the.—Constipation, which must be meddled with very cautiously by the aid of mild saline laxatives, such as a teaspoonful of rochelle salt, a dessertspoonful of castor oil, or injections of soap and water; and piles, the discomfort of which can be palliated only by the use of some such ointment as that already recommended, or daily doses of cascara.

Toothache, Treatment of the.—If toothache comes on care must be taken that sound teeth are not extracted in the vain hope of relieving it. When teeth decay rapidly in pregnancy it seems sometimes to be due to the removal of the bony materials for the purpose of building up the skeleton of the fœtus, and efforts should be made by supplying the lime salts as phosphates or hypophosphites mixed with the food to remedy the difficulty. Finely powdered bones have been shrewdly recommended.

Enlarged Veins, Treatment of the.—Enlargement of the veins of the legs should be treated by bandages or elastic stockings, and dropsy of the feet and ankles should lead to an immediate examination of the urine, lest some tendency to albuminuria may be threatening.

Bladder, Treatment of the.—Irritation about the bladder, perhaps with incontinence and retention, occasion much inconvenience, but can often be relieved by gentle laxatives and diuretics, such as the cream of tartar, or, if very troublesome, by a belladonna and opium suppository. The patient should, however, be guarded against the possibility of becoming fond of the action of anodynes, especially opium or chloral, at this trying time.

LABOR.

Definition.—Labor is the end of pregnancy, and may be defined as the process by which the fœtus and the afterbirth are separated from the mother. Nature's design being the continuance of the race, the fœtus must have reached such development before its expulsion that it is viable;

that is, capable of living external to the mother. If, therefore, the product of conception be expelled before such capability, the process is not called labor, but abortion or miscarriage.

Premature Labor.—Should labor occur in the seventh or eighth month it is called premature, because the fœtus has not attained its perfect development; if labor be delayed beyond nine months it is called postponed, if the fœtus be alive, but missed if it be dead.

Parturition.—Parturition is a term very often used instead of labor. When parturition occurs, with the efforts of the womb and the woman alone, it is called natural; but if it is necessary to render aid, usually by the application of forceps, it is called an artificial or instrumental labor. In order that a labor may be natural the fœtus must not exceed the normal size and the presentation must be normal, also the passageway and the muscular forces required to cause the expulsion of the passenger.

Duration of Labor.—This varies with race, place, climate, manner of living, hereditary, physical conformation, whether first or subsequent labor, and with the sex, presentation and position of the child. Labor is shorter in warm than in cold climates, in savage than in civilized races, in women in the country accustomed to plain food, outdoor exercises and regular habits, than in those leading opposite lives in the city. In the primipara (a woman who is having her first baby) it is longer than in the multipara (a woman who has had more than one child); it is also longer when the face or buttocks come first instead of the head, and with male than female children.

Labor with First Child.—As a rule the primipara is in labor fifteen to twenty hours; the multipara six to eight hours. If the primipara is thirty-five years old and more, labor may be prolonged for twenty-one to twenty-seven hours; above forty-one years labor is very apt to be thirty-three hours.

Duration of Second Stage.—The second stage of labor is generally one-third that of the first stage. The majority of labors begin between 9 and 12 P. M., and end between 9 P. M. and 9 A. M.

Birth Presentation.—The presentation of the child varies. By far the greater majority of the children are born head first. The child may present by the head, buttocks (when it is called a breech), face and either shoulder. The vertex or head may demand forceps application at times, especially if at the expiration of any hour during the second stage it fails to progress. Should the face present, the physician will endeavor to push it up and change it to a vertex, otherwise it will be necessary to apply forceps. Such a child will have a blackened face, which discoloration at the end of a week or ten days will disappear.

Buttock Presentation.—If the buttocks present, more or less difficulty will occur, and it may be necessary to apply force to the after-coming head.

Shoulder Presentation.—A shoulder presentation will require an entire change of the position of the child, as this is an impossible labor. As a rule both feet are brought down first, the head being born last.

Preparations for Labor.—The lying-in chamber should be large enough for suitable ventilation, and yet not so large as to be with difficulty heated. Every precaution to secure for the invalid a full supply of unpolluted air should be instituted, and conveniences for affording hot water at short notice are of importance. The bed should be a hair or spring mattress, which ought to be covered with some waterproof material; over this a thick, old spread, newspapers or comfortable, to absorb the blood and other discharges, should be laid, and this again covered with a sheet. The remaining bed-covering must be arranged according to the season of the year. In this room should be collected all the clothing which will be needed for the comfort of the mother and expected infant, and besides the articles of every-day use there should be provided a strong sheet, which can be tied around the post at the foot of the bed, for the patient to pull upon during her pains, a firm cushion for her to press her feet against if she so desires, an abundant supply of towels, plenty of soap and warm water, a pound or so of lard free from salt, a few yards of flannel, a soft, warm shawl or small blanket to receive the baby in before it is washed, sharp-edged but blunt-pointed scissors to cut the cord or navel string, eight yards of coarse sewing cotton doubled eight times and knotted at the two ends for tying the cord, a binder of strong new muslin about a yard and a half in length and half a yard wide, or larger if needful, and a paper of large, strong safety pins for fastening the same around the invalid's abdomen after she is delivered.

The Mother's Dress.—The dress of the patient should be the usual chemise and night-dress rolled up around her waist, so as to keep them from being soiled, and a sheet folded in four and pinned around her limbs as a skirt, fastening it at the right side so that it can easily be unpinned and slipped down out of the way when the labor is completed.

Stages of Labor.—Labor, parturition or confinement, is divided into three stages. The first consists in the dilation of the mouth of the womb, sufficiently large to permit the fœtus to escape. The second constitutes the birth of the child. The third is the expulsion of the placenta or after-birth.

First Stage of Labor.—During the first stage of labor the patient may walk around the room, sit up in a chair or lie upon a lounge, as is most agreeable to her, but when the mouth of the uterus is dilated to the size of a silver half-dollar she should take her position upon her left side, with her hips near the edge of the bed, and about a foot lower down than she is accustomed to lying. In this posture the medical attendant can best aid her in her trial until toward the end of the process, when some advantage is often gained by placing the patient upon her back.

Preparing the Nipples.—Preparation of the nipples should be made by washing them with strong green tea, or solution of a drachm of tannin in two ounces of cologne water, twice daily for three weeks before confinement, in order to harden the skin and render it less liable to crack and become sore whilst nursing.

Period of Actual Labor.—The period of actual labor is generally ushered in with slight griping pains in the abdomen, and more or less aching in the back, which come on at first, perhaps, at intervals of half an hour, lasting for a minute at a time; then at intervals of ten or fifteen minutes, and so on until they grow severe and the space of respite between them dwindles to five, four or even three minutes.

Pains and Length of First Stage.—In the first stage of labor the pains have a cutting or tearing character, and are commonly felt in the stomach, or lower part of the abdomen, and also in the back. They are accompanied by a frequent desire to pass water, produced by the pressure of the child's head upon the urinary bladder as it descends, and often by a disposition to evacuate the bowels, from a similar cause. Pressure of the head likewise frequently produces severe cramps in the legs, which may be partly relieved by friction, but often disappears as the labor progresses. The duration of this stage varies greatly, but in a labor of twelve hours' duration, the usual proportion would probably be ten hours in the first stage, an hour and three-quarters in the second stage, and fifteen minutes in the third.

Pains of Second Labor.—In the second stage of labor the character of the pains and the expulsive efforts which accompany them is changed. They now become what are commonly called bearing-down pains, in which the patient almost instinctively endeavors to aid the contractions of the uterus in its efforts to empty itself, by straining as if at stool; and, indeed, should she seem reluctant to yield to this disposition, she ought to be instructed to bear down exactly as if her bowels were being moved whilst constipated. The cries emitted are generally more like prolonged grunts, and can be readily recognized at a considerable distance by one who is familiar with their peculiarities. After a continuance of these pains for one, two or more hours the child's head, if that comes first, as happens in probably nineteen out of every twenty cases, begins to press upon the external parts or vulva, and finally, with an unusually forcible pain, often with a piercing cry from the mother, her baby's head emerges into the world. As a rule, the next pain expels the shoulders and hips, the rest of the body offering little resistance to the expulsive efforts of the womb after the head is born.

Third Stage of Labor.—The third stage, consisting in the delivery of the placenta, is usually attended with one or two slight pains, by which the afterbirth is forced out of the womb into the vagina, whence it must usually be removed by the medical attendant.

Although in the majority of cases any intelligent person could successfully manage a case of labor, there are numerous accidents, malpositions and complications, which may occur without any warning in any particular case, so that if skilled medical assistance can possibly be procured it should by all means be sent for. The man or woman who neglects this runs a terrible risk of being the murderer of the mother or of the child, perhaps of both.

Duty of Midwife.—But if no qualified physician is procurable, the acting midwife should from time to time, say every ten minutes during the second stage of labor, anoint the vulva or external parts of generation of the patient freely with lard, at the same time examining very gently, with the finger, what progress is being made in the descent of the head, supposing, as is usually the case, that forms the presenting part, as this too frequently causes puerperal sepsis, which see.

The Delivery.—The moment the head is born the finger should be repassed in around the infant's neck, so as to find out whether the navel-string is wound around it, as not unfrequently happens. If such is the case, the cord should be pulled down a little, and the mother urged to bear down for the child's sake, as rapidly as possible, and complete the birth; when the cord must be immediately loosened and slipped over the baby's head to save it from strangulation. At the same moment the head of the child comes into the world the midwife's other hand should be placed upon the lower portion of the mother's abdomen, and the uterus pressed upon gently.

Treating the Womb.—As the body of the child is born the uterus should contract to the size of a ball, apparently about five inches in diameter, and if this does not take place, the womb should be firmly grasped through the walls of the abdomen, in the hand, and so stimulated to due contraction. This is very important, because, if it does not occur promptly the patient may bleed to death in a very few minutes.

Attending the Child.—As soon as the womb is found to be properly contracted into this hard ball, attention should be turned to the child. If it cries at once, the cord may be immediately tied an inch and a half from its attachment to the infant, with the sewing-cotton already provided, and then cut half an inch above this again, that is, half an inch further away from the child, squarely off. The baby is then to be lifted up, with both hands clasped around its body, for it is very slippery, and received by an attendant in the flannel or old blanket, which has also been prepared. The attendant ought either to hold it until the labor is completed, or to place it on its left side, in some safe situation, preferably in its cradle or crib, not in an armchair, where it may be crushed to death by being sat upon.

Expelling the Afterbirth.—During this time the midwife should keep her hand upon the patient's abdomen, gently pressing and kneading the womb occasionally, in order to promote the recurrence of a contraction, strong enough to expel the placenta. As long as the afterbirth remains the woman is not safe from dangerous or fatal flooding; but whilst the uterus continues firmly contracted, and feels like a hard ball under the fingers of the midwife, there is but little danger. After five or ten minutes, if slight pains come on, the mother should bear down a little, and the cord be gently pulled upon, when, in many instances, the placenta comes away. As it reaches the vulva, the patient should be told to cease her efforts, and the midwife should twist the afterbirth round and round on itself, eighteen or twenty times, gradually withdrawing it at the same moment. This is to wind the membranes, or bag which held the water into a string, if possible, inside the vagina, and perhaps the uterus, so that they may all come away with the placenta in safety. The mass, when removed, should be laid away for subsequent careful examination, in order to determine whether any part has been left in the mother, as the effects of such an accident are much to be dreaded.

Contracting the Womb.—The attention of the midwife should, however, immediately return to the mother, and her hand at once applied again over the abdomen, when the womb ought to be felt as a ball of some three and a half inches in diameter, or about the size of the new-born baby's head, and even harder than before. If not so felt, firm pressure and friction over the abdomen must be made to induce it to contract. Should it not do so within a minute or two the midwife must introduce her hand up the vagina into the cavity of the womb, under strictly antiseptic precautions, and pulling out the clots of blood she will probably find there, strive again to excite the womb to its proper contraction.

To Prevent Flooding.—Should these efforts prove unavailing, not a moment is to be lost, for the next five minutes will perhaps cost the patient her life by flooding. Let, therefore, a piece of ice, a sponge dipped in vinegar, or a peeled and gashed lemon, be carried up with one hand and rubbed around inside of the womb, whilst the other hand of the midwife, by firm pressure and friction over the patient's abdomen, contributes to stimulate that uterine contraction in which lies the mother's only safety. Or a teaspoonful of ergot, repeated in fifteen to twenty minutes. As soon as this is accomplished, as it probably will be by these remedies, a tight bandage should be pinned around the patient's body, with two or three folded napkins beneath it, pressing upon the part of the abdomen over the womb, to prevent relaxation, which happily seldom occurs when thus treated.

Making the Mother Comfortable.—After being securely bandaged, the patient may be lifted up a little, out of the wettest part of the bed, if it can be done without any effort on her part; but for fear of flooding, the more quiet the parturient is kept for the first two hours after labor, or until the blood has had time to clot firmly in the large, open-mouthed veins of the uterine cavity, the less is her danger. When the patient is made as comfortable as possible, a clean napkin, loosely folded, is to be placed between the thighs, but not pressed up tightly against the vulva, lest it act as a plug and prevent the detection of flooding, should that come on.

Should the Child Not Cry.—In case the child does not cry when first born, its mouth should be carefully cleared of mucus and other obstruction, and a little cold water sprinkled upon its breast. Should this fail in rousing a gasping effort at breathing, the baby, still attached to the cord, if that is pulsating, should be put into a basin of very warm water, and after a minute or two, when the surface of its body is well heated, the dash of cold water over its face and breast again tried. If still unsuccessful, the baby should be wrapped up in hot flannels, and artificial respiration, by blowing into the mouth whilst the nostrils are held, and then forcing the air out by compressing the chest, attempted as a forlorn hope.

The writer has found the results of dry heat, applied by cautious roasting before a fire, promising enough to warrant further employment in otherwise hopeless cases.

Baby's First Bath.—If, on the contrary, the child cries lustily, and the mother is doing as well as can be expected, the cord should be again examined to verify the fact of its being securely ligated, and the baby given its first bath. The infant should be rubbed all over with lard, to soften the *vernix caseosa* or cheesy matter with which it is more or less covered, then well washed with white castile soap and milk-warm water and thoroughly dried.

Dressing the Navel.—The cord is dressed by being drawn through a hole cut in the middle of a piece of soft old linen, folded once, and trimmed to four inches square, and after being wrapped in this is laid upward on the baby's stomach, and bound in place by a belly-band of silver flannel, fitted snugly but not too tight, and secured by safety pins or a few stitches, or the cord can be dressed in absorbent cotton and freely covered with boric acid.

Of the Wrong Presentations.—The management of labor when the back of the head does not come down first, and especially when the buttocks, feet, or arms present, is so apt to be difficult and dangerous that a physician ought always to be summoned, even from a great distance and at the utmost inconvenience, should any signs of a "cross-birth," as it is popularly called, be detected, or should unusual delay in delivery render obstruction probable. It will sometimes be a comfort to a woman in labor who is anxiously awaiting the physician's arrival to be reminded that if the birth comes before the doctor it will be because everything is all right, whilst, on the contrary, if there be anything wrong, the physician will usually have ample time to reach her before his services are actually needed.

After-Management of Labor.—The management after labor should be such as will best avoid any excitement, either mental or physical, liable to light up inflammatory action in the womb, which has just been the subject to such momentous change. The patient, in ordinary cases, ought to remain in bed until the twelfth or the fourteenth day, partaking of semi-solid food until the third day, when the bowels should be moved. For this purpose she may be given a bottle of the citrate of magnesia in two doses, one-half hour apart, salts or an enema. After the bowels have been thoroughly moved, solid food should be given. She should not receive company for at least three days, but devote all her energies to the task of recovering as speedily as possible, both on her own account and for the sake of the frail, new life so utterly dependent upon her care.

PUERPERAL CONDITIONS.

Character.—The puerperium, or the puerperal stage, is the two weeks following the birth of the child. It begins immediately upon the expulsion of the placenta.

Among the conditions of the puerperal state may be mentioned after-pains, which, though seldom troublesome subsequent to first deliveries, may in others cause more suffering than the labor itself.

After-Pains.—They can, however, be greatly relieved by the use of ergot just as delivery is accomplished, and of one-half grain opium suppositories, or forty-drop laudanum injections, or a Dover's powder, in two or three hours if they persist.

Sore Nipples.—Soreness of the nipples and cracked nipples are very apt to come on in patients with tender skins from the constant irritation of the baby's gums in nursing, and are unfortunately very difficult to heal, because the same irritation which originated the trouble in the first place is continually kept up.

Treatment of Nipples.—Vaseline, zinc ointment, laudanum and nitrate of silver sometimes succeed in curing the sore, but the most successful plan is to use a wooden shield with a rubber nipple if the baby can be persuaded to consent to the innovation. Women who suffer in succeeding pregnancies from this condition may do much to prevent its recurrence. About three months prior to the expected date of confinement, rub the nipples night and morning with cocoa butter and expose them several hours daily in the sunlight. Before and after nursing the nipples of the mother and the mouth of the baby should be washed with a solution of a teaspoonful of boric or boracic acid in a tumblerful of water. The nipples should be thoroughly dried.

Danger of Cracked Nipples.—The great danger of cracked nipples is that it may lead to abscess of the mammary glands (the so-called gathered breasts).

CHILD-BED FEVER OR PUERPERAL FEVER.

Character.—Puerperal fever is a very dangerous disease, which is invariably due to a lack of antiseptics. All cloth or napkins that come in contact with the vulva of the woman which have not been boiled, the hands of those attending to her unless thoroughly washed, all instruments used unless rendered aseptic will carry dirt of some kind, giving rise to this condition, which, practically speaking, is blood poisoning.

It generally comes on or about the third to the fourth day after delivery with a violent chill, great thirst and extreme prostration.

Symptoms.—The uterine discharge, or lochia, which should persist for ten days to two weeks, becomes very foul, the odor of which is nauseating, or it quickly dries up.

The fever may run very high, and diarrhœa with obstinate vomiting may set in. The mind soon grows clouded, if the attack be a severe one, muttering delirium makes its appearance, and the patient often dies on the third to the seventh day of the attack in a condition similar to that observed in typhus fever.

Treatment.—A large majority of the cases prove fatal, but full doses of twenty to thirty grains of quinine, with one-thirtieth grain of strychnine sulphate every two to three hours, succeeds in saving a small proportion of the cases. If an abscess forms, be it in the pelvis or elsewhere, it should be incised and drained. Cold sponge baths every two or three hours will reduce the fever, and an ice bag to the head will oftentimes prevent brain complications. Injections of bichloride of mercury should be used once or twice a day.

Puerperal Mania.—This is a form of insanity liable to come on a week or ten days after confinement, in which there is frequently a singular aversion to the child, and perhaps to the husband also. A tendency to suicide is also prominent, and patients thus affected should be watched with the most unremitting care Under perfect rest, nourishing diet, moderate stimulation and sedatives persons generally recover.

Puerperal Convulsions.—These may come on before or during labor, as well as in the month following delivery. They are generally due to accumulation of urea in the blood, the consequence of temporary Bright's disease, resulting probably from the pressure of the uterus containing the fœtus upon the kidneys. The treatment has already been pointed out under the head of uremia.

Milk-Leg.—This is an inflammation of the lymphatics of the limb, coming on especially toward the end of the second week after labor and deriving its name from the milk-white appearance usually presented by the skin of the affected part. As the febrile state of the system is apt to cause drying up of the milk, it was formerly supposed that in some mysterious way the lacteal fluid was transferred to the leg. At first it may be quite painful, but after the integument becomes accustomed to distension, the sensations are rather those of weight and discomfort than of positive suffering. The treatment is by laudanum or turpentine fomentation at first, and later with stimulating and anodyne liniments, which hasten a little the naturally tardy convalescence. The ordinary duration of the affection is from a month to six weeks.

MANAGEMENT OF THE INFANT.

Suckling the Baby.—After a baby has received its first bath, and been for the first time introduced to the mysteries and miseries of clothes, it should be put to the breast for the purpose of extracting whatever nourishment nature has there provided for it, and also as the commencement of its education in the art of nursing, a business upon which its life for some months will depend. Curiously enough whilst some children take hold of the breast as if by instinct, others must be taught to nurse, and show for this vital operation all the perverse unwillingness of Shakespeare's schoolboy, notwithstanding it is the one thing in the world they have to do.

Mother's Milk the Best.—Every mother ought, if possible, to suckle her own infant, not only for her own sake but for that of the child. Statistics show that babies nursed by their mothers, amid the unfavorable surroundings of prison life, thrive better than those who are brought up by hand in healthy country districts outside, and no woman in good health, who can furnish the nourishment, should be spared the reproach of risking the life and health of her offspring if she refuses to perform her maternal duties in this regard. A mother undertaking the suckling of her infant should, moreover, do so with a mind fully alive to its importance, and with a firm determination that no pleasures of society or of fashion shall interfere with its conscientious performance, or else she had better not attempt it at all.

Amount of Breast Milk.—The amount of milk contained in the breast, especially with the first child, is very small for two or three days, but in some forty-eight hours the rush of milk, as it is called by nurses, commences, and is often attended with some fever, and marked pain and soreness in the breasts. The remedy for this disturbance in the mother's system is, however, very simple and conveniently at hand, and as the child, which, if healthy and vigorous, generally has a good appetite, draws out the milk which nature has provided for its special benefit, all these uneasy sensations soon subside. If the coming in of the milk is unusually delayed, it may be necessary to give the baby a little cow's milk, well diluted and sweetened with sugar of milk; but this is seldom required.

Mothers to Avoid Excitement.—During the time a mother is nursing her infant every care should be used to avoid any violent mental excitement or shock, which is exceedingly apt to influence the secretion of the mammary glands to a certain extent, just as it does that of the lachrymal gland, and render the lacteal fluid temporarily unwholesome or poisonous to the infant; or it may completely suppress the secretion of milk, with very serious consequences to both the parent and her offspring.

The Wet Nurse.—If, for any reason, the mother is unwilling or unable to suckle her infant, the next best chance for the baby's life is to procure a good wet nurse. When such an alternative is adopted, great care should be exercised in selecting the foster-mother, and the physician's advice ought always to be obtained upon this important subject.

Bringing Up by Hand.—Should the mother fail to nurse her child, and no good wet nurse is procurable, the child must be brought up by hand, a species of manipulation which contributes, it is probable, more than anything else to swell the lists of infant mortality in most large cities, as well as to some extent in country districts. Although goat's milk is used occasionally in this country as an infant's food, practically the choice is narrowed down in most cases to cow's milk, and the great object should be to secure this from healthy animals, pure and free from all admixture, as pointed out in an earlier chapter upon milk as an article of diet, and in a perfectly fresh condition.

Testing the Milk.—All milk used for the feeding of young infants, especially in the summer, should be carefully tested, and particularly in regard to its acidity, with litmus paper. If found to be acid it ought to be at once rejected, and a sample of pure, sweet milk obtained.

Putting Baby to the Breast.—A new-born infant is not hungry, consequently it need not be put to the breast for three or four hours or more. This will also give the mother a chance to obtain a little needed rest. For the first twenty-four to thirty-six hours the baby should be put to the breast every four to six hours. The subsequent twenty-four hours about every three to four hours. About the third day or so, when the milk is well established, the baby should be nursed every two to three hours.

Time for Nursing.—Under no consideration nurse the baby between 11 P. M. and 5 to 6 A. M. If mothers would only institute this from the time of birth, both she and the baby will obtain a good night's sleep. Should the baby awaken, change its position, and give it a little water to drink, and invariably it will go off to sleep. Another bad practice is to give the baby the breast every time it cries, in order to quiet it. It should be conquered from the beginning, so do so.

Weaning the Child.—The time for weaning, generally about the age of nine months, should be determined partly by the growth of the teeth, presuming, of course, that the mother's health is not suffering in the meanwhile. When the first lower middle incisor teeth appear, which usually happens about the sixth or seventh month, the mother may begin to diminish the number of times for suckling more rapidly, at the same time replacing the breast milk, of which the infant is deprived, by cow's milk thickened with oatmeal, barley or wheet flour, and so forth. After the child has four teeth it should be weaned, although if the infant is feeble or the season unfavorable, the period of nursing may be extended a few months longer.

Dilution of Milk.—If the new-born baby is not nursed and fresh cow's milk is employed, it should at first be diluted with half its bulk of pure, tepid water, sweetened with a teaspoonful of sugar of milk to one-quarter of a pint of milk, and a few grains of salt. Condensed milk will not require sweetening, but should be freely diluted so as to resemble human milk in color. For the first month of a child's life it may be mixed in the proportion of one part of the condensed milk to ten or twelve of warm water.

Cleanliness of Nursing Bottle.—The most rigorous cleanliness of the nursing bottle and nipples must be insisted on, and under no consideration should the long rubber flexible tube apparatus be employed. It is an exceedingly dirty arrangement, as it cannot be properly cleaned. Simply use a very plain bottle, keeping the nipples in a soda solution.

Foods Other than Milk.—When a child does not seem to thrive well upon pure or diluted cow's milk, it has often been advised to resort speedily to mixtures of milk with meat broths, raw eggs, and so forth. Bretonneau reported, as early as 1818, that when children under his care who were suffering with tabes mesenterica, were fed with milk and meat broth, they rapidly improved, and other authorities recommend this mixture as the next best thing to woman's milk, or the malted milk can be tried.

EXTRA UTERINE PREGNANCY.

This constitutes a pregnancy occurring in the oviduct and not in the cavity of the womb.

Symptoms.—1. The woman will have all the symptoms of pregnancy. A pregnancy of this kind invariably follows a long period of sterility. The woman who has previously menstruated regularly will miss a period and consult a physician. If he examines her to ascertain the cause of the stoppage of the flow, and this variety of pregnancy is present, he will find the uterus very slightly enlarged and a mass to one side of it.

2. About four to eight weeks, as the fœtus continues to grow, the distended tube may rupture, or the contents may be expelled through the end of the tube (tubal abortion).

3. If the tubal abortion or rupture occurs, the woman will first notice a sudden, sharp, severe pain in the abdomen. This will be followed by fainting spells which may or may not end in death, due to the loss of blood.

Treatment.—If the condition is recognized prior to rupture, the woman should submit to an operation at once, before rupture takes place, which accident invariably terminates in death.

If the woman is not seen by a physician until rupture does occur she should be operated on at once, in order that the bleeding vessels may be tied. In a few rare cases nature checks the bleeding, which will be followed by a second rupture, usually with fatal results.

PART XI OF BOOK IV

Treats of the diseases of the skin, hair and nails.

ILLUSTRATIONS

CURATIVE MEDICINE

PART XI.

SKIN DISEASES

This class of affections embraces diseases of the skin, hair and nails, and therefore includes maladies which occasion much distress and deformity, but are seldom dangerous to life.

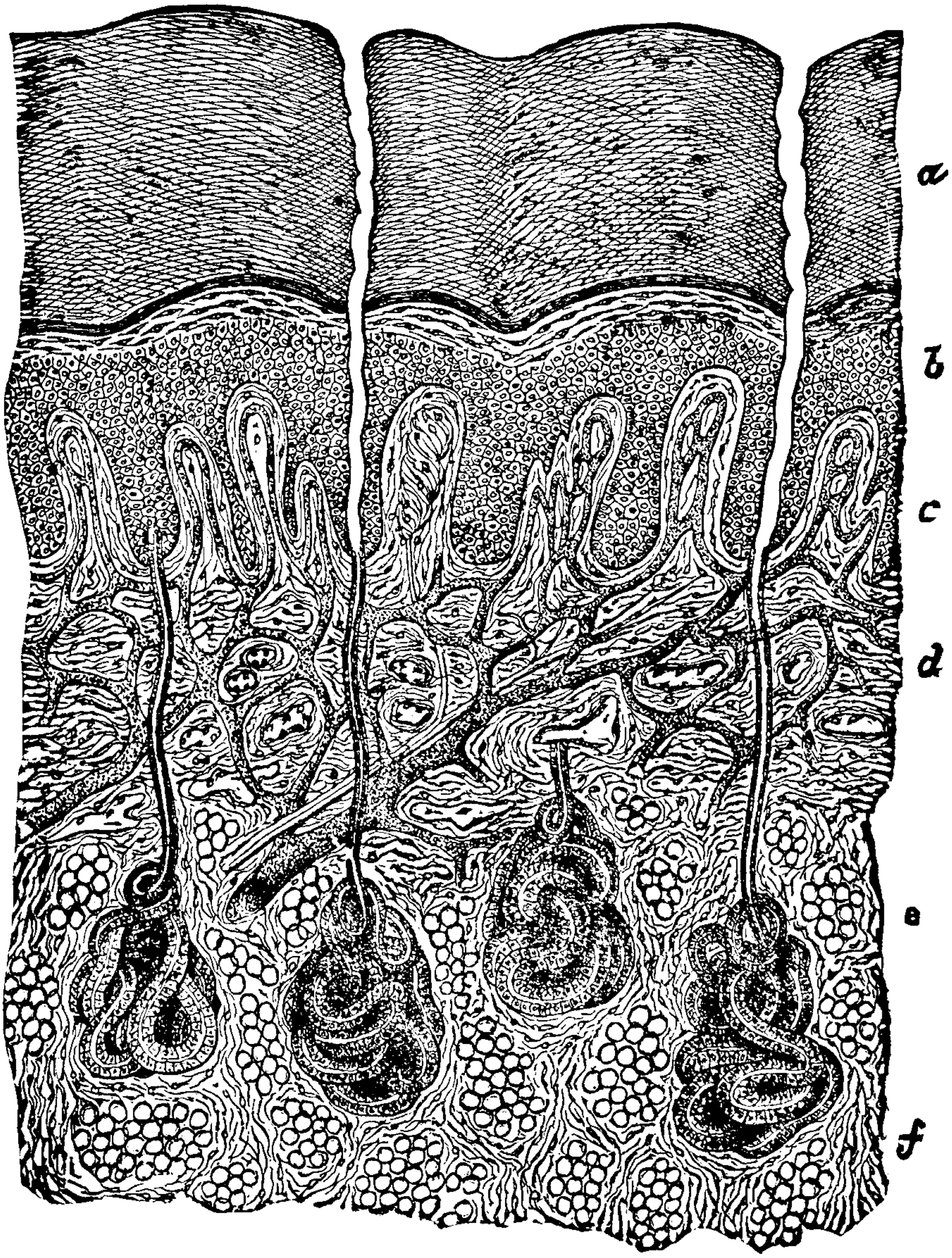
Classes of Skin Diseases.—Skin diseases are easily recognized, but there is sometimes difficulty in distinguishing between the different forms. They divide themselves thus:

1. Those of an eruptive (erythematous) character.
2. The catarrhal, in which the conditions resemble those belonging to inflammation of the mucous membrane.
3. The vesicular, which is composed of small blisters.
4. The pustular, made up of pustules or small boils, containing pus or matter.
5. The papular, in which pimples appear, containing neither water nor pus.
6. The scaly eruptions in which the affected parts are covered with dry, whitish layers of epithelial cells.
7. Skin diseases caused by animal or vegetable parasites, of which the itch is a remarkable illustration.

SKIN REDNESS (Erythema).

Symptoms.—Erythema is the name applied to the redness due to a superficial inflammation of the skin. It is the mildest form of skin disease, and is apt to affect fat people in hot weather. Infants are liable to be affected with it behind the joints.

Treatment.—See Nettle Rash.



THE SKIN

a. Epidermis or cuticle.
b. Dermis or true skin.
c. Nerve prolongations.
d. Blood-vessels.
e. Oil cells.
f. Glands.

NETTLE RASH (Urticaria).

Symptoms.—This is an eruptive affection which sometimes comes out quite suddenly, and is attended with a most troublesome itching. It is characterized by the formation of "wheals" or rounded patched of elevated skin, whiter than the surrounding parts, which are slightly reddened at the margins.

Causes.—It may arise from the bites or stings of insects; from the eating of certain fish, especially shellfish; or from reflex irritation, and other causes.

Treatment.—It is greatly aggravated by scratching, and, like simple erythema, is relieved by dusting with finely-powdered oxide of zinc and starch, with lycopodium, or even with rye flour. Lotions of lead water, benzoic acid and borax are also sometimes useful. Locally carbolic acid, two drachms; glycerine, two drachms; water, one pint. Small doses of calomel, followed by a saline.

MOIST TETTER OR ECZEMA.

Symptoms.—Eczema, sometimes called moist tetter, is a catarrhal inflammation of the skin usually attended with a breach of surface. It presents at first irritable, raw, red patches, with occasional little blisters which soon break and a fluid is discharged, which in drying forms crusts or scabs. Later on the patches become dry, scaly, and often cracked. This is a form of skin disease which is often seen in young infants, in whom it sometimes receives the name of milk-crust. The pain, burning and itching of eczema are intense, and yet it is only aggravated by scratching. It is especially apt to appear about the flexures of the joints, as, for example, in the hollows of the elbows and knees.

Treatment.—Many formulas have been recommended and used for this prevalent condition. Stimulation of the skin is of great importance, and various drugs have been used for that purpose, such as resorcin, tar, camphor, etc. The following have been recommended by various specialists on the disease:

R.—Camphor	1 drachm
Oleate zinc	2 drachms
Powd. starch	1 ounce

Use freely as a dusting powder.

R.—Acid boric	2 drachms
Acid carbolic	½ drachm
Glycerine	½ drachm
Water	1 pint

Apply twice a day.

Resorcin	½ drachm
Bismuth subnitrate	2 drachms
Glycerine	2 drachms
Lime water	4 ounces

Apply two or three times daily.

Some cases do better with an ointment, when the following may be applied:

R.—Ichthyol	1 drachm
Pulv. Camphor	½ drachm
Zinc ointment	1 ounce

SHINGLES OR HERPES.

Symptoms.—Herpes, which is a good type of the vesicular affection of the skin, is characterized by little blisters which come out in small groups, and when appearing about the mouth and nose constitute the cold-sores with which almost everyone is familiar.

Shingles Proper.—A severe form called herpes zoster, or the "shingles," comes on with smarting and burning pain in a belt half way around the body of large patches of the eruption. It is distressing and tedious, often lasting a month or six weeks, but rarely dangerous. The popular idea that it will prove fatal if it goes all around the body is without foundation.

Treatment.—The only treatment is to apply anodynes and soothing lotions, such as the morphia and lead water recommended in erysipelas, and administer opiates to relieve the pain, or pil acetanilide comp.

PEMPHIGUS.

Character.—Pemphigus is another vesicular eruption, characterized by the formation of large blisters, from half an inch to two inches in diameter, resting on slightly reddened surfaces, and mostly attended with severe itching. These blisters sometimes appear on the fingers, but commonly attack the lower limbs. They should be punctured at once and boric acid applied. They generally indicate a more or less impoverished state of the system, in which iron, quinine, strychnine and good nutritious food are called for.

© E. J. S.

ECZEMA.
Scaly Form.

ECZEMA.
First Stage of Simple Eruption.

© F. J. S.

SCALD HEAD (Favus).

Remedy.—Arsenic is also very useful, and locally soothing ointments or absorbent powders may be employed.

IMPETIGO (Pustular Eruption).

Character.—Impetigo is the most common of the pustular eruptions, and is characterized by the formation of separate pustules, somewhat like those of small-pox. They may attack any part of the body, but are most apt to appear upon the face and limbs. This disease, like eczema, which in many respects it resembles, seems as if it were an aggravated form of impetigo, and is especially frequent among children, although adults are not exempt. Impetigo is always associated with general debility, defective nutrition, or hygienic neglect.

Remedies.—The treatment is by good food, tonics, with cod-liver oil, and strict attention to cleanliness. Soothing applications, such as Goulard's cerate, should be made first to the pustules, but later on a very mild mercurial ointment is more effectual. Mild antiseptics or boric acid can also be used.

BOILS.

Causes.—Boils, those common and exceedingly troublesome inflictions upon mankind, are classed under the head of pustules. With all the advances we have made in late years in pathology, the cause of boils still remains undiscovered. Sometimes they seem to be due to high living, and in other cases poor diet appears to determine the advent of a troublesome series of these parts. One boil is very apt to precede a crop of fifteen or twenty, although there is no certainty that this will be the result.

Treatment.—1. The best way of managing a boil is to poultice it with flaxseed or bread and milk, containing laudanum to ease the pain. If the boil is small, the poultice may be spread upon a piece of oiled silk, which prevents it from becoming dry, and held in place by a bandage, or by a square piece of linen upon each corner of which has been daubed a little spot of adhesive plaster, the stick of plaster being melted in the flame of a candle for the purpose. This holds a dressing of any kind on a broad, flat surface of the body, as, for instance, the skin of the back, very satisfactorily.

2. When the boil softens in the centre, and the fluctuation of matter can be detected, or its yellowish color can be seen under the skin, some twenty-four hours of suffering may be saved by having it lanced, and the pain of the cut may be abolished by freezing the surface with ether spray,

or by stroking it with a little bag containing a mixture of ice and salt. In certain cases it is important to lance a boil early, so as to prevent the burrowing of the pus toward some important structure; but ordinarily, if the sufferer dreads the knife, there is no actual necessity for using it, and the boil may safely be left to break of its own accord, under the poultice, one, two or three days later than the time when it is ripe for lancing.

3. Lancing the little pimple, with which a boil first commences, exactly through the middle, which can be done almost painlessly under the ether spray, will nearly always cut short this troublesome affection. Ten or twelve grains of quinine daily, so as to produce slight cinchonism for a week, occasionally breaks up a course of boils, but is by no means an infallible remedy.

CARBUNCLES.

Character.—Carbuncles chiefly differ from boils in the larger area involved in the inflammation, from which a core of dead connective tissue, called a "slough," several inches in diameter, may come away. Carbuncles are apt to come on the nape of the neck, and on the back, but may appear on any part of the body. A large carbuncle will sometimes keep a patient in bed for a month or six weeks, and the pain and exhausting discharge wears out the strength so much that it may cause death; if a second of large size appears, after the first begins to heal, as it is not very unusual, it quite frequently proves fatal.

Treatment.—Poultices of flaxseed meal, bread and milk, powdered slippery elm bark, or of yeast; anodynes to relieve pain; and twelve grains of quinine daily, with tincture of iron to support the strength, constitute the appropriate treatment. Early and free incisions into the inflamed tissue, made after freezing the part, are of great service. After opening apply equal parts of carbolic acid and glycerine.

PIMPLES.

The papules or pimples are solid elevations of the skin, containing neither water like the vesicles, nor pus like the pustules. They are three in number, including strophulus, the red gum or tooth-rash peculiar to infants, lichen or prickly heat and prurigo.

Strophulus.—This consists of an eruption of innumerable small, reddish pimples, which occur for the most part on the face, neck and arms of young children. The irritation and general disturbance is slight. The eruption is usually caused by digestive derangement of some kind, as, for instance, that of cutting a tooth, and passes away with the cessation of its cause.

Treatment.—The only treatment necessary is some mild, saline laxative, and a lotion of very weak solution of carbonate of soda, five or ten grains to the ounce, with a teaspoonful of glycerine, to allay the itching if that appears to be very troublesome.

Prickly Heat or Lichen.—This is very common in hot weather, in the simple form of reddish pimples, which itch a great deal but usually subside on the approach of the cooler season. It sometimes takes on a severe form, and may even become chronic.

Treatment.—In mild cases tepid baths, plain and easily digested food, an occasional saline laxative, with a tablespoonful of infusion of gentian, and five grains of bicarbonate of potash or soda internally, three times daily, will effect a cure. To relieve the itching, solutions of borax, vinegar or carbolic acid may be used with advantage. In aggravated cases the more powerful tonics, with tablespoonful doses of cod-liver oil and one-sixteenth of a grain of arsenic three times a day must be resorted to.

Prurigo Symptoms.—This is characterized by an eruption of pale, slightly elevated pimples, most situated on the trunk of the body, and attended with very intense irritation, especially at night, so that the marks made by the patient's nails in scratching can almost always be seen, and aid in recognizing the malady. It is frequently the result of the presence of the vermin with which so many dirty people are infested.

Remedies.—Cleanliness, by the aid of strong alkaline baths, and the use of an ointment of carbolic acid, or if white precipitate, with the administration of tonics and good food will generally effect a cure. Sometimes, however, the disease, unless it is carefully treated early, proves very obstinate, being kept up in great measure by the constant scratching, which it is very difficult for the patient to abstain from.

PSORIASIS (Tetter).

Character.—Psoriasis is the most important scaly eruption; in certain of its varieties it probably constituted one form of the leprosy of the Bible. It is characterized by the appearance, at first, of oval or rounded patches of slight irritation, then upon these an eruption of scales, which grow dense and white toward the centre. Afterward the spot expands from its outer edge, where the skin is often reddened and slightly raised above the level of the surrounding surface. This is the skin disease to which the name of "dry tetter" is commonly applied. In the worst or inveterate form, the whole body may be covered with these white scales, except the face, the palms of the hands and the soles of the feet. Even these do not always escape. The incrustation of scales in this variety of psoriasis is thick and dense. When it has lasted for some time, the skin chaps and breaks, after which there is severe soreness with exudation of fluid from the broken surface, intense irritation and itching, with great general and physical exhaustion, lasting for many weeks, or perhaps months. In rare cases it may even prove fatal. In the milder form, it is especially apt to appear very symmetrically upon the knees and elbows, and is most common between the fifteenth and twenty-fifth year of life. It is prone to recur in a patient who has once manifested it, but is not contagious. Often it is hereditary, and may be associated with a gouty or rheumatic taint in the system.

Treatment.—The treatment consists of careful attention to diet, avoidance of alcoholic stimulants, and the administration of arsenic in the form of Fowler's solution, five drops thrice daily. Externally soothing lotions or ointments are required in the first stage, and mild mercurial or tar ointments are of service after it has become chronic.

R.—Ol cade	1 drachm
Lanoline	1 ounce

Apply twice daily.

R.—Tar ointment	1 drachm
Petrolatum	1 ounce

Apply twice daily.

R.—Chrysarobin	15 grains
Lanoline	1 ounce

Apply to each spot twice daily.

PITYRIASIS (Scalp Disease).

Character.—Pityriasis is a squamous disease especially apt to affect the scalp when it appears in the milder form, giving rise to the shedding of an immense number of bran-like scales, resembling an exuberant crop of dandruff.

Treatment.—The condition of the health in general should be looked after. Iron and arsenic are given, also calcium sulphide locally for the scalp.

R.—Tr green soap	....	4 ounces
Alcohol	....	2 ounces

Dilute and use as a shampoo, if crust or scales. After removal apply

R.—Sulphur precip.	....	1 drachm
Salicylic acid	....	10 grains
Petrolatum	....	1 ounce

Or,

R.—Tr Cantharide	....	3 drachms
Tr capsicum	....	3 drachms
Castor oil	....	2 drachms
Bay rum	....	3 ounces

WARTS, CORNS AND BUNIONS.

Hypertrophies of the skin are all unusual diseases, except warts and corns, which are common enough to make up for all the rest. The coming and going of warts on the hands is as much a mystery now as in former ages, when the most ridiculous remedies were gravely prescribed.

Wart Remedy.—Warts can be destroyed by caustics, of which nitric acid is the most severe and effectual, and chromic acid perhaps the least painful. When arising from the poison of syphilis, they are sometimes extremely sore and troublesome, so much so as to require removal by surgical operation.

Causes and Treatment of Corns.—Corns are similar to warts in their structure, except that they have a much thicker layer of epidermis over their surface. They are almost always produced by the pressure of tight shoes, and may be avoided by caution in this respect. They can usually be prevented from giving much trouble by carefully trimming out the centre of the corn at short intervals, or by wearing one of the various forms of perforated corn-plasters in common use. In cutting corn, the incision should never go through the epidermis, so as to cause bleeding, since dangerous inflammation has thereby been set up.

R.—Salicylic acid	....	½ drachm
Ex. Cannabis Ind.	....	10 grains
Collodion	....	4 drachms

Apply daily for 3 or 4 days when the callous can be removed.

Bunion Treatments.—A bunion is generally made up of a corn on the side of the great toe, and an irritated synovial sac or bursa beneath it. It is also the result of wearing too tight a shoe, especially such as are too narrow at the point. When inflamed, it should be soothed with lead water and laudanum; a loose shoe, or one with a piece cut out of the side, being worn. After the reduction of the inflammation, benefit may be obtained by painting with tincture of iodine. A bunion should never be neglected, as it is liable to suppurate, leaving a troublesome indolent sore, which may for years cripple the patient, even if permanent lameness does not result.

PRURITUS (Itching).

Character.—Pruritus is a very common disease of the skin, which is characterized by itching without any eruption or other apparent change in the appearance of the part affected. Children and elderly people are particularly apt to suffer thus, and the localities involved are generally those about the orifices of the body.

Causes.—Sometimes, like prurigo, it may be traced to the irritation caused by vermin, usually the pediculus corporis or body-louse, which may be gotten rid of by attention to cleanliness and the application of weak mercurial ointment, a tincture of larkspur, or various other home remedies. When not thus produced, the cause must be sought in some deterioration of the general health.

Treatment.—As local applications, lotions of borax, half an ounce to the pint, or of carbolic acid, one or two teaspoonfuls to the pint, and ointments of zinc camphor, belladonna or morphia are useful.

FRECKLES.

Freckles consist of a deposit of oxide of iron from the blood, just beneath the epidermis or in its lower layers. They may often be dissipated by painting with tincture of iodine or frequent application of peroxide of hydrogen.

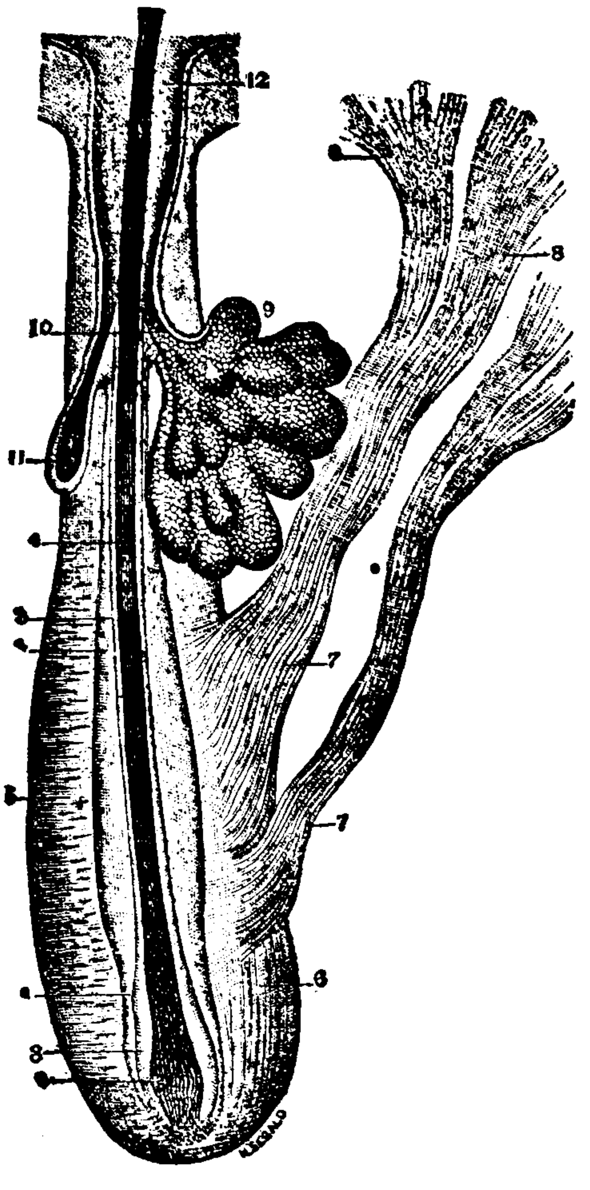
DISEASES OF SKIN GLANDS.

Seborrhea.—In seborrhea there is an excessive production of secretion, made up of oily matter and cast-off epithelial cells, which accumulates upon the surface in the form of thin, yellowish scales. It is especially common on the skin of young infants.

Treatment.—The layers of scales may be removed by the use of white castile soap and warm water, and if there is no inflammation of the skin, a mild carbolic or white precipitate ointment may be used to prevent their return.

Flesh-worms.—Acne, commonly called pimples or flesh-worms, coming, as it does, upon the face just at the time when young people of both sexes begin to feel most anxious about their personal beauty, gives rise to a far greater amount of unhappiness than many of the serious maladies to which flesh is heir. It is an inflammation of the sebaceous glands of the skin upon the face and back, and elsewhere, which comes on in successive crops, and gives rise to the spotted and pimply countenances which are often so unsightly or even repulsive.

Description.—These sebaceous glands, one of which is well delineated in the accompanying wood-cut, are generally situated, as there indicated, by the side of a hair, and if inflamed, caused by the pressure they exert when distended, an inflammation of the surrounding derm constituting the pimple of acne. In the figure is exhibited a hair in its follicle, highly magnified. At 7 and 8 appear the curious little muscles which have the power of erecting the hair in conditions of sudden fright or horror. They are, as is well known, much more active in animals—for instance, the cat—than in mankind. 9 and 10 indicate a large, and 11 a small, sebaceous gland, both opening on the skin by the side of the shaft of the hair at 12. The small, black spot generally visible near the centre of an acne pimple is popularly supposed to be the head of a flesh-worm, which can be squeezed out by pressure at the sides of the papule. In reality, however, the yellow thread which looks like the body of a worm, is only the hardened secretion of a sebaceous gland, the top of which, being exposed to the air, has collected dust and dirt, and so become black.



A Magnified Sebaceous Gland.

Treatment.—No advantage is gained by squeezing out these little plugs of fatty matter, as in most cases the bruising of the parts more than compensates for any benefit afforded by the relief of internal pressure in the pimple from retained secretion. A great many local applications for the cure of acne are offered for sale, some of which are composed of powerful poisons, and are liable to do great and permanent injury. A safe and often useful lotion is made of precipitated sulphur, variously combined with mucilage of sassafras-pith, glycerine and camphor; or an ointment of precipitated sulphur, with vaseline, a drachm to the ounce, or white precipitate with vaseline, half a drachm to the ounce, may be employed.

Accessory Treatment.—The most important part of the treatment is attention to any general derangement of health, especially of the digestive apparatus, or, in females, of the menstrual function. Internally one-quarter grain of calcium sulphide three or four times a day is often beneficial.

Diet.—Errors in diet will often bring out a crop of acne, and articles of food which contain fried butter or fat of any kind, appear to be apt to have this effect. Pastry of all varieties, particularly mince-pie, buckwheat and other hot cakes, sausage, cheese and nuts should all be avoided, as well as spirituous and malt liquors in every form. Although the treatment and hygienic care, as thus advised, will generally diminish the activity of the eruption, they may not always effect a cure, and consolation must be sought in the fact that it seldom persists unless kept up by imprudence, after the period of maturity in the organism has been attained.

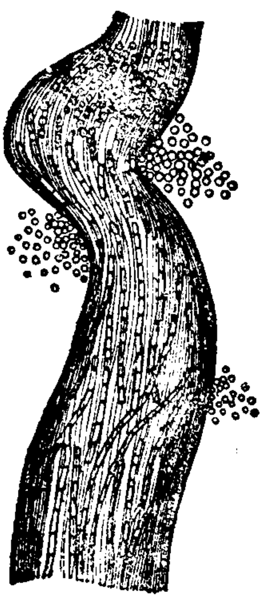
SKIN DISEASES DUE TO VEGETABLE PARASITES.

Causes.—It is now generally admitted that the fungus growths found so constantly in and among the epithelial scales of the epidermis are the causes, and not the mere accompaniments, of a curious group of skin maladies. The development of fungus not only invades the skin, but affects also the hair and the hair-follicles. Though the variety of vegetable growth differs in the different diseases, each presents the same general features, consisting of microscopic threads named mycelium, corresponding to the stem of a larger plant like a grape-vine, and microscopic seeds sometimes produced in bunches like grapes, and called spores. The full recognition of the fact, as it is believed to be by the present writer, that the fungous growth is the essential cause of the whole disease is vitally important, because upon it depends the system of preventing these maladies from spreading to healthy persons, by total destruction of the spores or seeds of the respective diseases.

A Case in Point.—In the instance of a member of the author's family, a little girl was infected with the fungus of Favus just underneath the tip of her chin, probably from spores left by some diseased child on the sill of a car window, from which she had been looking out, and at the time of being attacked with this complaint, which was fortunately recognized at once, and put an end to by appropriate treatment, she was in perfect health.

RING-WORM OF THE HEAD.

Symptoms.—Tinea tonsurans or ring-worm of the head is the most common of these vegetable parasitic diseases. It shows itself as a dry, scaly patch, rounded or oval in outline, which gradually grows larger and larger, the hairs dying and dropping out at the centre, so that ultimately a bald spot of from half an inch to two inches in diameter is left. The same fungus which produces this malady in the head sometimes develops among the hair of the beard, producing what is called tinea sycosis or barber's itch, and upon the other parts of the body where it is denominated tinea circinata or common ring-worm, with which, however, no worm has anything to do.



The Effect of Ringworm on the Hair.

Further Symptoms.—Ring-worm of the scalp commences usually as a little pimple, which soon spreads and takes on its characteristic ring-like appearance, showing a circle of minute scales, pimples and vesicles at the circumference of the patch. As the disease advances the hairs included in the circle become dull, dry, twisted and easily broken off, whilst the epidermis and stumps of the hairs become covered with a greyish-white powder, consisting chiefly of the vegetable growth.

Illustration.—If one of these broken hairs is put into a drop of caustic potash solution, and examined under a high power, such as 250 diameters of the microscope, its shaft can be seen as represented in the figure, penetrated with the mycelium of the fungus, called the tricophyton tonsurans, and floating around may often be detected separate spores of the same plant as indicated at the upper part of the wood-cut on both sides of the hair.

RING-WORM OF THE BODY.

Tinea circinata, which is also denominated herpes circinatus and ring-worm of the body, begins like that upon the head with a small pimple, but soon spreads with great rapidity, and the rings of eruption may attain a diameter of four or five inches.

Characteristic.—The great characteristic by which this affection can almost always be recognized is its healing up in the middle, so that the appearance is presented, after a time, of a patch of healthy or slightly reddened skin, surrounded by an angry, red ring about a quarter of an inch wide. Such an arrangement of the eruption is peculiar to ring-worm and suggests that the fungus in its growth at the centre of the ring has exhausted some material found in the skin which is necessary for its development. Were this not the case it would almost certainly continue to flourish in the middle, as well as at the edges, so that the course of ring worm affords a strong argument in favor of that part of the germ theory which supposes that the immunity conferred by one attack of small-pox, for instance, is due to the exhaustion in the entire system of some ingredient necessary to the growth of the specific small-pox fungus.

BARBER'S ITCH.

Character.—Tinea sycosis, or barber's itch, is the variety of the disease in which its vegetable cause happens to develop upon the chin of an adult, male patient. A great amount of irritation is usually set up, perhaps, from the roots of the hairs constituting the beard, extending more deeply into the substance of the true skin, and the plant therefore producing a deeper-seated inflammation of the parts as it grows down along the sides of the hair-follicles, than in the non-hairy portions. Hence large papules, and even pustules resembling those of acne in its aggravated state, are apt to be formed, and the itching and burning, as well as the disfigurement, are occasionally very troublesome to the patient. Perhaps among the vegetable parasitic diseases there is none to which persons are more liable to be exposed than this tinea sycosis or, as it is commonly called, the barber's itch.

Causes.—As before observed, any one of the innumerable epidermic scales, continually shed from human integument and constantly floating in the atmosphere around us, whence they are deposited with other materials in the form of dust, may be freighted with spores, or seeds enough of the fungus which causes tinea, to infect thirty, forty or fifty individuals should they meet with proper conditions for growth and reproduction. If persons fully realize this truth they can, of course, readily understand that all the ordinary precautions usually resorted to in barber's saloons, to wit, those of having separate cups, razors and brushes for each individual customer only diminish the danger of infection, and by no means insure a certainty of escaping the disease. For not only is the air of the room liable to carry separate epidermic scales, which may each convey the infection, but many of the operations connected with the process of shaving are still more likely to be the means of communication. For instance, the razors which are employed, even if they be individual property, are all sharpened with the same strap, upon which may have been spread, a few moments before you enter to be shaved, a few score epithelial cells from a case of tinea, one or two of which, should they accidentally adhere to the surface of your razor, as it certainly is quite possible for them to do, would be amply sufficient to implant the disease upon your face. In like manner the towels which are used, the brushes and combs, and even more certainly the hand of the barber himself, may prove the most efficient carriers of contagion which could possibly be devised.

Precautions.—In order to prevent the spread of these vegetable parasitic diseases the precautions already suggested must be rigidly enforced. All articles of clothing which have been worn in contact with parts of the body where the parasite grows should be purified by immersion in boiling water, or, if the nature of the material does not permit this, by baking at a heat of 250° Fahrenheit. All bed linen, bandages, brushes, combs and towels, or other articles suspected of similar contact, should be treated in the same way; and, of course, should be used by no other person until thus purified. The patient, if a child, should be kept by itself as far as possible, and those having charge of the case should thoroughly wash themselves after handling the parts affected. It is probable that the use of a strong carbolic acid soap, or of sulphite of soda or chlorinated soda solution would add to the security against attack, and with such precautions there is little danger that the malady will be transferred to others. Of course after proper treatment has once been put into operation, the danger of infection is still further diminished.

Treatment.—1. The essential point in treatment is to apply to the roots of the hairs a preparation which will kill the fungus, just as weeds are destroyed in an asparagus bed by sowing the ground with salt. In order to do this, the hair—if any exists—should first be removed, and the surface made as clean as possible. When the hair is not very thick, or has already been nearly destroyed by the disease, a cure may perhaps be effected by lotions or ointments of sulphuric acid, carbolic acid or salicylic acid. An ointment of verdigris is a favorite home remedy, and often succeeds after causing a good deal of unnecessary irritation.

2. Tincture of iodine, applied twice a day for fourteen days, and the spot then covered with the ointment of corrosive sublimate, of about two grains to the ounce, is an effectual method of treatment, which may be employed with great caution in obstinate cases, or the following solution applied at night: Hyposulphite of soda, one drachm; water, one ounce. Where the hair is very thick and strong it is sometimes necessary to pull it out with tweezers, as will be directed in speaking of favus, although this severe operation is, happily, not often required.

SCALD HEAD.

Character.—Tinea favosa or favus, called also scald head and honeycomb ring-worm, is characterized by its peculiar dry, sulphur-yellow crusts, in the form of little cups about a quarter of an inch in diameter. In advanced cases, however, these cups run together, so that their well-defined form can, perhaps, with difficulty, be recognized, except at the edge of a patch. A peculiar mouse-like odor is emitted from a child's head bearing a good crop of favus, this being probably produced by the spores of the fungus coming in contact with terminal branches of the olfactory nerve of the observer. On careful inspection, each cup is usually seen to surround a hair, and there is commonly little trouble in detecting the fungus spores and mycelia on microscopic examination.

Causes.—Although this disease is more frequently met with upon the heads of neglected, ill-nourished children than elsewhere, there is little doubt that any one of these spores of the achorion schœnleinii, as the fungous cause is denominated, might, under favorable circumstances, germinate and give rise to an abundant crop of favus in the hair, beard, or skin of the most vigorous individual upon whom they happened to be deposited.

In some cases the fungus of favus attacks the nails, developing beneath them and by the pressure which it causes producing their absorption and perforation. Much local inflammation about the root of the nail is thus set up.

Treatment.—The treatment of favus consists in removing the crusts by softening with a poultice, cutting or shaving off the hair, and then rubbing in thoroughly sulphur or tar ointment. If the spot is small a weak solution of corrosive sublimate may be painted over it, but this powerful poison requires very careful management. In obstinate cases it may be necessary to pull out the hair, either by the process of avulsion, where a cap made of adhesive plaster is suddenly torn off the head, bringing the hair with it, or by extracting six or eight hairs at a time with tweezers. This latter operation, called epilation, is denominated by Sir E. Wilson "the purgatory of avulsion," and condemned as little less cruel.

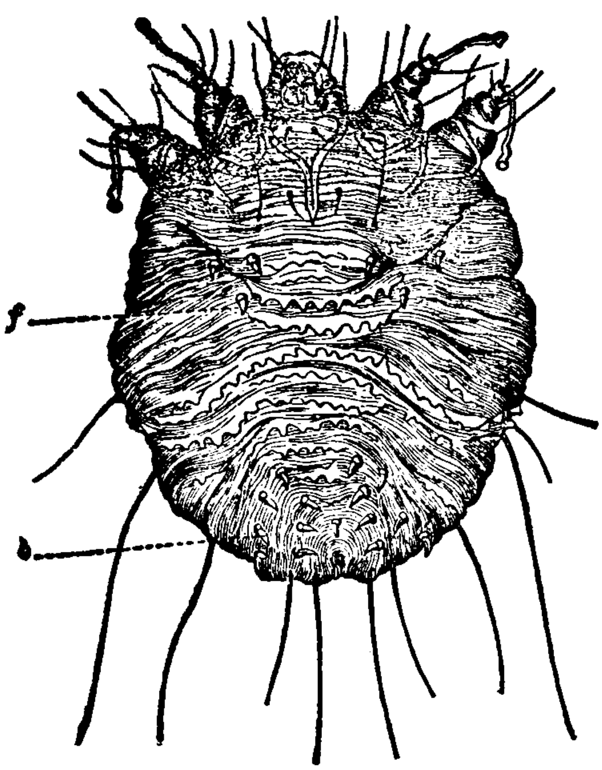
Brown Patches.—Tinea versicolor or chloasma depends on the growth in the epidermis of a fungus similar to that of ring-worm, but bearing its spores in heaps like bunches of grapes. The disease, which is seldom troublesome, is characterized by brownish-yellow, slightly scaly, irregular patches, which appear on the front of the chest and sides of the neck. It may also affect other parts of the body. As it does not penetrate deeply into the epidermis it is easily cured by painting with tincture of iodine, tincture of chloride of iron, or solution of sulphurous acid.

ITCH (SCABIES OR CHIGGER).

Causes.—Scabies or the itch, the most important skin disease caused by an animal parasite, was called in former times, when its true cause was but little understood, the seven-years' itch, because it was so hard to cure. At present it is universally admitted that the whole cause of this most annoying malady is the itch insect, or itch-mite, which is represented in the cut on the next page as it appears under the microscope if magnified about two hundred diameters. From the irritation set up by the parasite, and still more from the scratching to which it drives the unfortunate patient, vesicles, pimples and pustules are formed and grouped together in every variety.

Symptoms.—1. The itching, which is terribly severe even in daytime, is generally much worse at night after becoming warm in bed. The favorite haunts of the insect upon its human domain are the hollows of the elbows and knees, the front of the wrist and the backs of the hands just below the roots of the fingers; but it is also found in other portions of the body where the skin is tender. The palms of the hands and the soles of the feet are not infrequently infested, notwithstanding the integument is thick in these parts. In a vast majority of cases showing the discrete or separate eruption on the palms and soles it is due to either scabies or syphilis, and the presence of itching in the former and its absence in the latter of these two diseases enables us to distinguish them with great certainty.

2. The accompanying eruptions of scabies vary somewhat in their character according to situation. Thus the prurigo of itch is generally best defined upon the forearms, the lower part of the abdomen, and the upper and inner portion of the thighs. A vesicular eruption is more frequent about the fingers and breasts of thin-skinned people, and pustules are met with in children especially on the hands, feet and hips.

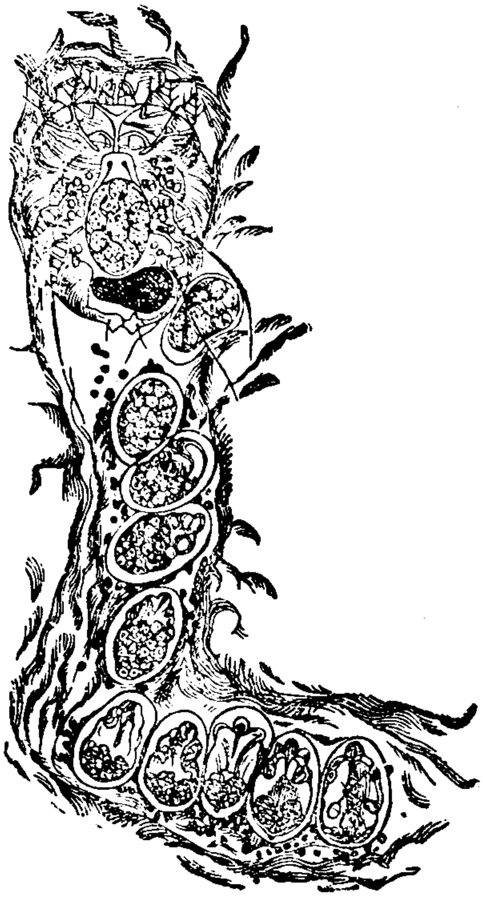


The Itch Insect Magnified Two Hundred Times.

3. In searching for a specimen of the insect, which can be seen quite distinctly with a good magnifying glass, it is well to look for one of the pimples, which has, extending from it, a little whitish line about an eighth of an inch long and generally somewhat curved. This is the burrow of the female insect, in which she has laid her eggs and is raising a happy little family to follow her example and live off the fat of the land they inhabit. If the top of the burrow is scratched through very carefully at its outer end with the point of a fine needle, and then the tiny round dot which may be found there picked out on the needle and transferred to a slip of glass, positive evidence of the nature of the disease can be at once detected by suitable examination under a microscopic or hand-magnifier.

Illustration.—The adjoining figure represents one of these burrows of the acarus scabies or itch insect, and in it is seen the mother of the family at the upper extremity, whilst eggs and young in various stages of development are depicted in different portions of the gallary excavated for their accommodation in the epidermis of their hospitable host.

Treatment.—The treatment of scabies should be by applications which, whilst they tend to kill the insects, will increase as little as possible the **irritation** of the skin. If this irritation is not already too great, the patient should go into a warm bath and scrub himself with brown or soft soap for half an hour; he should then lie in the bath for another half hour, and after being thoroughly dried, rub himself with the compound sulphur ointment all over, except the head, for twenty minutes, allowing the ointment to remain on the body all night. This whole process should be repeated every night for three times, which will probably end the lives of the itch insects and so terminate the malady.


The Burrow of the Itch Insect.

Disinfection.—In order, however, to avoid being reinfected from the clothing upon which some of the acari or their eggs may remain, every article that will bear washing should be thoroughly boiled, and those pieces of apparel which would be injured by water should be several times pressed with a hot iron, so as to completely destroy the parasites.

Further Treatment.—When the skin is very irritable the application of Peruvian balsam or the styrax ointment should be tried at first, and it ought to be remembered that even in those whose skins are not remarkably tender the sulphur ointment, if used very vigorously, is apt to produce an eczematous eruption, which, however, quickly subsides on the cessation of the application.

LICE.

Treatment for Lice.—The three kinds of pediculi or lice which infest the head, the body and the pubes of man, differ in their appearance under the microscope, being apparently each best fitted for the special part it has to play in tormenting the human family. They can all be defeated in this great business of their lives by strict attention to cleanliness, frequent bathing, and the application of mercurial ointment diluted with five times its bulk of lard. For the purpose of avoiding salivation, this ointment should not be used directly after a bath, nor rubbed in very strongly, nor, in fact, allowed to remain in contact with the skin any more than necessary, or a one to one thousand solution of bichloride of mercury may be applied.

PART XII OF BOOK IV

Tells of the bones and muscles of the human body and the diseases to which they are subject.

ILLUSTRATIONS

CURATIVE MEDICINE

PART XII.

DISEASES OF THE BONES AND MUSCLES

Bones.—The skeleton is the framework of the body, and is composed of an articulated assemblage of hard organs, the bones.

It serves to preserve the shape of the body; forms cases for the protection of the vital organs, and gives attachment to muscles and forms levers of movement.

Number of Bones.—The number of distinct pieces or bones composing the skeleton varies at different periods of life. Some remain distinct from the first moment of their development, such generally being of the simplest form, such as the bones of the carpus or wrist, and the patella or knee cap. Others, which are viewed as single bones in the adult, not only consist of several pieces in the beginning, but in the progress of development have other pieces successively added, as in the case of the vertebræ or bones of the spine and the thigh bones.

May Unite Bones.—Again bones considered as distinct pieces when the body has arrived at maturity, at a later period may become united with those which are contiguous, as in the coössification of the cranial bones. Therefore in the adult skeleton the number of bones to which we usually refer are two hundred and six, exclusive of the teeth and sesamoid and wormian bones, which are not uniform in number. Of this number twenty-six are found in the backbone or spine; twenty-two in the skull and face; the ribs count twenty-four, twelve on each side, whether the person be man or woman; each arm has thirty-two bones, and each leg has thirty. These bones vary very much in size, shape and thickness, and all have been named and described with great minuteness by anatomists.

Composition of Bones.—The bones under every modification of shape and mechanical arrangement are constituted by precisely the same elementary matters, the principles of which are an animal and an earthy substance, in intimate combination.

Phosphate of lime is the most abundant mineral material, being about 51 parts in the 100 of bone. Carbonate of lime, 11.3 parts; fluoride of calcium, 2 parts.

The animal matter of bone is gelatinous, allied to cartilage; originally every bone is developed from cartilage by ossification.

The mineral matter of bone increases with age; making bones of the old more brittle. There is more of it also in some bones and parts of bones than in others.

Structure of Bone.—A good idea of the structure of a bone may be gained by picking the second joint of a chicken or turkey clean, and then sawing off about an inch of the upper end and splitting this piece in half lengthwise with a hatchet or strong knife. This thigh-bone of a turkey corresponds to the femur or thigh-bone in a human being, where it lies near the centre of the leg and reaches from the hip to the knee. Its upper end may be recognized by its having upon it a single round knob, which formed part of the hip-joint.

Marrow of the Bone.—On examining such a bone it is found to be hollow in the middle, and partly filled with a fatty substance called the marrow of bone. In this marrow run important little blood-vessels, which carry the blood to nourish the bone, and from it they pass and repass to minute channels running lengthwise in its substance, which are called the Haversian canals, after the name of the physician who first discovered them. In dried bones, and especially when they have undergone prolonged bleaching in the open air, such as those of a long dead horse or cow, these Haversian canals may be readily seen, looking like fine pores in the broken ends of the bones.

Telescopic View of the Canals.—Under the microscope they are discovered to be encircled with rings of lacuna, or little holes in the bone substance, each of which communicates with its neighbors by very minute branching tubes. During the life of an animal the lacuna are filled with soft, jelly-like bone-corpuscles, but in dried bones these gelatinous bodies shrivel up, leaving the lacuna empty, except of air, which, by refracting light differently from what the solid bone does, makes the lacuna look like black dots under the microscope.

Bones of a Chicken.—If the breast-bone of a young chicken is examined it will be found that its smaller end is made up of the tough, milk-white or semi-transparent substance called gristle or cartilage. When a chicken is first hatched nearly all its bones are chiefly composed of cartilage, and as it grows older they gradually become more and more ossified, that is, changed into bone. But certain portions of the body commonly remain cartilaginous through life, as, for instance, the gristly bands which fasten the ribs to the breast-bone, and the rings of the trachea or windpipe.

Bones of Arm.—The bones of the arm, counting from the shoulder downward as it hangs at the side, are first the humerus or arm-bone, which extends to the elbow, and next the two bones of the fore-arm, which make up the part from the elbow to the wrist, and are named the radius and ulna. The latter of these two bones projects on the under side of the arm, and the radius has the hand attached to it, and is rolled part way around the ulna every time the hand is turned over from the position of pronation, or lying with its palm downward, to that of supination or lying upon its back. This is a very important movement, and great care must be taken by the use of properly padded splints to save it, when the radius and ulna of the fore-arm are fractured by accident, as very frequently happens.

Bones of Wrist.—The wrist or carpus is composed of eight small bones, each with a hard name derived from Greek or Latin, and the palm of the hand is formed by four of the metacarpal, a word meaning beyond the wrist bones, the metacarpal bone of the thumb making the fifth. The bones of the fingers consist of three rows of phalanges, the thumb having two phalanges only.

Besides the bones mentioned, anatomists reckon the shoulder-blade, or scapula, and the collar-bone, or clavicle, as belonging to the arm, or. as they name it, the upper extremity.

Kinds of Joints.—The joints of the arm exemplify the two chief kinds of articulation made use of in the human body, namely, the ball and socket joint, of which the shoulder is an example, and the hinge-like joint, of which the elbow is a good illustration. The joints between the metacarpal bones and the first row of the phalanges of the fingers, that is, those at the roots of the fingers, are imperfectly formed ball and socket joints, and allow, as anyone can see in his own hands, of a good deal of lateral or sidewise, as well as backward and forward motion. The other articulations of the fingers are hinge-joints, and like the hinges of a gate, permit only of a back and forth motion.

The Synovial Fluid.—The ends of bones where they rub against each other inside the joints are covered with firm smooth cartilage, and to diminish the friction as much as possible these polished surfaces of cartilage are kept slippery by a peculiar liquid named the synovial fluid

PARTS OF THE HUMAN SKELETON.

Top Central Plate.—This shows the bones of the cranium, or head, eight in number. The large frontal bone forms the forehead. The articulation of the teeth are prominent. It also shows the facial bones, or those of the face, fourteen in number.

Middle Central Plate.—This shows the bones of the chest; the sternum, or breast bone, in the centre; the ten true and two floating ribs on either side, and part of the backbone, to which the ribs are attached.

Lower Central Plate.—This plate shows the bones of the pelvis. Pelvis means basin. It is the basin or girdle by which the bones of the lower body, as the hip bones, are joined to the upper. The two large side bones are the os innominata, or unnamed bones. The central triangular bone is the sacrum, a composite bone, forming the union between the vertebræ and os coccyx, or tail end of the backbone.

Upper Left-Hand Plate.—This represents the eight bones of the carpus (wrist); the five of the metacarpus (between wrist and phalanges), and fourteen bones of the phalanges (battle rank bones), twenty-seven in all.

Next Figure Below.—This is the sacrum, detached from the pelvic girdle. It is also seen in lower middle plate. It is called sacrum (sacred), because it was of old offered up in sacrifices.

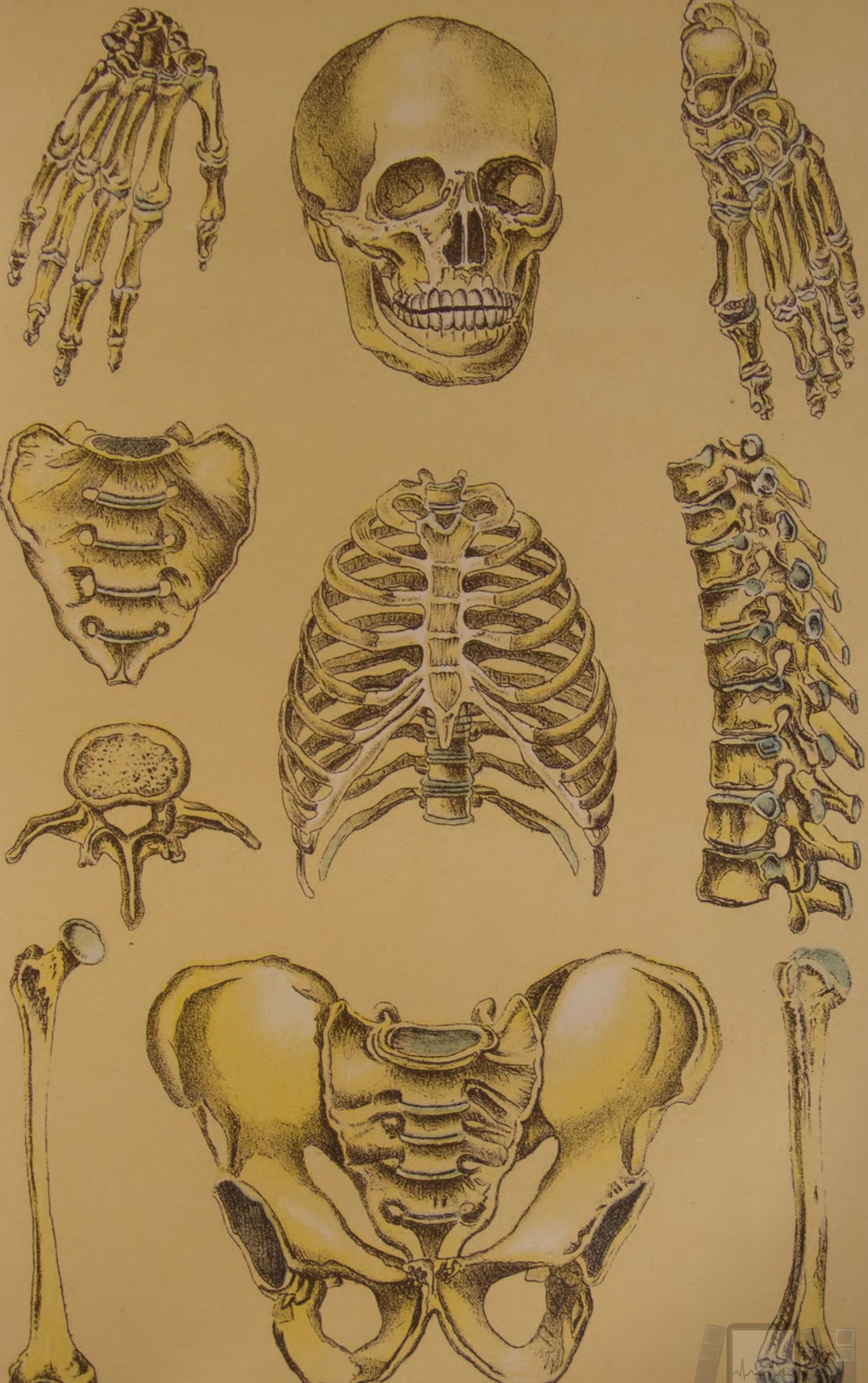
Third Left-Hand Figure.—This is a section, or single joint of the backbone, or spinal cord.

Bottom Left-Hand Plate.—This represents the femur, or great thigh bone. It is cylinder-shaped, and the largest, longest and strongest bone in the body.

Upper Right-Hand Plate.—This represents the bones of the foot. They are divided into three classes. 1. Tarsus, or ankle bones, seven in all. 2. Metatarsus (between tarsus and phalanges), five in all. 3. Phalanges (battle-rank bones), fourteen in all, a total of twenty-six foot bones.

Middle Right-Hand Plate.—This represents a part of the backbone or spinal column. It consists of a series of vertebræ, within which is the spinal cord or nerve, to injure which means paralysis or death.

Lower Right-Hand Plate.—This is the humerus (shoulder), or bone of the upper arm. It is the only bone in the upper arm, and it revolves on the scapula (shoulder-blade) above, and the ulna and radius of the fore-arm below.



Parts of the Human Skeleton.

or "joint-water." This synovial fluid, called also the synovia, acts the part of oil to a door hinge, and when sometimes in old people the synovia becomes scanty, their joints will creak and grow stiff, just as the hinges of a door do for want of oil. The ends of the bones in a joint are held in place by a tough, firm wrapper, called the capsular ligament, which encloses them tightly on all sides, and also prevents the synovia from escaping and being lost.

Bones of Leg.—In general arrangement the bones of the legs are very similar to those of the arms, making allowance for the difference in function of the two pairs of limbs. The thigh-bone or femur is the longest and strongest bone in the body, as might be expected from the larger share of work in walking, running and leaping it has to perform. It is articulated (or jointed) to the pelvis at the lower corner of the body by the hip-joint, a ball and socket articulation, which allows of considerable movement in every direction.

Knee to Ankle.—From the knee to the ankle, the leg, like the fore-arm, is furnished with two bones. One of these, called the tibia, is the shin-bone, forming the front of the leg and the inner side of the ankle, that is, the side next the other limb. The bone on the outer side of each leg and each ankle is named the fibula, and is much smaller than the tibia, its partner in the business of supporting the weight of the body. The ankle or tarsus is composed of seven bones instead of eight, as are found in the carpus, and it is articulated below and in front, near the middle of the foot, with five metatarsal bones. At the front, ends of the metatarsal bones are jointed on the toes, each with its three rows of phalanges, except the great toe, which, like the thumb, has but two.

Nature of Sprains.—The ankle-joint is more apt to be "sprained" or "strained," than any other, and this accident, therefore, requires a few words of explanation here. A strain of a joint is the result of moving the bones which compose it too far, or in an unnatural direction, so that the capsular and other ligaments are stretched or perhaps torn a little by the force applied. A strained joint is very painful, apt to swell rapidly, and often proves troublesome for months, or even years, if not properly treated. Until a doctor comes, the injured articulation should be placed in an elevated position, so that the blood will drain away from it, kept perfectly quiet, and covered with cloths wrung out of hot or cold water, so as to reduce the danger of inflammation.

Bones of Skull.—The bones of the skull or cranium are broad, comparatively thin, and curved in such a way as to make a hollow case or oval box, shaped a good deal like an egg, for the protection of the brain, which is placed inside of them. The most important are the frontal or forehead bone, the two temporal or temple bones and the occipital bone, which is at the back of the head. These bones are united together by seams or sutures, consisting of a curious kind of dove-tailing, which fastens them so firmly together that, in their natural state, it is impossible to get them apart without breaking them.

Character of Skull Formation.—The arch form of the skull makes it much more capable of resisting blows upon the head; but if these are so severe as to fracture the bones, especially if they are dented in so as to press upon the brains, unconsciousness is often very quickly produced. This would happen much more frequently were it not for the layer of spongy matter interposed between the hard plates which form the cranial bones.

Bones of the Face.—The bones of the face are comparatively light and thin, except the lower jawbone, into which are set the lower teeth, and which is the only bone about the head which is furnished with a movable joint, except the occipital bone, where it rests upon the neck.

Bone of Spine.—The spine or backbone is made up of twenty-four vertebræ, the sacrum and the coccyx. These latter bones seem to be each composed of several vertebræ, which, for the purpose of being rendered stronger, have grown fast together. The uppermost vertebræ is called the atlas, because upon it the head is supported; and the second is named the axis, because upon it the atlas, and with it the whole head, turns, as in shaking the head negatively. The upper seven vertebræ are called the cervical or neck bones; the next twelve are designated as the dorsal or back vertebræ; and the last five are named the lumbar vertebræ or vertebræ of the loins. These twenty-four bones are fitted together in such a way as to form a continuous tube, which receives and protects the spinal cord or spinal marrow just as the upper continuation of the spinal cord—that is, the brain—is encased and protected by the bones of the skull. The vertebræ are jointed so as to allow considerable motion, both sideways, forward and backward, and have between each pair a cushion of fibro-cartilage, which serves to preserve the brain from injury by the shocks and jars which would otherwise be given to it in jumping, running and various other movements. The sacrum, which is continuous with the vertebræ, is united with two large, flat and irregularly-shaped bones, to form the pelvis or basin at the lower part of the trunk. The pelvis supports the spine and the organs in the abdominal cavity, and is in its turn sustained on each side by the thigh bones, which prop it up at the hip-joints, as already indicated.

Bones of the Thorax or Chest.—The heart and lungs are protected by a bony cage composed of the twenty-four ribs, which lie a little beneath the skin of the thorax or chest and in thin persons can be easily felt at the sides or near the breast-bone. This breast-bone or sternum is situated directly in the middle or front of the thorax and has the front ends of the ribs attached to it by cartilages, named the costal or rib-cartilages, which allow of the outward and upward movement of the ribs, necessary in breathing.

The back or posterior ends of the ribs are jointed on to the vertebræ of the spinal column in such a way as to allow of needful motion, and yet secure sufficient stability and firmness.

Dislocation of Bones.—When a dislocation occurs, or, as it is commonly called, a bone is put out of joint, the bones composing an articulation have been pulled or twisted so hard as to displace them, breaking some of the ligaments which are arranged to keep them in their proper positions.

Example of Dislocation.—Generally, a person whose arm, at the shoulder, for example, is dislocated, suffers a good deal of pain and loses the use of the limb until the bones are put back in their places again, or as it is called, the dislocation is reduced.

A dislocation is one of the heavy penalties people often have to pay for imprudent over-exertion in lifting and wrestling, or for carelessly letting themselves have falls and hard knocks, or becoming entangled in railway accidents.

Repair of Fractures.—The repair of broken or fractured bones is a wonderful process of nature, in which a material called callus, at first like putty, is formed around the broken ends, holding them together, feebly at first, but afterward it gradually hardens, uniting them more firmly indeed.

Since this "knitting" of the broken bones may occur in almost any position they happen to lie in, or are pulled into by the irritated muscles in the neighborhood, it is evidently very important that they should be put and kept in exactly the right place. For this purpose there are many ingenious splints and bandages devised and used by surgeons. See Accidents and Emergencies and Surgical Diseases.

DISEASES OF THE BONE.

Inflammatory Affections.—These sometimes follow wounds, but are more common as result of syphilitic or scrofulous disease. There is swelling and pain of affected part (especially at night). Unless overcome in early stage, necrosis is apt to follow.

Necrosis.—This disease is akin to mortification of the flesh and is sometimes called Death of the Bones. It may occur from injuries to and inflammation of the periosteum or may be due to phosphorous poisoning. There is dull, deep-seated—sometimes acute—pain, followed by increase of size and the formation of new bone around the old. There is tenderness and distension and a breaking down of tissue with a discharge of pus and of small particles of bones. Blood poisoning frequently ensues from absorption of dead bone tissue that has not found outlet. To prevent this an incision should be made over a swelling in bone troubles if pus be suspected and thus permit escape of diseased parts. This should only be done by a skilled surgeon and under thorough antiseptic conditions. Temporary relief is obtainable by poultices and quieting fomentations. Surgery is usually necessary, all diseased bone being scraped away.

Nodes.—These are hard, bony swellings, which are apt to occur as tertiary symptoms of constitutional syphilis. They are most common in long bones and are frequently found on the front surface of shin-bone. They are often painful for a time, particularly at night, but yield promptly to treatment with the iodide of potassium in the majority of cases.

Softening of Bone (Osteomalacia).—This is an uncommon disease observed in adults; seldom seen in males, occurring in greater frequency in females. It is characterized by a softening of the bones, rendering them very liable to break or bend on the application of little force; resulting from absorption or deficiency of the earthy matters in the bones.

Brittleness of Bone (Fragilitis Ossicum).—This is an affection of bone in which the inorganic are out of proportion to the organic constituents, rendering the bones brittle; there is an apparent increase of the earthy matters, with a diminution of the vascularity of the bone. Children and young persons seem to suffer most from this disease, and in many instances an hereditary tendency can be traced.

Osteoma (Chondroma).—The bones are subject to tumors, to cartilaginous or other growths. They form hard rounded tumors, fixed to their point of origin. They may attain a huge size—but are usually small.

They grow slowly without pain or other symptoms except such as may be caused by their bulk or pressure, and interfere with the functions of neighboring nerves.

Osteomata are liable to inflammation and necrosis, but never undergo malignant or cancerous degeneration. Chondromata may not only become inflamed, and necrosis and sloughing follow; but it becomes cancerous in some instances; for instance, after an injury to a bone, a chondroma may appear and develop with terrible rapidity, and upon its removal may return, become cancerous and form secondary tumors elsewhere.

Treatment.—If osteomata or chondromata are removed whilst small the operation is to be recommended, but when left until a huge tumor has developed, of the nature of which no doubt can be entertained, any interference is of questionable propriety.

Synovitis.—Among the important diseases of the joints must be mentioned synovitis or inflammation of the lining membrane, by which the synovia or joint-water is secreted. This disease, usually attended with severe pain, and when the joint is a large one accompanied with much constitutional disturbance and fever, appears in two forms, the acute and the chronic.

Causes.—The acute form is usually the result of injury, which may be very slight in its character, as even the least puncture of the joint by which air can enter is liable to produce it. Acute synovitis runs its course in ten or twelve days, causing much swelling and severe suffering on the slightest movement of the limb to which the joint is attached. The chronic form is commonly a continuation of the acute, and may itself result in softening and what is called pulpy degeneration of the synovial membrane.

Treatment.—The treatment of synovitis is by free leeching of the affected part; perfect rest in bed, with the limb elevated and secured in a splint if needful; low diet with saline purgatives, such as epsom salts or seidlitz powders, and anodynes to relieve pain. In the chronic form small blisters and painting with tincture of iodine are likely to prove useful. Inflammation of the synovial structure of the joints is apt to take on a rheumatic, scrofulous or syphilitic character in persons who are constitutionally under the influence of these taints. In such instances the appropriate treatment for them, as already pointed out, is to be associated with that for ordinary synovitis.

Ulceration of the cartilages may occur in a joint as a consequence of long-continued inflammation, causing intense pain, and usually disabling the limb. Its liability to occur renders the prompt treatment of synovitis doubly important.

Abscess (Coxalgia).—Abscess within a joint is rare in healthy persons, but in the scrofulous it is by no means uncommon, and in strumous children abscess in the ip-joint, causing the lamentably frequent affection, coxalgia, is a malady of much importance.

Treatment.—The general treatment in these sad cases is that already indicated for scrofula, but the local trouble should be immediately attended to by an experienced surgeon, and remedied as far as possible by the aid of the complicated apparatus devised for the purpose.

Pott's Disease.—This consists of a tubercular inflammation of the bodies of the vertebræ o spinal bones, and their cartilages; and is most common in children between two and ten years of age, although it may occur at any age. In some cases the affection appears to follow a slight injury to the spine in those of tubercular or strumous tendencies, in others the disease develops without apparent exciting causes.

Symptoms.—Rigidity of spine, tenderness and local pain are the prominent early symptoms. Abscess may occur early, but is most common in the late stages. Deformity or spinal curvature usually occurs as a result of the disease process, depending upon the amount of breaking down in the bones and the falling together of the vertebræ, and may be gradual or rapid in its development. Treatment is as indicated in article on Coxalgia.

THE MUSCULAR SYSTEM.

Muscular Function.—The power which moves different parts of the frame, according to the directions of the will, as, for instance, the legs, in walking, is produced by the contraction of muscles. These muscles form the lean meat of animals and of the human body, and, except in very fat people, make up a larger portion of the bulk of the frame than any of its other constituents.

Composition.—They are composed, as is readily seen in a piece of fresh beef or mutton, of long strings of reddish material, which, under the microscope, are found to be made up of a multitude of fine, beaded threads, arranged in small bundles, and called the ultimate muscular fibres. They exercise power in moving the limbs, and so forth, by shortening up or contracting when excited by the nervous fluid, sent to them through the nerves from the brain, as ordered to do so by the will.

Mechanism.—The exact mechanism of moving the arm, for instance, by the process of contraction, may be easily understood from the picture shown on page 752, in which it is readily perceived that the shortening up of the muscle must pull up the hand, bending the arm at the elbow-joint, and changing the position from that represented in the second, to that shown in the third figure. Precisely the same kind of operations accomplish the motions of lifting the feet in walking or climbing, swinging the arm in throwing a ball, opening and shutting the mouth, and, indeed, of most of the voluntary movements of which we are capable.

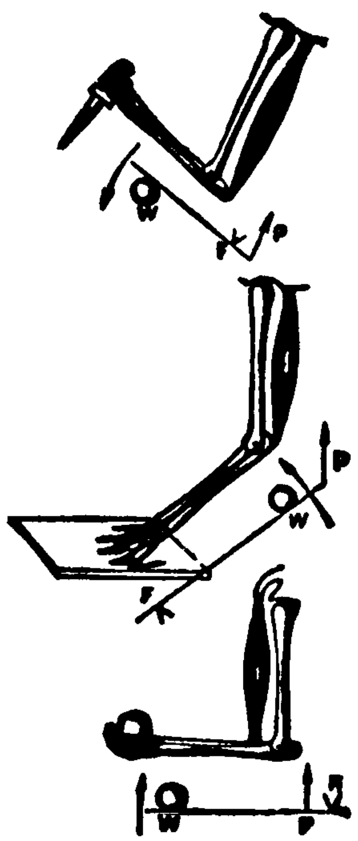
Voluntary and Involuntary.—But whilst many of the muscles are controlled by the will and are, therefore, called voluntary, many of them are not so ruled, and hence have received the name of involuntary.

Most Important Involuntary Muscles.—Among the most important of the involuntary muscles are the heart, the intercostal muscles, the muscles between the ribs which help to expand the lungs in respiration, and the muscular fibres of the alimentary canal, which aid in pushing along the food in digestion. Fortunate is it for us that such is the fact; for otherwise, when our wills were off duty, as in sound sleep, the operations of these vital organs would stop, and life, which depends upon them, soon cease.

Muscular Attachment.—The muscles are usually attached to the bones, and move them by sinews or tendons, which are made of white, fibrous tissue, the strongest and most flexible material in the body. These tendons are like long, round, white cords, such as may be seen in the lower part of the leg of a chicken. The largest tendon in the human body is that of the heel, called the tendon Achilles, which is the continuation of the big muscle of the calf of the leg. This powerful muscle is used in jumping and, since it acts at a great disadvantage, is necessarily very strong in order to be able to throw the entire body forward, as in making a leap.

Origin and Insertion.—As a general, but by no means universal, rule, a muscle has one attachment which is fixed, commonly spoken of as its origin, and a second, called its insertion, upon which it acts by drawing it toward the origin when the muscular substance contracts. Muscles mostly pass in a straight line between their two attachments, but sometimes they act around an angle by sliding over a pulley, or by means of a small bone in the tendon, like the knee-pan. The muscles are so attached that they are always slightly on the stretch, and thus, at the moment they begin to contract, they are in an advantageous position to bring their action to bear on the bones which they move. When the contraction ceases, the bones are drawn back to their former position without any sudden jerk.

Muscular Leverage.—The muscles commonly act upon the bones as levers, by working upon the short arm of the lever, so that more direct force is required on the part of the muscle than there is weight in the body moved. From this arrangement, however, the indispensable advantage is gained that the small contraction of the muscle causes an extensive movement of the part acted upon, and much greater rapidity of motion is secured. Each of the three orders of levers is met with in the different bones of the human skeleton; often, indeed, all three varieties are found in the same joint, as for example, the elbow, where the simple flexion and extension of the biceps and triceps muscles, which are large, fleshy masses on the front and back of the arm, between the shoulder and elbow, afford excellent illustrations, as shown in the accompanying figure.



Bones of the Forearm Acting As Levers of the Three Orders.

Illustration of Leverage.—The arm is used as a lever of the first order when the triceps is caused to contract, and by pulling upon the upper end of the forearm moves the hand around the elbow-joint, which serves as a fulcrum. This is shown in the upper diagram in which the hand is represented as striking a blow with a dagger.

Again the arm furnishes an example of a lever of the second order, when the hand resting on a point of support, such as a table, acts as the fulcrum, and the triceps muscle pulling on the upper end of the ulna or smaller arm bone, by straightening the arm lifts a weight placed upon it in front of the elbow.

The third order of levers is exemplified by the arm when bent by the contraction of the biceps in ordinary flexion of the elbow. Here the muscle, which is the power, is placed between the fulcrum, which is the lower end of the humerus at the elbow-joint, and the weight, which is lifted in the palm of the hand, as shown in the lower diagram.

Number of Muscles.—The whole number of muscles in the human being is not far from five hundred, mostly arranged in pairs on opposite sides of the head, body or limbs. It is, therefore, manifestly impossible to describe them all in detail here, and yet there are a few which are important enough to require notice.

Important Muscles of the Face.—Among the muscles of the face should be mentioned those of the eye, six in number, four of which turn the eyeball up or down, inward toward the nose or outward toward the temple, as becomes necessary to see an object distinctly. The muscles of expression are especially attached about the mouth, and produce their effects by puckering up the lips, as in whistling; drawing up the corners and widening the mouth, as in laughing; pulling down its angles, as in weeping, and so forth. The masseter muscles placed inside the cheeks between the upper and lower jaws are very strong, and enable human beings to chew up some very hard articles of food in the operation of mastication, as has been already explained.

Flexor Muscles.—The action of the large muscle of the front of the arm, called the biceps or two-headed muscle, has been already described. The muscle of the forearm, which shut the fingers as in clasping the hand, are called the flexors, because they flex or bend the fingers. The tendons by which their power is conveyed may be readily felt on the inside of the wrist of a man who tries to shut his hand when the fingers are forcibly held open by another person. The forearm muscles which open out the fingers after the hand is closed, in doubling up the first for instance by the flexors, are called the extensors. The tendons of the extensor muscles, when the latter are strongly contracted, show very distinctly on the back of the hand, as straight, hard cords, running from the root of each finger to the middle of the wrist.

Muscles of the Spinal Column.—The spinal column is almost surrounded, except in front, by a thick mass of muscles, which gives the great strength required by many kinds of laborers, such as porters who carry heavy loads upon their backs. The muscles of the leg, which are needed in walking, running and jumping, are very large and strong, corresponding to the hard work they are called upon to perform.

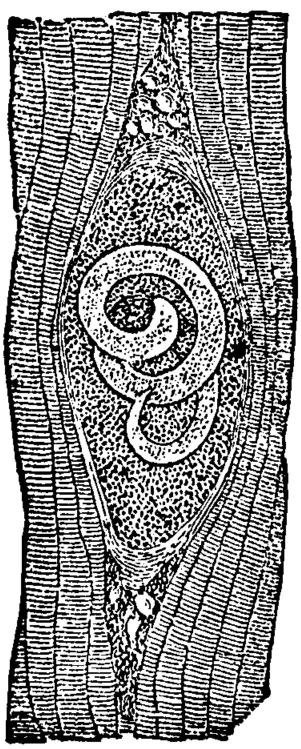
The Longest Muscle.—The longest muscle in the body is the sartorius or tailor's muscle, which is so named because it helps to bend the lower limbs into the cross-legged posture so frequently adopted by tailors. It lies on the inside of the thigh, is thin and narrow, but sometimes measures over two feet in length.

Intercostal Muscles.—The intercostals are flat, thin layers of muscular fibres, which extend from the lower edge of each rib, except the last pair, to the upper margin of the rib next below. In this way they fill up all the spaces between the bars of the bony cage in which the lungs are contained, and, when they contract, pull up these bars or ribs so as to widen and deepen the cavity of the thorax, and so cause air to be drawn into the lungs.

DISEASES OF THE MUSCLES.

Inflammatory Disease.—Inflammatory disease of the muscular system, except as it is connected with rheumatism or pyemia, is extremely uncommon. When it occurs it is liable to go on to suppuration, and the formation of abscess. The pain is dull and aching rather than acute, and the disease is to be treated as already directed in speaking of the management of boils.

Hypertrophy and Atrophy.—These occur in muscles and produce effects important or otherwise, according to the position of the muscle in the animal economy. The most important hypertrophy is that of the muscle composing the heart, the influence of which has been detailed in the article on valvular disease affecting this organ.



Trichina Spiralis in Human Muscles.

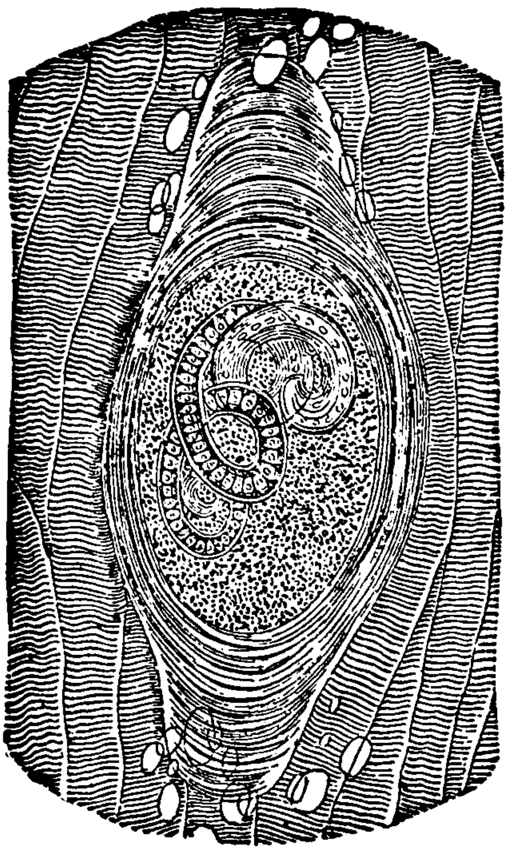
Contractions.—Palsy and spasm in various forms have also been considered in the chapter on diseases of the nervous system, upon which these disturbances chiefly, thought not entirely, depend.

Trichiniasis.—The most important disease of the muscular system not yet discussed is its infection with parasites, and particularly with the trichina spiralis or pork worm, which, in consequence of the late embargoes upon American hams and bacon, has assumed a national or, indeed, an international importance. The great fatality in many cases of trichiniasis, as the malady produced by the trichina has been named, and the ease with which the whole trouble can be avoided by a proper understanding of the nature and origin of the affection, render a full account of the entire malady and its means of prevention singularly appropriate to a popular work like the present one.

The Trichina Spiralis.—The trichina spiralis, which is next, perhaps, to the echinococcus, the most dangerous animal parasite infecting man, is found also in pigs, foxes, guinea-pigs, rats, cats, mice, marmots, polecats, badgers, and more rarely in some other animals, including the dog. A physician of Philadelphia found that of ten cats which he dissected in 1879 nine were infested with trichinæ.

Sources of Trichinæ.—Pigs, from which the human race is most apt to become diseased with trichina, are supposed to become themselves infected, chiefly from eating rats, the offal of other pigs, and the excreta of human beings containing trichinæ. It is doubtful whether a single case of trichiniasis in man ever occurred where the patients became infected otherwise than by eating raw or underdone pork, and the most common sources of infection are sausages, ham and bacon.

How Trichinæ Breed.—If the trichinæ existing in diseased pork are very young they may be simply digested, when they reach the human stomach, without being developed. But if the parasites have attained their fuller growth, the cysts which contain them are alone dissolved by the gastric juice, and the embyro is set free. These embryos, after they pass through the pylorus and duodenum, soon become mature, and their thread-like appearance renders them quite easily recognizable by the naked eye. Countless eggs are now discharged by the females, and in about a week's time the new brood of trichinæ hatched out from these eggs begin to make their way to the muscles, either by boring their way through the soft tissues, or by being carried along by the current of blood in the blood-vessels, or perhaps by both of these methods of progression through the body. These larval trichinæ attain their full size in about two weeks from the time they leave the egg. The males and females are each about one-thirtieth of an inch long and about one seven-hundredth of an inch broad.



Encysted Trichina More Highly Magnified Showing Structure of the Parasites.

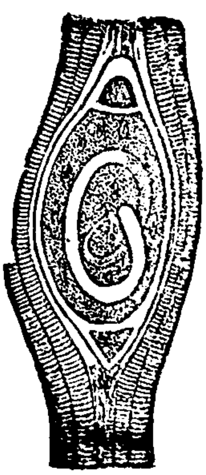
Effects of Trichinæ.—In some few favorable cases severe gastro-intestinal inflammation is set up, and the parasites are violently expelled by diarrhœa, without being able to enter the muscles at all, so that if it were possible to detect the malady with certainty at this stage, nature thus suggests the appropriate treatment by drastic purgatives. In the majority of instances, however, the migration of immense numbers of larval trichinæ from the intestinal canal takes place, and occupies in general about four days only. In this brief space of time even the most distant muscles of the body may all be invaded.

Symptoms.—Among the earlier symptoms of the trichina disease are a general feeling of debility and discomfort, and a loss of appetite, to which succeed nausea and vomiting, diarrhœa, prostration of strength, and a sensation of stiffness about the neck, arms and legs. These evidences of illness resemble, it will be observed, to a great extent, the first stage of typhoid fever, for which the cases are usually mistaken if there is no point in the history of the patient to suggest trichiniasis. The further progress of the parasites through the tissues sets up high fever, with frequent pulse and copious offensive perspirations, although the temperature of the body seldom or never reaches the elevation which characterizes that of typhoid. For some days the stiffness of the limbs seems to increase, while all the muscles become painful, swollen, and very sensitive to the touch.

A Characteristic Sign.—About the end of the first week the attention of the attending physician is usually awakened (if it has not previously been aroused) to a suspicion of the trichina disease by the appearance of an edematous swelling of the eyelids and root of the nose. This is often the first characteristic sign of trichiniasis, and should be looked for at this period of the illness in all cases of supposed typhoid and rheumatic fever. During the second week movement of the intercostal muscles in respiration grows very painful, thus preventing to a great extent the necessary repose of the patient. If the diaphragm is invaded, severe hiccough is apt to come on, and when the larval trichinæ commence to infest the laryngeal muscles hoarseness and loss of voice make their appearance.

Cause Paralysis and Exhaustion.—When a large quantity of trichinous meat has been eaten, so that the immigration into the muscles of the afflicted patient is by millions, they soon cause an almost paralyzed condition, attended by excessive exhaustion. The facial edema continues through the second week, when it generally disappears, and is followed by swelling of the feet and legs, and ultimately of the trunk. At the end of the third week, if the patient survives to this period, the pulse and respiration are very frequent, the tongue is red and dry; the mouth can scarcely be opened, the sweating is profuse, the pain so severe that little or no sleep can be obtained, and there is great anxiety or delirium, death frequently occurring in the fourth or fifth week, with symptoms of profound exhaustion.

Complications.—Complications, such as pneumonia, peritonitis and pleurisy, are not uncommon, but in favorable cases when the number of trichinæ is comparatively small, or the constitution of the patient unusually vigorous, the pain, swelling and diarrhœa begin to abate, the oppression of breathing passes off, the desire for food returns, sleep is obtained, and the anemic patient enters upon a slow and tedious convalescence; the parasites having become encysted within the muscles, these gradually become acclimated, as it were, to the presence of the foreign bodies, and slowly regain most or all of their original powers and functions.



Commencing Calcification of Trichina Cyst.

Further Symptoms.—After piercing the fibrous sheath of the muscular fibre bundles, the embryonic trichinæ become encysted within lemon-shaped capsules (generally one worm in each capsule), of a sort of connective tissue, in which they have some freedom of movement. After a time, these capsules, which, of course, are fixed to one spot in the muscle, become calcified, a process which occupies in man about two years. During this period there is often, for a time, in patients who recover, some loss of power, for a while almost complete, in muscles or groups of muscles; but not infrequently, after this stage is reached, entire recovery ultimately seems to take place. Still, this infested condition of the muscle, which probably exists in thousands of people who walk about utterly unconscious of it, may be the yet undetermined cause of rheumatism and paralysis, or promote the development of consumption and other wasting diseases.

Size of Mature Trichinæ Spiralis.—The mature trichinæ—the males being about one-eighteenth and the females about one-eighth of an inch long—live in the intestines for six or eight weeks. They never reach the soft tissues of the body, in which their young larvæ are so abundant, but are discharged, from time to time, with the excreta of the patient, either alive or after their death has occurred.

Discovery of Trichinæ.—Trichinæ, as well as cysticerci, were first discovered in human beings in the dissecting room, by Dr. Simon, in 1835. Professor Leidy was the first to detect them in the pig. They were, however, repeatedly observed without their true import being ascertained until 1860, when Dr. Zenker, of Dresden, explained their origin and relation to certain symptoms of obscure attacks of sickness, and described the disease trichinosis or trichiniasis. In the same year Leukart published his elaborate and trustworthy investigations upon the subject of the trichina. Previous to 1860 the trichina had been identified only once in pork, although, as occurring in man, it had been well known for a quarter of a century. It is not decided how it will retain its vitality when encysted in human muscles.

Remarkable Vitality of the Trichinæ.—Professor Langenbeck, of Berlin, has reported a case where, in removing a tumor from the neck of a patient, eighteen years after the man had an attach of trichiniasis, which passed for poisoning at the time, he found living trichinæ in the fragments of attached muscles; and it is stated on good authority that they have been known to exhibit signs of life after a still greater lapse of time. As in this instance, before Zenker's discovery, very many cases passed for poisoning, for typhoid and rheumatic fever, and for other diseases. An epidemic involving over five hundred persons in Blankenberg, Germany, was treated as an outbreak of gastro-rheumatic fever, and it was only several years afterward that the attention of one of the gentlemen who suffered from the disease being called to Zenker's discovery, he submitted to an operation for the removal of a small piece of one of his pectoral muscles, in which encysted trichinæ were detected, and the true nature of the disorder which had affected the five hundred patients many years previously was revealed for the first time.

Trichina and Its Cyst Completely Calcified.

Epidemics of Trichiniasis.—In this country severe epidemics have occurred in New York, Mississippi and Iowa, and isolated cases are from time to time appearing in various other States. In 1875, it is stated, that there were some eighty cases of trichiniasis in Berlin, and about seventy-five near Hanover. A group of cases occurred in 1882 in Bridesburg, and another near New York. In 1874 there was quite a severe epidemic in the family of a pork packer residing in Buffalo, New York. The disease is as rare in France as it is common throughout the German Empire.

Vitalty of Trichinæ After Death of Infected Hog.—In pork the trichinæ may be found either encysted or naked among the muscular fibres. It is not certain how long they may live after the pig is killed, but they are known to be capable of propagation after remaining for one hundred days in putrid pork. The frequency of the disease in swine is probably as great, if not greater, in America than elsewhere; but here mankind is not so often infected, because less raw or under-done sausage, ham, bacon, and so forth, is eaten with us than in Europe. Of 1,394 hogs taken at random, and examined by the Chicago Academy of Sciences, twenty-eight were found to be infected with trichinæ; but this large proportion can only be accounted for on the supposition that an epidemic among swine was then raging.

Method of Detecting Trichinæ.—The editor of the *American Journal of Microscopy* recommends that in examining the flesh of swine suspected of being infected with trichinæ, the following method should be adopted: The parts of the animal to be first tested are the diaphragm, the tenderloin, and the muscles of the head and throat. In the ham, the most likely place to find the parasites is where the muscle ends in tendon. A thin slice should be cut off with a sharp scalpel, or with a pair of scissors curved on the flat. This thin section should then be soaked for some minutes in acetic acid, spread out on a glass slide, and covered with a thin glass in the ordinary way; or, if the section happens to be very thick, a compressorium, in which the two plates of glass are forced together by means of a lever and screw, will be found very useful.

Human Muscle Containing Calcified Trichinæ. (Natural Size.)

A little instrument constructed on the plan of the compressorium, and called a "trichinoscope," is sold to supply the popular demand for home protection against trichinæ.

Infected Pork Should be Destroyed.—All pork which has been found to contain trichinæ should be seized, condemned and destroyed, either by fire or by strong mineral acids, such as the sulphuric or nitric. Mere burying of poisonous meat of this kind is obviously not sufficient. Moreover, the question as to whether owners of such carcasses should not be compensated for all property confiscated, is well worthy of consideration; because if such was the rule, butchers and dealers would have no inducement for concealment and fraudulent sale.

Only Safe Rule.—In spite, however, of any apparently perfect system of inspection, such as that adopted in Germany, dangerous meat, from some cause or other, will necessarily escape observation, so that the only safe rule for us to adopt, and to urge upon everybody else, is never to eat any pork which has not been thoroughly cooked.

It is not safe to trust to pickling and smoking, even when these processes are combined, as is ordinarily the case, and it must be borne in mind that meat is seldom thoroughly cooked when cut in slices more than an inch thick.

The fact that two dangerous and often fatal maladies like trichiniasis and cysticercus disease, both of which are generally beyond the reach of medical treatment when once they have infected the human system, are not infrequent from eating pork which has been imperfectly cooked, should render the employment of this culinary precaution in regard to all meats universal, especially as it is a safeguard so easily applied.

Myositis.—This affection consists in an inflammation of the voluntary muscles, and may arise from injury to or overuse of a muscle, from gout or rheumatism, from secondary syphilis, or from infection followed by suppuration.

Treatment.—The treatment for injury or overuse of muscle is absolute rest of muscle and the local application of anodyne lotions.

If due to rheumatism or syphilis, prompt relief will follow treatment appropriate to these affections.

Degeneraton of Muscles.—Fatty degeneration is occasionally observed in muscular tissue—in which the tissue is converted into a fatty granular mass.

Treatment.—By use of passive motion, massage and electricity to improve nutrition of the muscles.

Ossification.—Ossification of a portion of a muscle, or more frequently of its point of insertion into a bone, is occasionally observed as a result of long-continued irritation. Its course is slow and unaffected by treatment.

Tumors.—Muscles may be the seat of cancerous, syphilitic, vascular, cartilaginous or osseous growths. The treatment depends entirely upon their nature; non-malignant growths can often be removed by dissection; cancerous or malignant growths involving muscles of the extremities should be cut out or, as many cases call for, prompt amputation of the limb.

The Muscular System Front view.

THE MUSCULAR SYSTEM (See Adjoining Plate).

The plate presents a comprehensive view of the front muscles of the body. They may be grouped and viewed thus:

Head Muscles.—1. These are seen above the eyes, and are used for elevating the upper eyelids and corrugating the forehead.

Face Muscles.—2. These are muscles of expression and mastication. Those about the eyes are used in winking and opening and shutting. Those seen at either side of the nose lift the cheeks and lips. Those at the sides control the lower jaw in eating.

Neck Muscles.—3. These serve to lower and raise the head and turn it from side to side.

Shoulder Muscles.—4. These embrace the shoulders and upper arm. They are the great lifting and hitting muscles. The prominent one on the upper arm is the biceps muscle, or muscle with two heads.

Muscles of Forearm.—5. These control rotary, flexor and extensor motion, from the elbow to the wrist.

Hand Muscles.—6. These control all hand motions—opening and shutting, rotation, flexor and extensor movements.

Chest Muscles.—7. These are radiating from sides to centre. They control the twisting, elevation and lowering of the upper part of the body.

Abdominal Muscle.—8. This is seen in the centre, in white. It is intimately connected with breathing and raising and lowering the diaphragm. At its top is the *solar plexus,* the spot upon which prizefighters seek to deliver their knockout blows.

Hip, Thigh and Leg Muscles.—9. These powerful muscles coöperate for every kind of movement and exhibition of strength. The two strap-like muscles of the upper leg are the sartorial, or tailor's muscles, which enable us to cross our legs.

Lower Leg Muscles.—10. These are also powerful, and possessed of rotary, flexor and extensor power. They largely control the feet in walking, operating clear to the ankle joint.

Foot Muscle.—11. These control from instep to toes, each toe having its elevating and depressing muscle. The rotary motion of the foot is imparted wholly from the ankle.

PART XIII OF BOOK IV

Tells of the diseases to which children are particularly susceptible, giving the newest and most reliable treatments.

ILLUSTRATIONS

CURATIVE MEDICINE

PART XIII.

DISEASES OF CHILDREN

Proneness of Children to Certain Diseases.—While the diseases incident to those between three and fifteen years of age, which constitutes the period of childhood, are not confined exclusively to this time of life, and while they are few, if any, which may not occur also among infants or adults, children are particularly prone to the development of certain ailments which are rarely seen among those either older or younger. Many of the acute infectious diseases, such as scarlet fever, measles and chickenpox belong more especially to this period, first, because children seem particularly susceptible to them; and, second, because, as they reach an age when they begin to mingle with others, they become liable to exposure to contagion, and having once had them they become, as a rule, immune, or free from liability to their recurrence, from the well-known fact that most of these diseases generally occur only once in a lifetime.

As these constitute a large proportion of what are ordinarily known as children's diseases, it will be appropriate to consider them first.

ACUTE INFECTIOUS DISEASES

MEASLES.

General Description.—This disease, known also as morbilli and rubeola, is highly contagious, being conveyed not only by the touch and breath of the one affected, but also by infected articles and by a third person. Of all the contagious diseases it is the most liable to recur, there being sometimes, though not often, several attacks in the same person.

Characteristics.—It is characterized by fever, catarrhal symptoms and an eruption. Unless complicated by more serious ailments, such as bronchitis, which is the most frequent, it is rarely fatal if malignant forms such as hemorrhagic and black measles be excepted. From ten to twenty days elapse after exposure to contagion before the symptoms develop.

Symptoms.—The ordinary symptoms of a cold in the head, with feverishness and often headache and nausea are usually first noticed, being accompanied or soon followed by cough. These persist with increasing fever until, usually on the fourth day, an eruption appears, beginning on the forehead, neck and face, and during the next twenty-four hours gradually extending over the entire surface of the body. It consists first of distinct, slightly raised red spots resembling flea-bites, which disappear momentarily on pressure; they gradually increase in size and sometimes join each other, becoming confluent and making continuous patches of dusky redness, between which healthy skin may be seen.

An entire day before the eruption appears, examination of the inner surface of the cheeks will reveal the presence of bluish-white spots.

Length of Eruption.—The eruption remains at its height only about a day, when it begins to fade, and in two or three days it has entirely disappeared. To a less extent than in scarlet fever, desquamation of a fine branny character follows, more especially when the eruption has been intense.

Temperature.—The temperature, which during the first few days continues to rise, gradually declines when the eruption appears.

Swollen Glands.—At the height of the disease the glands of the neck and the features are swollen, and the eyes are sensitive to light and affected with a profuse watery discharge which may become thicker.

Diagnosis.—Measles may be mistaken for scarlet fever and for German measles. Its rash, however, is more blotchy and less uniform than that of the other diseases and does not appear as early as does that of scarlet fever. The catarrhal symptoms are more pronounced, while in scarlet fever sore throat is a prominent feature.

Treatment.—1. For the fever, from five to ten drops of sweet spirits of nitre in a teaspoonful of solution of acetate of ammonium, or simply in sweetened water, every two or three hours, will not only reduce the temperature but act on the skin and kidneys.

2. If a laxative is needed give a half wineglassful of citrate of magnesia every half hour until the desired effect is produced. Or give one-twelfth of a grain of calomel every hour. This will be helpful also in

settling the stomach if it is irritable, especially if combined with two grains of bicarbonate of soda.

3. For diarrhœa, which sometimes occurs, give a teaspoonful of chalk mixture every two or three hours, with five or ten drops of paregoric and two or three grains of subnitrate of bismuth.

4. For the inflamed eyes, bathe them with tepid water and drop into them every hour or two a few drops of a solution of twenty grains each of borax and boric acid and an ounce each of rose water and camphor water. The surface of the eyeball may be thoroughly cleansed with this solution, by gently separating the lids with the thumb and forefinger of the left hand and carefully expressing a medicine dropper full of the liquid into the corner of the eye. Before using it the liquid should invariably be made lukewarm by immersing the bottle containing it in a vessel of warm water for a few minutes.

5. The cough will be relieved by freely drinking flaxseed tea, with a little sugar and lemon juice, or by a half teaspoonful of brown mixture given every two hours. Camphorated oil may be applied to the chest every few hours, and a thin sheet of cotton wrapped around the chest to protect from liability to cold. If persistent, the cough may be benefited by the following, given in doses of a teaspoonful every two or three hours to a child from five to ten years old:

Carbonate of ammonium........................	16 grains
Chloride of ammonium	24 grains
Syrup of wild cherry enough to make	3 ounces

Or one-half teaspoonful of elix terpen hydrate and heroin every 2 or 3 hours.

6. During convalescence it is advisable to give some such reconstructive and tonic as syrup or solution of hypophosphites, a teaspoonful three times daily, or a like amount of a good extract of malt, with or without cod-liver oil. This will aid in the prevention of serious constitutional and pulmonary ailments which sometimes occur as sequels of this disease.

Nursing.—The patient should be kept in bed and protected from exposure to cold, as the chief danger is from liability to bronchitis and pneumonia. Bathing the body with lukewarm water every few hours. uncovering only a small portion of the surface at a time, will add to comfort and aid in reducing fever. The room should be kept darkened on account of the condition of the eyes. When the eruption appears to be delayed or does not come out well, warm baths and hot drinks should be employed.

Diet.—Plain, simple, nutritious diet, such as is suited to all fever cases should be given. Milk and broths will be found useful as a foundation for other articles of food.

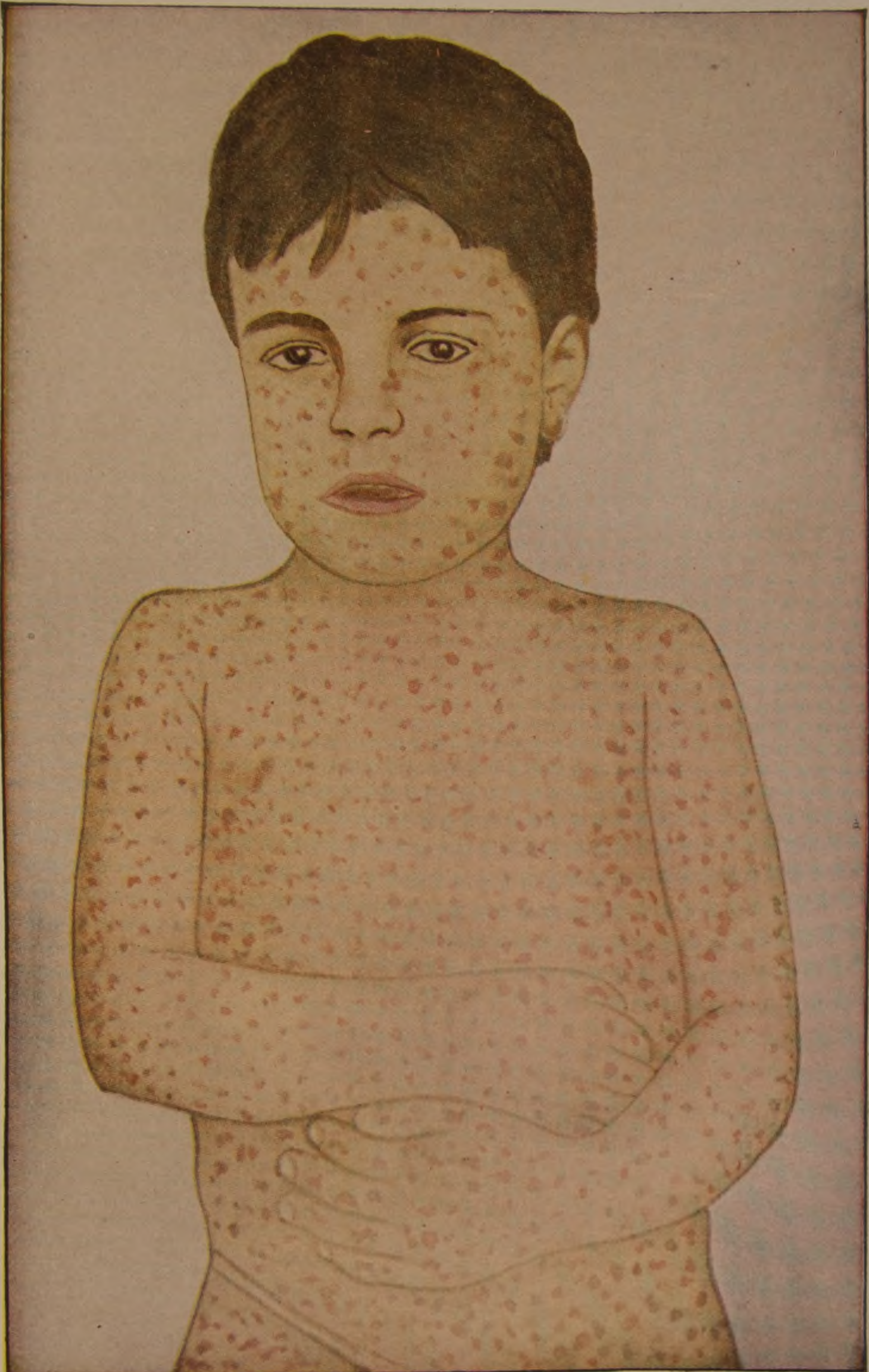
General Remarks.—Any case of measles should be treated as a serious disease, and is epecially dangerous to children under five years of age and those constitutionally weak. It kills usually by causing pneumonia, abscess of the lungs, or in the ear, and very frequently causes consumption. It injures the eyes, which is due to their covering membrane being inflamed. Deafness is a frequent result, following abscess of the ear, which is noticed by the attendant as a yellowish discharge of pus (matter) running from one or both ears. This abscess may cause inflammation of the membranes of the brain (meningitis) by breaking through the base of the brain, and may be fatal.

It is a mistaken idea and a wrong one to purposely expose a child to measles because "they might as well contract it while young."

Measles is one of the most contagious diseases of childhood. Ninety-eight per cent. out of every one hundred children who have not had measles will take it by coming in contact with another case. It is "catching" four days before the "rash" or breaking out in the skin occurs, and remains so until the falling off of the bran-like skin flakes is completed, a total period of twenty-one days.

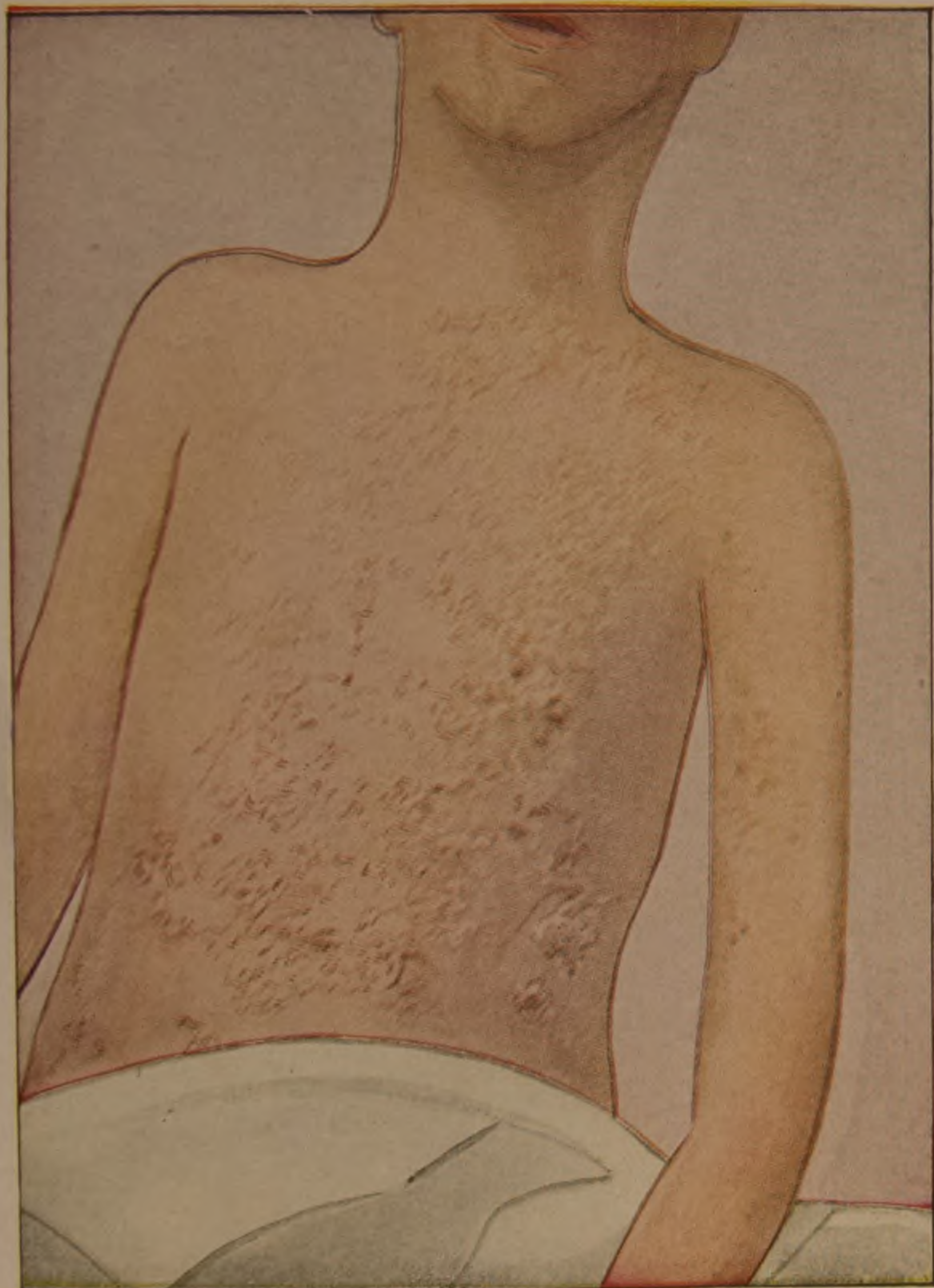
The early symptoms of measles begin as an ordinary cold. The child coughs, sneezes, has a running nose, the eyes are red and injected, there is a slight fever, loss of appetite and general restlessness at night. Children attending school with these symptoms should be sent home, and if a general epidemic breaks out, it is better to close and disinfect the school.

Every case of measles must be reported promptly to the Board of Health by the physician or guardian of the child. The neglect of parents to summon a physician on account of the expense or fear of quarantine and ignorance chiefly in regard to the dangers of measles, are main factors in causing the spread of epidemics. Children treated at home do get well without a physician, but the danger lies in the child being allowed to get up and go to school or play with other children before the time of "catching" is over. Because your child has recovered rapidly is no reason why your neighbor's child should be exposed and possibly have a severe illness followed by pneumonia, abscess of the ear, deafness, etc., and death in many cases.



©E. J. S.

MEASLES (Rubeola).
Fifth and Sixth Days.



©E. J. S.

SCARLET FEVER.
Period of Decline.

SCARLET FEVER (Scarlatina).
Third and Fourth Days

All sufferers from measles should be removed to a room which can best be shut off from the rest of the house; carpets, curtains, necessary furniture and clothing should be removed. Kill all flies in the room and screen the windows and doors if necessary to keep others out. Lower the curtains to protect the patient's eyes from direct, bright light. Keep patient in bed continuously until all fever, cough and rash have disappeared. Allow windows of room to remain open, but do not expose patient to draught. Fresh air will not hurt if child is warmly clad. Members of the family who have not had the measles should stay in the house. This is necessary, for they are liable to catch it at any time and give it to others before the rash appears. Adults who have had measles can go about their occupations, but must not go near the patient or attend churches, theatres or other public gatherings. School teachers should not attend school if measles is in their home. Children who have had measles may go to the homes of relatives if there are no children, and their person and clothing have been disinfected. They cannot attend school, however, until fourteen days have elapsed and must not return or visit home until the room where the patient has been ill in, has been disinfected and the quarantine lifted.

Dishes, etc., used by the patient must be dipped in a solution of chloride of lime before being taken to the kitchen. One-half pound of lime to a pail of water is strong enough for disinfection. Napkins, towels, bed linen, etc., must be dipped in the above solution before being removed from the room. Remember it is cheaper and easier to follow the above precautions than to have another case in your own house, and is necessary to prevent your neighbors from contracting the disease.

GERMAN MEASLES.

General Description.—German or French measles, known also as rötheln and rubella, is a contagious disease, usually mild in character, having as its main features fever and eruption. It resembles in some respects genuine measles. After exposure to contagion, from ten to twelve days elapse before the symptoms develop.

Symptoms.—Frequently the first symptom, and always early in the course of the diseases, is the appearance of an eruption on the face, which during the first day spreads to the body and extremities. It consists of reddish spots, rather brighter than those of measles, which like those in that disease are somewhat raised and disappear on pressure. In the course of two or three days it fades away and is followed by slight branny desquamation. Accompanying this are slight fever and mild catarrhal symptoms, with quite frequently swelling of the glands of the neck.

Diagnosis.—The diagnostic points to be observed are sufficiently noted in the section on measles to which the reader is referred.

Treatment.—Rarely is more treatment needed than the spirits of nitre, recommended for the fever of measles, and for the itching of the skin, which is sometimes an annoying symptom, the surface may be dusted with compound stearate of zinc with menthol.

Nursing and Diet of a special character is not needed.

SCARLET FEVER.

General Description.—Scarlet fever is one of the most serious of the acute infectious diseases of childhood, and is characterized by fever, eruption and sore throat. It is known also as scarlatina, a term often erroneously understood to mean a mild form of the disease. Though distinctly contagious it is not so markedly so as measles, but infected articles of clothing, and so forth, retain the power to convey the disease for long periods of time. One attack generally protects from another, although exceptions to this rule occur. From three to twelve days, and sometimes more, elapse after exposure to contagion before the disease develops.

Symptoms.—These are usually sudden in their onset. The child previously apparently well or merely languid is without assignable cause seized with vomiting or has a chill. High fever, with the temperature ranging from 103 degrees to 105 degrees, rapidly supervenes, the face is flushed, the throat is inflamed and dry, the head aches and the tongue is somewhat coated, with red points projecting above the surrounding surface, somewhat resembling a strawberry in appearance.

Usually on the following day a scarlet eruption appears, first on the chest, and extending rapidly over the body, being most marked in the flexures of the joints and where the surface of the skin is particularly subjected to pressure or heat. This redness may be quite uniform or may occur in patches, with intervening areas of healthy skin. On drawing the fingers quickly over the surface a white line appears, which is, however, replaced almost at once by the original efflorescence. On this red base are to be seen many distinct, bright, minute red points, and occasionally larger red spots. The inflamed surface occasions itching of varying intensity and swelling of the skin. In the course of two or three days the eruption gradually fades, and with this the temperature declines. The outer layer of the skin now gradually peels off in flakes of variable size, the palms of the hands and the soles of the feet usually being the last to undergo this process. Until this has entirely ceased, and it may be prolonged to six or eight weeks, the danger of conveying the disease persists, inasmuch as the source of contagion lies largely, though not exclusively, in these particles of skin.

Prominent Features of the Disease.—Among the most pronounced features of the disease are the swollen glands of the neck and the inflamed condition of the throat, which may be so marked as to produce patches resembling those seen in diphtheria. These consist of a membranous exudate which sometimes extends from the throat into the adjacent passages, causing serious complications. Among these is inflammation of the middle ear, with perforation of the ear drum, one of the most frequent causes of deafness. Frequently the kidneys become involved, acute inflammation of greater or less intensity occurring. Recovery from this, however, is usual.

Convulsions.—Convulsions may be present either from the kidney complications or from profound impression on the nervous system by the poison of the disease. In the latter cases the disease assumes a malignant type, with excessive temperature, delirium, stupor and often diarrhœa and vomiting, as symptoms which rapidly lead to a fatal issue, sometimes within a few hours. On the other hand, cases occur which are so mild as to be scarcely recognizable as genuine scarlet fever, except from observation of a sequel and inquiry as to preceding circumstances. A physician, for instance, may be consulted for edema or dropsy of the extremities, indicating the existence of kidney affection, and on investigation may ascertain that a few weeks before the child had had a slight rash, followed by desquamation, without complaining sufficient to be kept in bed, and that there is a history of its having been exposed to the contagion. Such a record would justify the diagnosis of scarlet fever.

Irregular Manifestations.—Besides these variations from the usual type of the disease there are irregular manifestations, such as the hemorrhagic form, and grave complications such as gangrene and heart disease, which cannot, however, within the limits of this article, receive more than passing mention.

Diagnosis.—1. Acute exfoliative dermatitis is a disease of the skin in which marked desquamation occurs, resembling in this particular scarlet fever. The throat symptoms, however, so significant of the latter disease, rarely occur, nor is the characteristic appearance of the tongue present.

2. **Measles.**—The throat symptoms instead of the catarrhal manifestations; the sudden onset instead of the gradual development; the character of the eruption and the fact that it appears much earlier in scarlet fever, and the difference in the temperature record usually suffice to enable a diagnosis without much difficulty.

3. **German Measles.**—This has already been discussed in connection with that disease.

4. **Diphtheria.**—From this disease it differs, in that the false membrane in the throat does not appear for a number of days after the beginning of the illness, whereas in diphtheria it is seen at once. The early appearance and the characteristics of the eruption are also diagnostic points of value.

Nursing.—A warm bath at the outset of the disease will promote the activity of the skin and aid in bringing out the eruption. Frequent sponging with lukewarm water throughout the attack is of advantage. When desquamation begins the surface of the body should daily be anointed with carbolized vaseline or other ointment oil to facilitate the process of scaling and to aid in preventing the small particles from becoming scattered. Particular care should be exercised to gather all these and burn them. In order that all may be obtained a large sheet should be spread on the floor beneath the bed. The utmost caution should be observed to prevent the patient from taking cold, both during the attack and after convalescence is established, and for fully a week after the temperature is normal he should still be kept in bed.

Diet.—Milk, broths and water may be freely given, and if the fever is high ice bags may be advantageously applied to the head.

Treatment.—1. For the throat symptoms, a spray of peroxide of hydrogen and water, equal parts, should be used; or a saturated solution of chlorate of potash may be employed as a gargle. Cold applications to the neck are also useful.

2. In severe cases stimulants may be required for the weak condition of the heart. Half teaspoonful doses of whiskey, or ten-drop doses of aromatic spirits of ammonia in water should in these cases be given every two hours. Drop doses of tincture of digitalis every three hours are also useful.

3. In case the inflammation extends from the throat and involves,

as it often does, the ear, the aid of a specialist in ear troubles will probably be required to save the patient from impairment of hearing.

4. In inflammation of the kidneys, five grains of acetate or citrate of potash and a teaspoonful of infusion of digitalis every three hours will be proper for a child five years of age.

5. The following is useful for the reduction of fever:

Tincture of aconite........................	20 minims
Solution of citrate of potash................	3 ounces

Give a teaspoonful in a little sweetened water every hour until the fever is reduced and the skin becomes moist.

Another prescription is: Tincture of aconite root, 25 drops; salicylic acid, 1 drachm; syrup, 2 ounces. Teaspoonful every two or three hours. Or, tincture of iron in five to ten drop doses every four hours.

The external use of fat, raw bacon is recommended in connection with which use a gargle composed of one teaspoonful of cayenne pepper, two teaspoonfuls of salt and half a pint of boiling water, to which, after straining, is added a pint of vinegar. Gargle the throat frequently with this mixture and adults may take one teaspoonful internally every hour, and children in proportionately smaller doses, according to age.

General Remarks.—Scarlet fever is one of the most contagious diseases that attacks children and those of a run down constitution. It is contagious in its mildest form and very often these mild cases are the ones which spread an epidemic, as they are overlooked by the guardians of the children and physicians unless very carefully examined, owing to the absence of the rash, the child simply complaining of sore throat, tiredness and loss of appetite. The severest cases can develop by coming in contact with the mildest ones.

Scarlet fever is one of the most dangerous diseases of childhood, owing to its after-effects. The common after-effects are inflammation of the kidneys (acute nephritis), heart disease, abscess of the ear, the glands of the neck, and joint affections. Deafness may follow an abscess of the ear. If the abscess breaks through the floor of the skull, inflammation of the coverings of brain occurs (Meningitis).

A case of scarlet fever may develop in one to seven days after a child or adult has come in contact with a case.

A person catches scarlet fever by taking in the germs that have been shed or discharged from the nose and throat of the patient having the disease. The germs are usually inhaled or taken in through a sore or cut surface on any part of the body.

The early symptoms of scarlet fever consist of vomiting and fever, and older children and adults complain of sore throat. A normal case shows a rash which appears in from twelve to forty-eight hours. It is seen first on the neck and upper part of the chest as fine, bright red, pinpoint spots, which spread to the face, arms, legs and body of a well-marked case. The child is fiery red in appearance (the so-called lobster appearance). High fever occurs, and a discharge from the nose is seen. The throat is red, the tonsils show whitish or dirty yellow spots; the tongue is coated and red spots present themselves through the gray coat (Raspberry Tongue).

Every case of sore throat in a child should be considered serious, and a physician summoned at once to say whether it is scarlet fever or diphtheria. Do not allow a child with a sore throat to play with other children, attend school, Sunday-school included, until the diagnosis is settled. The spread of scarlet fever can be prevented by placing the patient in a room for a period of from five to eight weeks, depending upon the time of peeling, when the large pieces of skin are thrown off, and all discharges from the nose, ear, etc., end.

All cases must be reported to the Board of Health by the physician or guardian in attendance. The custom of placing a sign on the front and back doors of a house where the patient is confined must be permitted; it acts as a warning to others and must not be removed until done so by the health authorities. If the patient is not sent to a contagious hospital, he or she must be placed in a room away from the rest of the family. Wherever possible a trained nurse or attendant should be placed in the room and should not leave it until the quarantine is lifted. No one should be permitted to visit the room but the physician, who should be furnished with a gown to wear upon entering and taken off when leaving. The room must be screened and all living flies and insects destroyed. Carpets, curtains, clothing, hangings removed wherever possible. A sheet dipped in a solution of chloride of lime (one-half pound of chloride of lime to a pail of cold water) must be hung over the doors of the room. As the germs of the disease settle everywhere in the form of fine dust, the nurse should wipe off all surfaces in the room and the door-knob with a cloth moistened in the chloride of lime solution. The hair of the nurse or attendant should be completely covered by a covering of washable material and the outer garment by a long gown or slip. If it is absolutely necessary for the nurse or attendant to leave the sick room, she must leave her shoes and covering in the room. Outside the door she must wash her hands in the chloride of lime solution.

Dishes, napkins, bed linen should not be removed or washed until dipped in the chloride of lime solution, kept at the sick room door. Bowel movements or urine carried from the sick room should be wrapped in a towel wet in chloride of lime solution.

The health authorities demand that no teacher or scholar living in the house at the time of the outbreak or during the course of the disease, shall attend school of any kind until permitted to do so by them.

Milk jars cannot be returned to the milkman until they have been disinfected under the supervision of the Board of Health. The Board of Health will not disinfect or fumigate until the case is through peeling, all discharges have stopped and the patient recovered. Peeling may not occur from five to eight weeks. The danger of contagion during this period can be lessened by greasing the surface of the skin with lard or cocoa butter, which prevents the scales from blowing around the room. The nurse can hurry the peeling by gently peeling the large flakes of skin off when loose and collect them in a vessel to be treated with chloride of lime solution.

When the room is ready for disinfection, do not take out the clothing of nurse, patient, or gown worn by the doctor, bed linen, etc. Spread them out in order to allow the disinfectant to readily reach them.

In case of death, the funeral is usually ordered held within thirty-six hours and must be private.

CHICKEN-POX.

General Consideration.—Chicken-pox or varicella is a contagious disease having an eruption of vesicles. It generally occurs in children under six years of age, though it is sometimes seen in adults One attack confers immunity from a recurrence in the same individual. From ten to seventeen days elapse after exposure to the contagion before the symptoms develop.

Symptoms.—Often the appearance of the eruption is the most marked symptom, although there is also slight fever which may be accompanied by chills, vomiting, headache and pain in the back and legs. The eruption comes out during the first day, usually appearing first on the chest or back, though sometimes on the forehead in the form of red spots. Later they are seen also on the extremities. They vary in number from one or two dozen to several hundred.

In the course of a few hours the papular spots become vesicular, filled with a turbid liquid, and these by the end of a day or so begin to dry. Fresh crops during the few days following continue to appear, so that by the third or fourth day they may be seen in all stages of development. Itching is often quite marked, and scars are apt to result if the patient is not prevented from scratching.

Diagnosis.—Failure to distinguish this disease from mild cases of small-pox has not unfrequently occurred. In the latter disease, however, the eruption does not appear until the third or fourth day of the disease, and it is first seen on the face and forehead. The vesicles are not present until the fifth or sixth day; they become depressed in the centre and by the eighth day become pustular, not beginning to dry until after this time. The eruption is not seen in different stages of development as in chicken-pox. It is quite frequent in small-pox also to observe in the beginning of the attacks rashes resembling those of scarlet fever and measles.

Nursing and Treatment.—A mild laxative and a simple fever remedy are all that are required. Five drops of sweet spirits of nitre in a little water every hour, if the fever is marked, will be sufficient. Most cases require no treatment except isolation.

The following contagious diseases differ from those already considered, in the fact that they occur without eruption, namely, diphtheria, whooping-cough and mumps.

DIPHTHERIA.

General Consideration.—This is a highly contagious constitutional disease, having a local manifestation in the form of a false membrane, which occurs either on the skin, or, more often, on the mucous membrane. Its usual locations are the throat, nose and larynx. The disease may be very mild or it may be extremely fatal. Different epidemics exhibit different degrees of virulence, and the cases occurring early in a given epidemic are usually the most severe. It is communicated by inoculation, by contact with the person affected, by means of the saliva, the pharyngeal secretions and portions of membrane; by exposure to the poison of the disease through the agency of infected clothing, bedding, apartments, and so forth, and through foul emanations. Defective sanitary conditions favor its development. Its occurrence is associated with the presence of a certain special germ which is supposed to be the cause of the disease. In some cases, however, the germ cannot be found; in others it is seen only early or only late in the disease; while again the germ may be found in the throats of those who present no constitutional or local symptoms of the affection. One attack does not confer immunity from another attack, and the symptoms develop from two to twelve days after exposure to the contagion.

Symptoms.—The initial symptoms are those ordinarily attending a slight cold, such as a feeling of fullness and irritation of the throat, accompanied by moderate fever, chilliness and general lassitude. Although it may be delayed for a day or two, usually within a few hours, examination of the throat reveals on the tonsils the presence of a small whitish-gray patch or patches of fibrinous exudate or false membrane, which spread with greater or less rapidity, often involving the pharynx and nose, and extending downward to the larynx, and so forth. The color soon becomes dirty gray or yellowish. If the membrane is removed new membrane rapidly forms in its place. With the progress of the case, if it is severe, the constitutional symptoms become more marked; the glands of the neck swell; delirium and stupor may occur; the heart becomes weak and there is every indication of profound blood poisoning. This may indeed be manifested quite early in the course of the disease. With these grave symptoms it is not infrequent for the temperature to be but slightly raised or even subnormal. The presence of a thick membrane is not necessarily indicative of the existence of a grave case, for severe symptoms are quite as apt to occur when the membrane is thin. There may be considerable destruction of tissue from the sloughing membrane, giving rise to intense fetor.

When the membrane involves the larynx an additional element of danger confronts the patient in the mechanical obstruction of the air passages. The breathing is harsh and rasping, the voice often suppressed to a whisper, a brazen, croupy cough develops, pallor of the countenance and lividity of the lips may supervene, the patient struggles for air and unless speedily relieved death from suffocation occurs.

In the milder cases of tonsillar and pharyngeal diphtheria, after persisting for a few days, the membrane gradually disappears, coincident with which there is decided amelioration in the symptoms. Even in mild cases, paralysis of the muscles of the throat is quite apt to occur, causing difficulty in swallowing liquids, which often regurgitate through the nose. Renal complications sometimes occur.

Diagnosis.—In mild cases of diphtheria affecting the tonsils alone, it is difficult and sometimes impossible to distinguish them from cases of tonsillitis with exudation. As a rule, however, the thickness and gray color of the membrane, its tendency to spread, the glandular involvement and the general severity of the symptoms in diphtheria simplify the matter of diagnosis. The presence of the Klebs-Lœffler bacillus, the germ already alluded to, may be taken as confirmatory evidence of the disease.

In the present state of knowledge it does not seem possible to differentiate with absolute certainty between membranous croup which is non-infectious in character and which is probably relatively infrequent, and diphtheria affecting the larynx. The absence of constitutional symptoms and of local manifestations of diphtheria elsewhere, and inability to demonstrate the presence of the germ in portions of expectorated membrane are presumptive evidence of the non-contagiousness of the attack.

Cases of diphtheria sometimes occur in which there is an erythematous rash which may lead to confusion in diagnosing them from scarlet fever. For the points of distinction the reader is referred to the article on the latter disease.

Nursing.—The air of the room should be kept warm and moist, especially where there is a tendency to laryngeal involvement. Fresh air should be freely admitted and disinfectants employed to keep it pure. Pieces of ice may be allowed for the patient to suck and cold applications be made to the throat. Liquid nourishment should be systematically given.

Treatment.—1. In severe cases whiskey should be given every two or three hours in teaspoonful doses to sustain the vital forces.

2. The use of calomel and corrosive sublimate has its advocates, and while other plans of treatment are now more generally in use the benefit from their employment under suitable conditions seems incontrovertible. The writer has seen numerous cases in which the most violent symptoms, growing steadily worse, abated with surprising rapidity in response to the administration of from five to ten grains of calomel given hourly to a child until several characteristic movements of the bowels were produced. Corrosive sublimate in doses of about 1-100 grain have then been advantageously employed.

3. The local employment of lactic acid, one drachm to three ounce.

of lime-water, or of pancreatic extract, pepsin or vegetable pepsin, for the purpose of dissolving the membrane is advocated by some. Inasmuch, however, as the constitutional symptoms persist in spite of the removal of membrane and as its presence is usually not a menace to the patient the advantage of the practice is not apparent. It is of benefit, however, to use antiseptics locally. Peroxide of hydrogen diluted with an equal amount of water may be used as a spray every hour or two or weak solutions of formalin.

4. Iron and chlorate of potash have long been used, both for their local effect and their constitutional action. A mixture of this sort is of benefit:

Tincture of chloride of iron	1½ drachms
Chlorate of potash	48 grains
Glycerine	4 drachms
Water enough to make	3 ounces

Dissolve, and give a teaspoonful every two hours.

5. When the larynx is involved inhalations of the vapor of lime-water, especially in combination with liquor potassæ in the proportion of one drachm of the latter to one pint of the former, aid in dissolving the membrane. A blanket should be suspended over the bed in such a way as to form a tent, beneath which should be used a croup kettle or steam atomizer containing the liquid.

6. In cases which become progressively worse, and in which the signs of non-oxygenation of the blood indicate that death is imminent, tracheotomy in which the trachea is cut open, or intubation, in which, without cutting, a tube is inserted into the larynx through the mouth, will often save life if resorted to sufficiently early.

7. Tonics and reconstructives are needed in convalescence, and quinine, iron, arsenic and the hypophosphites, and the use of the most nutritious foods are indicated.

8. Antitoxin. Within the last few years the use of antitoxin, both as a means of prevention and of treatment, has been warmly debated. While its enthusiasts favor its employment in every case presenting symptoms of diphtheria, without even waiting to establish a diagnosis, in case doubt as to the character of the ailment exists, the more conservative men in the profession, who still have faith in its utility and efficacy, believe that the field for its employment should probably be limited to cases which present

methods of treatment. To procure good results, however, the remedy should be used as early as possible in all cases.

The improved methods in the manufacture of this product and its increasing reliability are fast gaining advocates for its more universal adoption.

In a child over two years of age from 1,000 to 1,500 units is the usual dose, or if the case is very severe, 2,000 units. The serum is very slowly injected beneath the skin, in the loose cellular tissue, preferably at the side of the abdomen, and allowed to be absorbed without friction. In from twelve to eighteen hours the dose is repeated if there is no improvement, and a third dose, usually of one-half the amount first used, may even be necessary. As an immunizing agent 1,000 units may be employed. The immunity conferred does not last a great while, probably less than thirty days, so that with new exposures, repeated immunization is necessary.

WHOOPING-COUGH.

General Consideration.—Whooping-cough or pertussis is a contagious disease, mainly of childhood, characterized by catarrh of the air passages and a significant cough. It is communicable from person to person by the breath and bodily exhalations and by the agency of apartments which have become infected. It is not the harmless disease which it is so often regarded as being, for aside from the deaths which result from the disease itself, there are very many which are indirectly traceable to it, owing to complications and the after-effects of the disease.

Symptoms.—For a week or ten days these are the symptoms of an ordinary cold, with cough, slight fever, and so forth. The cough gradually increases in severity and assumes the spasmodic character which gives to the disease its name. The paroxysms consist of a series of short expulsive coughs, in which the child often becomes blue in the face and apparently on the verge of suffocation, when a long drawn, noisy, whooping inspiration occurs. Thick stringy mucus is expectorated, often with vomiting, and sometimes with hemorrhages from the nose, lungs and so forth. Several of the attacks may follow each other in close succession and then a respite of varying length occurs. After several weeks the paroxysms become less frequent and less violent, and finally cease, although for many months mild attacks may be induced by transient colds, crying, and so forth. While one attack usually confers immunity, it is frequent for other members of the family in which the disease occurs to be affected by a nervous cough, closely simulating the true disease.

Nursing.—Except in very severe cases, with complications, or where the patient becomes exhausted from loss of food, it is not necessary to confine him to the bed or the house. An abundance of fresh air is desirable, although this must be secured without exposing other children to the danger of infection.

Treatment.—1. Inhalations by means of a steam atomizer or croup kettle, of medicated steam often afford relief to the paroxysms, limiting their frequency and severity. For this purpose carbolic acid, which may be advantageously combined with an alkali is recommended, as in the following formula, used by Dr. J. Lewis Smith, late of New York, and Dr. John M. Keating, late of Philadelphia:

Crystallized carbolic acid	3 grains
Borax	20 grains
Bicarbonate of soda	20 grains
Glycerine	1 ounce
Water	1 ounce

Some of the crude coal tar products, such as cresol, have proved markedly beneficial by inhalation.

2. Internally, belladonna has long been employed with a fair measure of success. For a child of five years, six or eight drops of the tincture should be given night and morning, until the characteristic dryness of the throat is produced.

3. Antipyrine in doses of three or four grains several times daily is often helpful, but must be given with care on account of its depressing effect on the heart.

4. Bromide of potash, from three to five grains, every three hours is useful where the nervous element of the disease is prominent.

5. Bromoform, a drop for each year of the child's age, given every three or four hours, is one of the most satisfactory of the more modern remedies.

MUMPS.

General Consideration.—Mumps, parotitis or parotiditis, is an infectious disease in which inflammation and swelling of the parotid gland occurs. Its symptoms develop from twelve to twenty-one days after exposure to the contagion. Unless complications occur, it is not a serious malady.

Symptoms.—Slight fever, swelling and tenderness of the parotid, and sometimes submaxillary and sublingual glands, with or without pain, are the main symptoms. The swelling extends both in front of and behind the ear, and eating, swallowing and even speaking may be difficult. The secretion of saliva is at times increased, at others, diminished. Either one or both sides may be affected, and in the former cases the immunity which is conferred by one attack is limited to the side which was involved. After lasting for a week or ten days, recovery rapidly takes place. Among the complications are the occurrence of orchitis and occasionally of mastitis.

Nursing.—Care should be taken to avoid exposure to cold and the patient should be fed on liquid and soft foods.

Treatment.—Nothing more than a mild laxative and a slight fever mixture is required. Either heat or cold, whichever is most comfortable, may be applied, and an ointment of ichthyol and lanoline one part to four, or camphorated oil.

MISCELLANEOUS DISEASES.

In addition to the contagious diseases, both eruptive and non-eruptive, are several which, though not confined exclusively to children, occur so often in them as to require consideration.

ST. VITUS' DANCE.

General Consideration.—St. Vitus' dance, or chorea, is a disease of the nervous system, characterized by involuntary and irregular muscular movements, without consciousness being suspended. There is a marked connection between this disease and the occurrence of acute rheumatic fever or inflammatory rheumatism and of endocarditis, or inflammation of the membrane lining the heart's cavities. It more frequently is seen in those having a pronounced nervous temperament and there appears often to be a family predisposition to the disease.

Strong emotional occurrences, such as deep grief, fright, and so forth, are sometimes the exciting causes, as are also great nervous strain and mental application.

Symptoms.—Every effort of the patient to perform a voluntary muscular act is attended by irregular spasmodic movements, over which he has no control, and the stronger the effort made, the more pronounced is this condition. The symptoms generally come on gradually, though sometimes suddenly, beginning usually in the hands and arms and extending to the face and legs. One or both sides may be involved and the movements may be general or confined to a few muscles. During sleep they are rarely continued. The disease may last for a few weeks only, or may persist in spite of treatment for many months or even years. It frequently recurs, especially in the spring of the year.

Nursing.—1. Rest in bed, quiet and separation from those members of the family who are not actually engaged in taking care of the patient should be secured. The general improvement of nutrition by means of good food and tonics should be aimed at and efforts made to overcome any impairment of the digestive function. After a few days of rest, which in very severe cases may have to be obtained by gentle restraint of the active muscles, massage and carefully regulated Swedish movement will be of advantage. Spraying the spine with ether is sometimes beneficial.

2. Iron in assimilable form, as the peptonate, is useful. The arseniate of iron in doses of 1-100 of a grain or more three or four times a day is an eligible preparation.

3. Arsenic in the form of Fowler's solution (liquor potassæ arsenitis) is more employed than any remedy. For a child of eight years five drops may be given in water three times a day after meals, and the amount increased until the constitutional effect is produced.

4. Strychnine has also been employed in many cases with good results. Beginning with a dose of 1-150 of a grain it may be increased until its physiological effects are noticeable.

INCONTINENCE OF URINE (Wetting the Bed).

General Considerations.—Incontinence of urine or eneuresis is a disease frequently occurring in children, both in acute and chronic form.

Sometimes due to malformations of the bladder it is more often caused by irritation due to too great acidity of the urine, stone in the bladder, phimosis and the presence in the rectum of worms or of a fissure. Or it may be due to weakness of the muscles of the sphincter controlling the bladder, to their being in an irritable condition, or to an excessive secretion of urine. It is the form occurring at night with which we are particularly concerned.

Treatment.—Manifestly the treatment must depend on the condition present.

1. Too great acidity is readily cured by administering liquor potassæ (solution of potash) in five-drop doses every three hours in a wineglassful of water, and continuing it for a while after the urine has become neutral or alkaline in reaction.

2. Where there is too great contractile power of the muscles, belladonna should be given in five-drop doses of the tincture, at bed-time, to a child of five years, to be increased if not productive of good results until pronounced dryness of the throat occurs. If it is beneficial it may have to be continued for some time to avoid a relapse.

3. Where there is a lack of tone to the muscles, extract of nux vomica and ergot are often useful.

4. An excessive amount of urine may be controlled by limiting the fluids taken before retiring for the night.

5. The other causes of incontinence must receive their appropriate treatment.

The following prescription is useful in many cases:

R.—Tr. Belladonna	1½	drachms
Fld. ext. Ergot	3	drachms
Syrup rhubarb	1	ounce
Syrup q. s. ad.	4	ounces

A teaspoonful three or four times a day for a child of five and larger doses in proportion to the age.

WORMS.

General Considerations.—Several forms of worms infest the intestinal tract, the most common of which, in this country, are the "round worm," "thread worm" and "tape worm."

Round Worms.—The round worm or ascaris lumbricoids is reddish or yellowish-red in color and cylindrical in shape, with tapering extremities, resembling somewhat the ordinary earthworm. From the intestinal canal it may travel to any part of the alimentary tract, and has been found in other parts of the body. They may occur singly or in large numbers.

Thread Worms.—The thread worm, pin worm or oxyuris vermicularis is a small whitish worm inhabiting the rectum and colon.

Tape Worm.—Of tape worms there are two kinds common in man, the tænia solium or pork tape worm and the tænia saginata or beef tape worm. The latter is the larger, often being twenty or more feet in length. Its head is provided with "suckers," by means of which it adheres to the mucous membrane of the intestine; the pork worm has also hooks which it inserts and secures a firmer hold. The entire body may be cast off, yet if the head remains a new body will grow in the course of a few months to as large a size as the first. The body is composed of small flat segments, appearing like a piece of tape marked into squares or oblongs. Separate segments or continuous ribbons of segments are often passed and are for a short time endowed with slight mobility.

Symptoms.—Various nervous and digestive disturbances may be produced by the presence of worms, or there may be no constitutional symptoms whatever. The thread worm causes intense itching in the rectum, especially at night.

Treatment.—1. Round Worms.—Santonin, three grains, or given in divided doses, followed by a saline laxative or a dose of calomel, is one of the most satisfactory plans of treatment. It may need to be repeated on several successive days.

2. **Thread Worms.**—Santonin and laxatives are also useful in treating this form of worm. Injections of quassia and water (a handful to a quart), of salt water or of carbolic acid and water (ten grains to a pint) are also advisable.

3. **Tape Worm.**—For two days before beginning the treatment the diet should be light, and for a full day only milk with a little bread should be allowed. A laxative should be given, and on the following day a drachm or two of the oil of male fern, preferably in capsules. This should be followed in about two hours by a dose of castor oil or of citrate of magnesia.

When the worm is passed careful examination should be made for the head. An infusion of pomegranate root, or its active principle pelletierine, is also one of the best remedies known. Or three or four ounces of pumpkin seeds may be bruised, soaked for twelve hours in water, and the liquid, or preferably the entire preparation, taken at once.

INFANTILE PARALYSIS (Epidemic Acute Poliomyelitis).

Infantile paralysis is a disease which, no doubt, has existed unrecognized for centuries. It has spread throughout this country with great rapidity within the last ten years. It is highly contagious and its seriousness must be appreciated when we consider its high death rate of 15 to 30 per cent. in recent epidemics which occurred in different States. The serious danger in contracting infantile paralysis lies in its leaving the patient in most cases, a hopeless paralytic and deformed, rendering them sometimes a helpless victim and a care upon their parents or society. It makes its appearance suddenly and silently into a community and strikes down a playful and healthy child: sometimes attacking adults, but it is considered essentially a disease of childhood. Thus in a few days or weeks numbers of healthy children will be afflicted and rendered permanent paralytics or killed by the disease.

Infantile paralysis is one of the most baffling diseases with which science and physicians have to deal, as its cause and transmission are not definitely known. It has been proven, however, that it is a germ disease by Dr. Flexner, of the Rockefeller Institute, New York, who has produced the same symptoms of disease in monkeys by injecting into their brains and spinal cord an emulsion of a cord taken from a human or other animal that has died of the disease. The germ which causes infantile paralysis is evidently too minute to be seen by the present magnifying lens of the microscope. It is supposed that the disease is caught by coming in direct contact with a sufferer from the disease. Flies are considered as a means of spreading the disease from one child to another. Dr. Pierson, of the Medical Corps of the United States Army, stationed at Fort Gibbon, Alaska, learned while treating some cases of epidemic acute poliomyelitis which occurred among the Indians during the summer of 1913, that the epidemic had been preceded by a severe epidemic of "Distemper" among the Eskimo dogs, and these attacks of distemper resembled the symptoms which the Indians suffered from; furthermore, the dogs died in a day or two and were paralyzed in the legs. These facts led him to suggest that there is a possibility of the epidemic having started among the dogs and contracted by the Indians who live in a dirty state and in close contact with them. He also suggests that as the distemper occurred in the summer months, that flies may have carried the disease from the dogs to the Indians. The disease always disappeared when frost came and fly time was over. He also observed that white people whose dogs had distemper, did not contract infantile paralysis, due to the fact that their dogs did not live in close contact with them, were kept clean and the people lived in a sanitary manner with screened windows and very few flies about. Thus in time science may prove that dogs and other animals with distemper may be suffering from the same disease from which the epidemics of infantile paralysis develop in the human race.

The symptoms of infantile paralysis show themselves without warning in an apparently healthy child or adult. There may not be another case of the disease in the neighborhood or country, when suddenly the victim complains of headache, fever, nausea and vomiting, often rigidity of the neck and spine and pains in the arms and legs of varying intensity. If the patient doesn't die within two or three days, paralysis occurs in one to six days which involves the legs and the upper part of the body. The paralysis may clear up after recovery. As a rule, though, the child is left a permanent paralytic and helpless in one or more limbs, etc. This paralysis is due to the poison of the germ causing the disease affecting the brain, spinal cord and nerves to the muscles, etc., of the body.

If a person is exposed to a case of infantile paralysis, it will be between two to ten days before they show symptoms of the disease.

How to Prevent the Spread of Infantile Paralysis.—The guardian or parent of the child which shows any of the above symptoms of this frightfully contagious disease must summon a physician who must notify the local health authorities. Place the child in a screened room away from other members of the family, secure a nurse or attendant and whenever possible move the patient to the Contagious Hospital, as this is too dangerous a disease to be treated at home. No one must enter or leave the room except the physician and he must wear a gown upon entering the room, protect his hair with a suitable covering and remove them after leaving the room, and disinfect his hands in some disinfectant solution as bichloride of mercury (1 to 2,000) or carbolic acid (5 per cent.). The nurse must wear a cap and gown and change her clothes when leaving the room and disinfect her hands. All discharges from the patient must be collected and disinfected with chloride of lime solution (one-half pound to a pail of water), also all bed linen, clothing, dishes, etc., must be dipped in this solution before being taken to the kitchen and scalded.

Hang a sheet over the door dipped in chloride of lime solution. Don't allow a fly or other insect to live in the room. Don't allow family pets to remain in the house. Chain them outside. Destroy all food from the patient's room. Don't allow anyone in the sick room but the physician, nurse or attendant.

When the case has recovered, the Board of Health will disinfect the room. Be sure and leave all carpets, curtains, clothing, bed linen, nurse's clothes, etc., spread out upon chairs and tables so that the disinfectant can come in contact with them.

Persons in the house must obey strictly the rules of quarantine and prevent the spread of this disease. They must not attend to business unless they bathe and wash their hair if exposed. Do not wear the clothes which were worn when in contact with the sufferer until fumigated by the Board of Health. Public places where numbers of people congregate, must be avoided. Milkmen must not remove bottles until told to do so by the Board of Health.

Remember, infantile paralysis occurs in the summer months. So kill all flies, and screen windows and doors.

PART XIV OF BOOK IV

Treats of the various diseases and conditions which may be treated surgically. It is, of course, merely descriptive, as under no circumstances but the most urgent, where a physician may not be obtained, should the layman attempt an operation of any sort.

ILLUSTRATIONS

CURATIVE MEDICINE

PART XIV.

SURGICAL DISEASES

BACTERIOLOGY, INFLAMMATIONS, CONTUSIONS, WOUNDS, ETC.

Bacteriology.—Bacteriology is the science which treats of germs. Their discovery within a few decades has wrought a revolution in surgical treatment. No intelligent understanding can be had of the principles of surgery without at least some elementary knowledge of bacteriology. For its more complete discussion see the special article upon the subject.

Micro-Organisms, Germs, Bacteria or Microbes are minute vegetable cells, most of which can be seen by the microscope only. They are widely distributed, being in the air we breathe, food, water, in the soil, on vegetable and animal matter either living or dead. They form a microscopic flora, a vast vegetable world, with varieties probably as innumerable as the vegetation with which we are so familiar. Some microbes when introduced into the system are non-disease producing, harmless. Others are pathogenic or disease producing, most virulent in their action.

Yeasts include several species of germs, the action of which, in bread raising and in producing alcoholic fermentation, is familiar. They are, for the most part, harmless to the human system; one variety, however, grows upon the mucous membrane as thrush.

Molds represent another class, familiar to us in their growth upon old leather and upon stale bread.

Bacteria.—The sub-class of germs known as bacteria are the ones of chief interest to the surgeon. Of the three forms, coccus, berry-shaped or round; bacillus, rod-shaped, and spirillum, corkscrew-shaped; the latter plays no rôle in surgery.

Growth of Bacteria.—Bacteria may multiply with amazing rapidity. Under ideal conditions a single cell in one day will have sixteen million descendants, and in three days the mass of new cells would weigh 7,500 tons. Multiplication is chiefly by subdivision, one cell dividing into two, the two into four and so on; or by "seeds," called spores.

Soil for Bacteria.—They require a suitable substance or "soil." Some grow better upon living matter, others upon dead. Most of them are readily grown artificially upon the blood serum of an animal, a suggestion as to the favorableness of the human tissues for a soil. They need heat and require water. Most grow better when exposed to the oxygen of the air, but a few better when air is excluded.

Lock-Jaw.—The bacillus of tetanus or "lock-jaw," is one of the latter class. The dust of out-buildings, the soil of gardens are favorable places for the growth of the tetanus bacillus. "Rusty" nails are common about such places. A wound is received by such a nail. The patient possibly develops lock-jaw, not because (as is popularly believed) the nail was rusty, but because, among the minute particles of dirt upon the instrument were the germs of the disease. The depth of this small wound, the superficial tissues closing and excluding the air, thus give a most favorable nidus for the growth of the tetanus bacillus.

Sunlight and Bacteria.—Sunlight antagonizes the growth of most germs. Temperature is a most important factor. The body temperature is a favorable one for many pathogenic germs. Freezing, or even a temperature of 200 degrees Fahrenheit below zero, does not kill bacteria, but only arrests their growth. Favorable temperature will again restore their activity. High temperature, on the contrary, destroys them. The Jewish idea of purification by fire was based upon a scientific fact. As a practical fact boiling water kills in a few minutes most disease-producing and death-dealing germs.

Special Surgical Germs.—There are quite a known number of germs which are particularly the surgeon's enemies. Such are the following:

Pus-Producing Germs.—Pus-producing (pus being commonly called "matter") micro-organisms, of which there is a large variety of cocci, must always be reckoned with. It must be understood that pus can be formed only by the presence, growth and action upon the tissues of some of this variety of germs. The formation of pus is called suppuration; the term purulent means pus-like or forming pus.

The Bacillus of Tuberculosis forms "cold" abscesses, produces "white swelling," Pott's disease, scrofulous conditions, besides the dread disease of consumption of the lungs. There is not a tissue of the human body which it may not ravage.

The Coccus of Erysipelas, the coccus of gonorrhea, the bacillus of tetanus, the bacillus of syphilis are common combatants of the surgeon.

Introduction of Microbes into the System.—A most important and practical question arises, How do disease-producing germs gain entrance into the living tissues? We daily breathe, eat and drink germs and are clothed in them. All common objects, including clothing, coming in contact with the skin, deposit bacteria upon it, so that unless rendered free from them, by special means, there is no portion of the skin upon which they do not exist. Keen says that the hands of the bride at the altar are surgically filthy.

Abundance of Germs.—Germs being plentiful in air, food and drink there is scarcely any portion of the lining or mucous membrane of the alimentary (food) canal or of the respiratory passages but what is in contact with them. Let the skin and mucous membrane be healthy and very few microbes enter the tissues; they are cast off harmlessly. But let there be inflammation or some unhealthy state of the surface, especially some "raw" spot, though ever so little, a prick, a scratch, the slightest break of skin or mucous membrane and the door is wide open for the entrance of the host.

Tissues that Assist Germs.—Providentially, certain tissue elements, notably the white blood cells and blood serum, have great capability of destroying germs which gain ingress into the system. "There is a battle royal between the invading host of germs on the one side and these defensive elements upon the other." If, for a time, the germs gain the ascendency, manufacturing their poisonous products, as they do, the subject is ill. Whenever the protective elements are conquerors the subject remains unharmed—in health. If, for any reason, a person becomes debilitated, the germ killing power of the tissue cells is less vigorous; if any portion of the body becomes injured this reduces the cell vitality at such site. The latter conditions thus render the tissues a favorable soil for germ growth.

Definition of Terms.—A germicide or disinfectant is an agent fatal to bacteria. The destruction of germs in clothing, in excrement, in a wound, on the hands, and so forth, is called disinfection. Disinfection of a wound, dressings or instruments is called sterilization. An antiseptic is an agent which retards or prevents the growth of germs. By sepsis or infection is commonly meant a condition in which disease-producing germs

50

are present, *e. g.,* a septic or infected wound. Asepsis means, commonly, the absence of bacteria.

Disinfection or Sterilization.—The paramount object of the surgeon in every operation to-day is to have the field of operation and all objects coming in contact with the wound as free from bacteria as may be—to do an aseptic operation. If the area of operation is already infected, for example, an abscess to be opened, he uses the antiseptic method. Three means of sterilization are available, as follows:

1. **Thermal Disinfection** consists in the use of heat in the form of boiling water, steam or hot air. By this means everything concerned in an operation may be sterilized except the skin of the patient and the operator's hands. In a modern hospital special sterilizers are used in which dressings, towels, sheets, operating gowns and so forth, are subjected to steam under high pressure. These articles, wrapped in sheets or placed in sterile jars, are not disturbed until the time of operation and are then handled with sterile hands. As a practical fact, simple boiling for fifteen minutes is a most efficient method of sterilizing, and the one which is universally used for instruments. Any clean, flat pan may be used for boiling the instruments. A teaspoonful of cooking soda to the pint of water should be added.

2. **Chemical Disinfection.**—Many chemicals will kill bacteria, but the most reliable and the one most common is bichloride of mercury or corrosive sublimate. (Bear in mind that it is a rank poison.) It is used in the strength of 1 part of the drug to 1,000, 2,000 or more of water. Seven and a half grains make, when added to a pint of water, a 1 to 1,000 solution. It is put up in tablets, each one containing seven and a half grains. Needless to say, it is not used upon mucous or serous membranes except in very weak solutions (1 to 4,000 or more). It cannot be used for the sterilization of instruments as it corrodes all metallic substances.

Carbolic Acid is valuable as a germicide in the strength of 1 to 40 or 1 to 20 parts of water. In such strength of the solution instruments are sometimes placed during operation, and it is occasionally used in cleaning the skin.

Creolin and Lysol may be used in one per cent. or two per cent. solutions upon the skin or instruments, but are chiefly employed in the former strength for vaginal and uterine douching.

Hydrogen Peroxide is an excellent agent for cleansing infected wounds. The common form should be diluted one-half or two-thirds. It is most conveniently used with an atomizer.

Normal Salt Solution, made by adding a teaspoonful of table salt to each pint of water and boiling to sterilize, is mildly antiseptic in action. It is much used for flushing out cavities of the body, *e. g.,* the abdomen where strong antiseptics are injurious. It is often used with great advantage to cleanse large superficial wounds, such as burns or to saturate dressings applied wet. As a simple ready household remedy for cleansing wounds, gargling the throat, and so forth, it is frequently valuable.

Boric Acid in a saturated solution (fifteen grains to the ounce of water) is mildly antiseptic and is very commonly employed for cleansing wounds of the mouth, nose, for washing the eye in inflammations. It is a useful remedy and may be employed freely with impunity upon the most delicate tissues. In the form of powder it is frequently, with good effect, applied to cuts or other wounds.

Iodoform, in powder, is a valuable antiseptic and is much used for dusting purulent or suppurating areas. It is particularly useful in tuberculosis foci. Cheesecloth impregnated with it is largely used for draining wounds, keeping abscesses open, for packing cavities to arrest the oozing of blood.

Acetanilid, a white powder, is a fair substitute for iodoform, except that it probably does not benefit tuberculous conditions and should be used with caution.

3. **Mechanical Disinfection.**—This consists practically of thorough washing with soap and warm sterile water. It will be described in detail under the next heading.

Preparations for an Operation.—The patient should be prepared the day previous. Suggestions for such preparation are found in the chapter upon Anesthesia. A room for operation should contain as little as is essential for the necessities of the case. Some graver operations, such as those upon brain, lungs or abdominal cavity had much better be done in a hospital with all modern equipments and conveniences. However, the room of a private house may be rendered fit.

A Fit Operating Room.—A room should be well lighted and ventilated and warm. The day before operation curtains, all hangings and carpets should be removed. The floor must be thoroughly scrubbed, the walls and ceiling brushed, or better, washed. Air, unless dust-laden, does not carry germs in sufficient numbers to infect the wound seriously. The room is to be well aired and dried. The day of operation a table (a kitchen table does well) is provided for the patient upon which are placed a folded comfortable or folded blankets. A rug or piece of carpet is spread beneath the table.

Other Preparations.—Two or three other tables or stands are placed near for instruments, basins and dressings. Buckets for the slops should be placed near. Several gallons of water thoroughly boiled must be provided. A portion should be hot, but much of it should be cooled by setting it aside in clean vessels under cover. A half dozen clean sheets and a dozen small towels should be at hand. A stove furnishes heat for boiling the pan containing instruments.

The Surgeon's Preparation.—The surgeon and his assistants remove their coats and roll the sleeves above the elbows. The hands and arms are to be freed so far as possible from germs—to be disinfected. A common and good method is as follows: Trim the nails short, clean well under them, removing also any excess of skin at the roots. Scrub the hands and forearms very thoroughly for five minutes or more with hot sterile water and a good soap, such as castile. A nail brush must be used; scrub very carefully about and under the nails and between the fingers. Give particular care to the creases of the hands. The nails are again cleaned with a knife and the hands afterward scrubbed. The hands are now thoroughly washed in plain sterile water and had better be dipped in alcohol for a few moments. The hands are last scrubbed for at least a minute in bichloride of mercury, 1 to 1,000, careful attention being given to the region of the nails.

The surgeon and assistants now envelop themselves in sterile gowns and scrupulously avoid touching any object which had not been sterilized.

The Assistant's Duty.—Meanwhile one assistant has sterilized the skin of the patient. The field of operation, including a wide area about the place of incision, should have been, the day before, shaved if hairy, sterilized, and meanwhile protected with sterile dressing. Whether so or not, the part, by the method used for the surgeon's hands, is disinfected immediately preceding operation. Sterile sheets and towels are now spread over the patient about the area of operation, leaving only a small portion exposed. With sterilized instruments and sponges (the latter preferably being a small strip of cheesecloth rolled into a mass) sterilized material for tying blood-vessels and suturing the wound, the surgeon is disappointed if he does not have an aseptic wound—one that heals readily without pus formation. In such an operation chemical antiseptics, which are irritant, are avoided. If, however, a purulent condition existed prior to operation, *e. g.*, an abscess, chemical disinfectants, notably corrosive sublimate solution, are, in addition to the former method, freely used, and the wound is probably left wide open for drainage of the pus.

Infection of Wounds.—Any wound accidentally received is infected, from the instrument wounding, from clothing, soil ground into it, in fact, anything coming in contact with it. One object of highest importance is the disinfection of such wound. For further discussion see Wounds.

Tying and Sewing Wounds.—For tying or ligating blood-vessels, silk or catgut, usually the latter, is used. For sewing or suturing a wound, catgut, silk, silk-worm gut, or silver wire are common. Catgut must be prepared by a special process. The other material is best sterilized by boiling.

Dressings for Wounds.—Dressings may be made of any material which readily absorbs wound fluids. Cheesecloth is best. This, together with gowns, sheets and towels is not readily prepared without special sterilizers. In emergency, however, after boiling, drying and wrapping them in sheets or towels they may be baked. Or clean unsterilized sheets and towels may be wrung out of bichloride of mercury solution and thus, damp, be put about the site of operation. Unsterilized dressings may be treated likewise, and so placed upon the wound.

CONTUSIONS AND WOUNDS.

Contusions.—By a contusion or bruise is meant the crushing or laceration of tissues beneath the skin, the latter remaining unbroken. Blood is poured out into the injured tissue making it "black and blue." The effused blood will, as a rule, be gradually absorbed and the injured tissue restored. Suppuration or gangrene rarely occurs.

Symptoms.—The symptoms are swelling, tenderness, numbness, followed by aching pain. Discoloration sooner or later appears. Loss of function may occur, and, in severe contusions, shock may be great.

Treatment.—If shock is present, reaction from it should be secured by rest in bed, stimulation and external heat. Rest and elevation of the injured part are of prime importance. Application of cold is indicated, except in very grave contusions, and in the feeble and aged. Heat, instead, is indicated in such cases. Compression by firm bandage is useful for the arrest of hemorrhage and to antagonize swelling.

Accessory Treatment.—The constitutional treatment is the same as that for inflammation. Massage, liniments, applications of ichthyol ointment and motion are essential in the late stages of contusions.

Wounds.—A wound is an injury in which there is a break or division of the tissues by some sudden force. In the sense here used, the term includes tearing or dividing of the skin. Wounds comprise cuts, stabs, gunshot wounds, bruised and torn wounds, poisoned wounds, and so forth.

Danger from Wounds.—The danger of a wound depends upon its depth and size, and above all upon the importance of the underlying parts involved, such as arteries and nerves, or vital organs, such as the heart and lungs. Stabs and gunshot wounds are generally far more dangerous than would appear from their size, because they are apt to involve vital portions of the frame, and also because pieces of the weapon or of the bullet may be left remaining in the wound, as was the case with the lamented President Garfield.

Healing of Wounds.—The healing of wounds occurs in two ways:

By First Intention.—In the first place, a wound may heal by primary union, or, as it is also called, union by the first intention, without the formation of any pus or matter, and leaving only a very line-like scar. This mode of healing should always be sought for, but can seldom be obtained, except under the following conditions, to wit: when the sides of the wound can be accurately fitted together, and are not subsequently displaced by bleeding or the exudation of matter, also when the wound is left quiet and protected from outward injury, and when it is kept free from impurity.

Healing by Second Intention.—The second mode of healing takes place slowly, with suppuration and the formation of little rounded knobs, called granulations, all over the raw surface, and leaves a large, red scar, ultimately becoming dead white. This second and far inferior method of healing is observed when the favorable conditions just mentioned are absent, as for example, first, when so much of the skin has been destroyed that the edges of a wound cannot be brought together, as in wounds caused by cannon balls or shells, in scalp wounds from blunt instruments, or where the edges of wounds are so torn and bruised that their life is crushed out; second, where the edges of wounds are separated after they were adjusted, by blood being effused, or by the formation of pus; third, when the injured parts have been disturbed, as, for instance, in the leg, by standing or walking, or the hand and arm by working, and so forth; or, if the wounded party has been badly transported from the scene of the accident; or, lastly, when the wound was dirty and had not been properly cleansed or disinfected, because want of cleanliness leads directly to putrefaction and the formation of pus, and it is especially the matter formed in the process of suppuration which separates the sides of wounds and prevents their healing by the first intention.

Proud Flesh.—When the wound does begin to heal in the second and inferior method, granulations form, which are often called proud flesh, and are especially dreaded by ignorant persons as dangerous intruders into a sore. These granulations by degrees organize into a living tissue of great firmness, and after they have filled up the cavity of the wound to the level of the surrounding cutaneous surface, or sometimes a little above it, they cover themselves with epidermis and constitute a scar.

Symptoms.—The symptoms of a wound are constitutional and local. The constitutional or general effect of a serious wound is called shock. In shock, sudden depression of the vital powers occurs. There is general weakness; a faintness, with sometimes loss of consciousness; the pulse is feeble and rapid; skin pale, cold and clammy; the bodily temperature is lowered; nausea with vomiting may occur. Loss of blood may be a strong factor in producing shock.

Reaction from Shock.—During and following the arrest of hemorrhage, reaction from shock is to be sought by raising the feet and lowering the head; at least place the head flat, and the lower extremities quite as high as the head; wrap the patient in warm blankets and surround him with hot bottles, hot bricks and so forth.

Stimulants.—A tablespoonful of whiskey or brandy may be given by mouth every half hour. An enema of black coffee one-quarter pint and whiskey two tablespoonfuls is excellent. Injections under the skin of whiskey, strychnine, digitalis, are invaluable. In the graver forms the injection of large quantities of warm normal salt solution beneath the skin, into the bowel or into the veins should be practiced.

Local Symptoms.—These are hemorrhage, pain, loss of function and gaping of the wound edges.

Treatment of Wounds.—The steps in treatment of a severe wound are given in order as follows:

Arrest of Hemorrhage.—The fact that hemorrhage may readily prove fatal, or, as it is popularly phrased, the person may easily bleed to death, is so important that a detailed discussion is needful. Every wound bleeds, because in every wound blood-vessels are injured. But the kind of hemorrhage, as well as its danger, varies with the size and the nature of the blood-vessels which have been divided. If the blood does not flow freely, but trickles from the wound, one may conclude that only small blood-vessels have been severed. When dark blood wells out in a steady stream, and when the flow is increased by pressure above the injured spot, that is, nearer the heart of the patient, a large vein has been opened. Lastly, when bright, red jets spurt out of the wound, forcibly, and in jerks, an artery is divided and danger to life is great and immediate.

Smaller Wounds.—Unimportant hemorrhages from very minute arteries, and from veins of only moderate size, can generally be arrested by pressure upon the wound itself, or by pressing the sides of the cut against each other, or it may stop of its own accord in consequence of the mouths of the vessels contracting and the blood in the wound coagulating into a tough, viscid mass.

Hemorrhage from an injured vein, as, for example, that from the giving way of a varicose vein in the leg, is sometimes difficult to check, on account of the pressure of some light article of clothing, such as a garter, above the bleeding point. On loosening this, slight pressure upon the wound and elevation of the foot above the level of the hip surface to arrest the bleeding.

Control of Hemorrhage by Compression.—If, however, bright, red blood continues to flow, in spite of pressure over the wound, a large artery must have been injured, and speedy death from loss of blood must be apprehended. In such instances, prompt aid is necessary, and a physician or surgeon should at once be sent for.

Where to Place Pressure.—Until he arrives any intelligent person can probably succeed in checking the flow of blood by making very firm pressure on the wound itself, if it is small, or on the trunk of the artery above the wound. The injured limb should be raised, as this lessens the force of the pulse in it, and, of course, the violence of the flow of blood. After cutting the clothing away from the source of hemorrhage, a folded piece of clean linen, or a pocket-handkerchief, should be laid on the wound, and fastened firmly down by means of a bandage or another handkerchief. But if, in spite of this, the blood still continues to run, the trunk of the artery between the heart and the wound must be sought for and firmly compressed by the fingers, the handle of a large key, or some other suitable object. In certain parts of the body the arteries lie so near the surface that they can be effectually compressed with the fingers.

Pressure on Arm Artery.—In the upper part of the arm the main artery courses along the inner side, nearly in a line with the inner seam of the coat or dress sleeve, as is shown in the accompanying figure. By feeling along the place indicated by the dotted line, it is easy in any spare person to discover the strong pulsation of this large artery of the arm, or brachial artery, as it is technically called. The artery may be compressed in this position by placing a thick stick between the arm and the chest, and tying the arm tightly to the body, or by pressing the artery firmly against the bone of the arm with the thumb, as shown in the illustration.

Diagram of Main Artery of the Arm.

Pressure at Collar Bone.—Sometimes, when the wound is higher up on the arm, or in the arm-pit itself, it may be necessary to compress the artery at a point nearer the heart; and this can usually be accomplished by making pressure with the thumb or a big key, just behind the collar-bone, as is also indicated.

The Spanish Windlass.—If it is found difficult to continue the application of force in these situations, or if the only person present must leave the sufferer whilst he hurries off for assistance, the little device known by the name of the Spanish windlass should be resorted to. To apply this, take a large handkerchief and fold in it a rounded pebble about an inch in diameter, or any other smooth, hard body of similar size; fold the handkerchief cravat-shape, and tie it loosely about the limb, at the point where pressure is to be made upon the artery; and then, putting a stout stick beneath the loop, twist it around so as to tighten the handkerchief and bring a strong pressure upon the stone underneath the loop on the side opposite to the stick, which in its turn compresses the artery and stops the flow of blood. This is, of course, a much more painful, as it is a more powerful method than pressure by a bystander's thumb or finger; but in urgent cases it may be needful to call it into service in order to save life.

The Tourniquet.—The Spanish windlass is a rough imitation of the surgical instrument called a tourniquet, which is far preferable as a means of arresting hemorrhage whenever it can be procured. As soon as a tourniquet can be obtained, it should be substituted for the primitive and painful windlass, which, if continued several hours upon a limb, might itself lead to mortification of the part, and perhaps to a fatal result.

Treatment With a Handkerchief.—In order to check bleeding from wounds in the arm below the elbow, or about the hand, where workmen of all kinds are particularly apt to receive injuries, take a large handkerchief, as before, and tie up in it a stone or a potato of the size of a walnut, or a simple, large, hard knot will perhaps answer the purpose. Then fasten it loosely about the arm, just above the elbow, as shown in the illustration, and bend up the forearm so as to make the knot press upon the large artery in its position in the hollow of the elbow, as indicated in the accompanying wood-cut. If the hemorrhage is found to be checked, the knot is in the right place at the bend of the elbow; but if blood continues to flow, straighten the arm, move the knot or stone a little, and try again. As soon as you find the flow of the blood is stopped, take another large handkerchief, or a strip of bandage, and fasten the wrist firmly to the shoulder, so as to keep up the life-saving pressure upon the blood-vessel at the elbow.

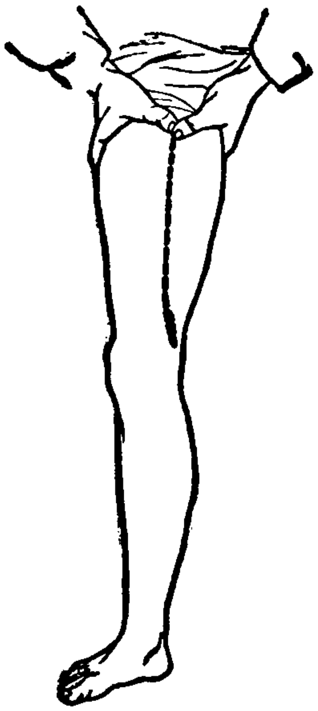
Method of Checking Hemorrhage in the Hand or Wrist.

Wounds Below the Knee.—Hemorrhage from wounds of the leg, below the knee, or of the foot, such as are so often inflicted by the slipping of an axe or hatchet in chopping wood, may be controlled in a very similar way by tying a large pebble in a handkerchief, so as to make a knot the size of a turkey's egg, fitting it in the hollow of the knee, and then bending the leg up on the thigh in such a manner as to produce pressure upon the artery, on exactly the same principle as that displayed in the figure just above. When it is found that the knot is properly adjusted, so as to answer the purpose of arresting the flow of blood, the leg should be secured in its doubled-up position in order to prevent a return of the hemorrhage, in consequence of the apparatus becoming displaced.

Thigh Wounds.—For bleeding from wounds in the thigh, the artery must be compressed an inch or two below the middle of the groin, and about as far in front of the usual position of the inner seam of the pantaloons. The exact point is indicated by the marginal illustration, which shows very well the way in which the thumbs ought to be applied.

Fressure on Thigh Artery.—The femoral artery, or artery of the thigh, is so large and strong that its pulsation can usually be felt without much difficulty in thin or even moderately spare persons; and it is a good plan for every one to become acquainted, by examining his own body, with the location of this and other chief arteries. This point in the femoral artery is also a favorable one for making compression in bleeding wounds of the foot and leg.

Fainting Fit.—In whichever way bleeding from an important artery has been for the time checked, it must be remembered that it is very liable to burst out again the moment the pressure is relapsed or the obstruction removed; also, that when a person faints from loss of blood the hemorrhage ceases whilst the heart is beating feebly in the fainting condition, and the blood may clot quite firmly in the mouths of the divided blood-vessels. When, however, the patient revives the renewed vigor of pulsation in the heart and arteries will generally drive out these recently-formed clots of blood, and the bleeding starts afresh with, perhaps, a speedily fatal result, if a most vigilant watch is not maintained over the wound. Where the hemorrhage is venous only, however, there is a good prospect that the clots of blood formed in the open mouths of the vessels will be able to resist the feebler pressure brought to bear upon them by the reviving circulation, and that bleeding will be effectually checked by the occurrence of the fainting fit.



Course of the Femoral Artery.

Tying of Blood-Vessels.—In order to obtain primary union, it is necessary, in dressing a wound, to stop all hemorrhage. A surgeon grasps with forceps the end of any vessel that bleeds considerably, and before closing the wound ligatures or ties it. Sterilized catgut is best for ligatures, but silk, or even cotton thread that has been boiled, will answer. Simple twisting with forceps will arrest hemorrhage of very small vessels, while oozing is generally controlled by pressure with compresses wrung out of water as hot as can be borne by the hand.

Reaction from Shock.—See Shock.

Cleansing of the Wound.—This includes the removal of both foreign matter visible to the eye, and the removal as well of microscopic germs which contaminate every accidental wound. Have at hand plenty of water and good soap. Scrub the wound and surrounding area thoroughly with soap, with scissors and forceps removing any visible foreign matter (splinters, bits of clothing, grains of dust or hopelessly damaged tissue). Wash with plain water and alcohol and irrigate with corrosive sublimate solution (1 to 1000). If the wound is of a hairy part, the area should be shaved. All blood clots should be removed and the wound left clean and dry.

Provision for Drainage.—Most accidental wounds, unless small and superficial, should be left partially open for drainage, so that infective material which it has not been possible to remove, may flow out. In such cases, a bit of rubber tubing may extend to the depth of the wound or a strip of iodoform gauze or plain sterile gauze may be gently inserted to the depth of the wound, one end of the strip protruding. A few strands of suture material well serves the purpose.

Closing of the Wound.—Where confidence of thorough disinfection is felt, and the loss of tissue is not too great, the edges of the wound should be brought together and the tissues held in the relation they bore before injury. Sewing or suturing a wound is the best means to this end. Surgeons use special needles and a variety of suture materials: silk, silver, wire, silk-worm gut and specially prepared catgut. In an emergency, however, a large sewing needle and large-sized sewing thread, which have been boiled, may do good service. Interrupted stitches (each stitch tied separately) are usually the better. The edges of a superficial wound may be held together by strips of adhesive plaster placed outside of the dressing of the wound. Or, in slight cuts and abrasions, collodion painted over a bit of dressing is sometimes efficient.

Dressing of the Wound.—Any aseptic or antiseptic material which absorbs wound discharges freely, such as absorbent cotton, cheesecloth or even thin old muslin forms a good dressing. Sprinkling the wound freely with an antiseptic powder helps to prevent suppuration; dressings had better be applied moist, wrung out of bichloride of mercury solution (1 to 2000). Plentiful dressings should be applied, sufficient to soak up the wound discharges and to protect from outside infection. A wound should be disturbed for dressing as seldom as possible. If the dressings become soaked with wound fluid, if there is much pain, or a rise of temperature indicates suppuration, the wound should be freshly dressed; otherwise, the dressing should remain in place a week or ten days.

Securing Rest.—In case of severe wounds, not only should the patient rest in bed but absolute rest to the part should be secured. Compression by firm bandage, an easy position, fixation by splint or plaster dressing, support of the arm in a sling, these all give comfort and hasten healing of a wound.

Constitutional Treatment.—General treatment should be according to the suggestions for the treatment of inflammation; in addition, watch for suppuration, gangrene, erysipelas or tetanus. Temperature is a good index of the condition.

Punctured Wounds.—Wounds made by sharp instruments (such as a dagger, a splinter, a fork prong, and so forth) have especial dangers, and require radical treatment. Foreign bodies are frequently left at the depth of such a narrow wound; the opening is small and readily closes, locking up infective material; underlying organs of the abdomen, head or chest are liable to injury. Such wounds generally demand the attention of the skilled surgeon. He will usually probe for a foreign body and will generally open the wound to its depth, often incising it freely, in order to disinfect it properly and to allow for drainage. He will determine whether underlying organs are injured and any treatment needed for such.

Gun-shot Wounds.—The special dangers to be combated in gun-shot wounds are shock, hemorrhage and infection. Injury of vital organs is liable. In many cases it is better not to probe for a bullet. The ball should be searched for when it has surely carried in with it foreign bodies; when it is in a vital organ, as the brain; and when its presence interferes with healing.

Poisoned Wounds.—Dissection wound is a term applied not only to wounds received by medical students and surgeons in their dissections, but to wounds sometimes received by butchers, cooks and fishdealers, who handle putrefying animal matter. Such wounds are particularly virulent. A wound of this character should be thoroughly washed, and the blood squeezed out of it. If a puncture, it should be freely opened and swabbed with pure carbolic acid, then washed with bichloride of mercury solution, and wet antiseptic dressing applied. Bites by animals should be so treated, the human bite being one of the worst.

Stings and Bites of Insects.—For the more common and less poisonous wounds, applications of solutions of washing or cooking soda, ammonia water, iodine or lead-water and laudanum, give relief. The bite of a large spider or scorpion should be treated as a snake bite.

Snake Bites.—Copperheads, water-mocassins, rattlesnakes and vipers are the only poisonous snakes of the United States. We have a poisonous lizard known as the "Gila monster." A snake bite must be treated promptly and usually without proper appliances. When the bite is upon a limb, very tightly tie or twist a band or fillet around the extremity above the wound; several such bands are better. Cut out the wound at once, suck the wound, burn it with nitric or carbolic acid or heat. A hot iron is efficient; hunters may pour powder into the wound and apply a spark or lay a live coal upon it. Constitutionally stimulate freely with whiskey or brandy to sustain the system while it is ridding itself of the poison. Strychnine, ether and digitalis hypodermically are valuable. The fillets should not be removed for some time, and then slowly, one at a time, the uppermost one first.

Hydrophobia or Rabies.—This is an infectious disease due to inoculation through a wound with the virus from a rabid animal. The animal may be a dog, a cat, a wolf, a fox or a horse. About 14 per cent. of the people bitten by mad animals develop the disease and die.

Treatment of Hydrophobia.—When a person is bitten by a supposed rabid animal and is seen soon after the injury, firm constriction of the part above the wound should be made, the wounded area should be freely cut out, burned with a hot iron or nitric acid and dressed with wet antiseptic dressing. If the patient is not seen within a few hours of the injury, cauterization will do no good. In any case, send the patient to a Pasteur Institute for preventive treatment. If the animal causing the wound was not rabid, treatment will do no harm; if it was mad, treatment will probably save the patient.

INFLAMMATION.

Definition.—Inflammation is defined as "the changes which occur in living tissue when it is injured, provided that the injury is not of such a degree as at once to destroy its life." Inflammation may end in return of the tissues to complete or partial health, or in their death.

Causes of Inflammation.—The causes of inflammation are predisposing and exciting. Predisposing causes are such as are present in the tissues and render them liable to inflame; any affection or indulgence which impairs the health or weakens the system is a strong predisposing cause. Exciting causes are injuries; for example, blows, falls, crushes, burns, and so forth.

Symptoms of Acute Inflammation.—Symptoms are general or constitutional and local. The former are manifested chiefly as fever. The latter in an organ or a part, as heat, swelling, pain, discoloration and disordered action or function. Constitutional symptoms of acute inflammation may be absent, but in severe cases they are sure to occur, forming the symptom group known as fever—symptomatic or inflammatory fever.

Chronic Inflammation.—This condition is gradual in onset and progress. There are no constitutional symptoms due directly to the inflammation. As to local symptoms, there is pain, varying in degree and character; swelling is often great; function is more or less interfered with; heat and discoloration are rare.

Treatment of Acute Inflammation.—The prime rule of treatment is first to remove the exciting cause. If it be a splinter, pull it out; if drink or indigestible food is inflaming the stomach, stop it; scrape out diseased bone, clean out the germs from an infected wound. Further treatment should be both local and constitutional.

Local Treatment of Inflammation.—Two agents are suited to the treatment of both the early and the late stages of an inflammation, namely, elevation and rest. Elevation combats engorgement of the part. A sprained ankle is more comfortable if put on a level equal with or higher than the body. Rest is of utmost importance. Rest of the patient in bed should be insisted upon in every severe inflammation. Rest to an inflamed part is secured by various means. The partial, or better, the complete cessation of the usual action or function of an organ, is desirable. To an inflamed eye, rest is secured by dark glasses, a darkened room, or a pad to exclude the light; to a sprained joint, by an easy position and fixing it on a splint, or hanging the arm in a sling.

Other Treatments.—In the early stage of an inflammation, when the vessels are engorged, local bleeding and cold are valuable agents. Local blood-letting is done by cutting, leeching or cupping. Neither of these should be done except under the intelligent guidance of a physician.

Cold is highly valuable if used wisely; it is not to be used after the early stages, not to be too long continued or too intense; it should usually not be used with the very aged or very feeble.

Wet cold or dry cold may be employed. Wet cold is obtained by various fluids; ice water or water mixed with one-fourth the quantity of alcohol is good. One of the most common and best applications is lead water and laudanum. It is composed of one ounce of laudanum, one or two ounces of Goulard's extract, and one part water. A few layers of muslin or cheesecloth should be kept upon the part and should be frequently wet with the fluid.

Dry cold is generally safer, more easily applied, more comfortable. Cracked ice is put into a rubber ice-bag or bladder, or wrapped in a piece of flannel, and so applied, several folds of flannel first being placed over the part. The immediate application of an ice-bag to a sprained joint is excellent treatment. In all applications of cold the part must be carefully watched to guard against too great interference with the circulation.

Treatment in Later Stages.—Treatment in the later stages of an inflammation is directed toward promoting a reabsorption of the material which has been poured out, a clearing up of the wreckage. This is accomplished by compression, the application of astringents and sorbefacients, massage and heat.

Compression.—Compression is usually obtained by the firm application of a bandage. It should never be forcible, and if applied to a limb, should always include the distal extremity, *e. g.,* the elbow or wrist should not be firmly bandaged without including the hand and all the part below the affected area.

Astringents and Sorbefacients.—Lead water and laudanum, before mentioned, has an astringent effect. Tincture of iodine diluted with from one to three parts of alcohol, painted from time to time over an inflamed area, is often useful. Ichthyol ointment is very excellent in inflammatory swellings. It is rubbed well into the part or applied upon a cloth. It is best prepared by mixing one part of ichthyol with one to three parts of lanolin. Mercurial or blue ointment is used in much the same way as is ichthyol ointment.

Massage.—Massage is a systematic rubbing and manipulation after the acute symptoms have subsided. Motion and massage prevent stiffness, promote circulation and absorption, and bring tone and health to a part.

Heat.—Heat, either moist or dry, may do good and should generally be substituted for cold after a day or two. It then commonly gives greater comfort, relieving pain. Heat may be applied by fomentations, poultices, water bath or douche, and dry heat.

Fomentation.—Fomentation is the application to the skin of a piece of flannel wrung out of a hot liquid, usually water, as hot as can be borne. It is covered by a rubber-dam, oiled silk, or waxed paper; cotton should be placed outside the latter and the whole held in place by a bandage. A hot water bag placed over the bandage is useful.

Stupes.—The turpentine stupe is made as above by sprinkling upon the wet flannel from ten to twenty drops of turpentine.

Poultices.—A poultice is a soft mass applied to a part to bring heat and moisture to bear upon it. Poultices may be of flaxseed, arrowroot, starch, bread and milk, and so forth. A poultice should be applied in thickness of half an inch, should be covered with rubber-dam, waxed paper or oiled silk and over laid by a hot-water bag. It should be removed before it cools, another being ready to apply at once. Where suppuration is threatened or exists time is often wasted and suffering prolonged by continued poulticing. This great blunder is common with the laity. In such a case, free opening by incision cannot be done too quickly.

Dry Heat.—Dry heat can be easily applied with the hot-water bag, a bag of hot sand or meal, a hot plate or bottle.

Counter-Irritation.—By counter-irritation we mean the use of some irritant upon a surface, thus attracting an increased quantity of blood and relieving thereby inflammation of a deeper structure. Blisters, mustard plasters, turpentine stupes, tincture of iodine, liniments, and so forth, are so used.

Constitutional Treatment.—General treatment may include general bleeding, circulatory sedatives, diaphoretics, diuretics, anodynes, antipyretics, stimulants and tonics. Hygienic measures are invariably demanded, cathartics are usually indicated.

Cathartics.—One of the first essentials in beginning inflammation, is free movement of the bowels. If this has not occurred spontaneously, one of several purgatives may be given. Calomel is often invaluable. It may be given in doses of one-tenth to one-fourth of a grain, repeated every hour until a grain or more is taken, or be given in one large dose of one to three grains. It may have to be followed by castor oil or epsom or rochelle salt. Either of the latter is sometimes excellent alone, a teaspoonful of each or of both being given every hour until a movement occurs. A bowel injection or enema composed of glycerine one ounce, epsom salt one ounce, and enough soapsuds to make a pint is often helpful.

Hygienic Measures.—These are of the utmost importance. Diet should be nutritious and easily digested. Milk is the ideal food. If peptonized it is more readily digested. Fermented milk known as koumiss, is excellent. Meat juice is highly nutritious. Meat broths are stimulating but do not contain a large quantity of nutriment. Soups strained and skimmed may be borne. As a patient grows better, he may take soft eggs, custard, junket, rice pudding, milk toast, boiled chops, oysters, and so forth.

The Sick Room.—The sick room should be bright and well ventilated. The temperature 68 degrees Fahrenheit. Bed clothing should be clean, the patient should be sponged daily for cleanliness and to keep the skin active. A little alcohol added to the water makes a grateful sponge bath.

Antipyretics.—Antipyretics are agents reducing temperature. If fever is excessive, it is best lowered by cooling drinks and the application of cold to the surface. The latter is most usually accomplished by ice-bags, by cold sponging or cold pack.

Stimulants.—In low, long-continued inflammatory fever, some form of alcohol is most essential. It should, however, be given under the direction of a physician only.

ABSCESSES, BOILS.

Abscess.—An abscess is a newly formed circumscribed cavity containing pus. This new cavity is formed by the liquefying action of the bacteria upon the tissues.

Forms of Abscesses.—The general classes of abscesses are acute, following an inflammation, and that variously called chronic, cold, strumous or tubercular. The latter form is due to the bacillus of tuberculosis, and does not contain true pus.

Acute Abscess.—As soon as it is determined that an inflammation has gone to suppuration, free opening should be made. After free opening and evacuation, an abscess cavity should usually be irrigated by an antiseptic fluid. If free opening has been made, hydrogen peroxide is excellent for cleansing. This should be followed (unless abscess be of an internal organ) by corrosive sublimate solution (1 to 1,000 or 2,000). Drainage by tube or otherwise should be provided and hot moist antiseptic dressings applied. Rest promotes healing. This is obtained by bandages, splints, slings, and so forth.

Chronic Abscess.—The tubercular cold, scrofulous, or so-called chronic abscess, is a cavity produced by the action of the bacilli of tubercle. No true pus is present unless pus organisms have also gained entrance. A cold abscess lacks inflammatory signs. There may be no constitutional symptom unless true suppuration is added. The general health of the patient is, however, invariably below normal.

Treatment of cold abscesses is upon the general principles for the treatment of acute abscess, but should be trusted to none but a surgeon.

Felon or Whitlow.—This is a violent rapidly-spreading inflammation of a finger or toe, usually the former, due to pus germs. The symptoms are throbbing pain, great tenderness, swelling, a dusky redness. In case of a deep felon redness and pain may extend up the arm, and there is usually fever.

Treatment.—Rarely the application or iodine, cold, rest and elevation may afford relief. Generally, however, such treatment is worse than useless. Early free incision is very generally the only effective procedure. Incision, irrigation, antiseptic fomentations, and splinting, with elevation of the extremity, is the outline of treatment.

Boils or Furuncles.—This is the most common form of superficial abscess. If not surgically treated, a boil will finally rupture, pus will flow out, and a "core" of dead tissue at last be discharged. The treatment consists of early crucial incision, removal of dead tissue, irrigation with peroxide of hydrogen and corrosive sublimate, and the application of hot antiseptic fomentations.

Carbuncle.—This condition is a circumscribed infectious inflammation of the deeper layers of the true skin and subcutaneous tissues. It ends in a slough. A carbuncle has many points of suppuration. It often causes profound constitutional disturbance, and may prove fatal in the aged and enfeebled.

Treatment.—The best treatment is that of cutting out, under general anesthesia, the entire area infected. The large wound produced heals by granulation, or may later be skin-grafted. The wound is treated and dressed antiseptically. Secure rest and sleep with morphine, give nourishing diet and attend to the bowels and kidneys.

Ulcers.—An ulcer is a loss of substance (due to inflammation) of a superficial structure. It is commonly known as a "sore." The causes are various. Blows may knock off the skin. Burns may cause extensive ulceration. General diseases, such as tuberculosis or syphilis, may predispose to ulcers. Bed sores are common. Varicose ulcers of the leg, due to enlarged veins, are frequently met with.

Treatment.—Treatment consists essentially of removing the cause, so far as possible, and in treating the ulcer antiseptically. If a bed sore, remove the pressure; if syphilitic, internal medication is imperative; if a varicose ulcer of the leg, daily antiseptic cleansing should be practiced, and aseptic dressing should be applied. The most important factors, however, in assisting nature to relieve the engorged veins are rest, elevation, and firm, smooth bandage from the toes extending above the diseased area.

Gangrene or Mortification.—These denote the death of a part of the living body in mass. Putrefaction of the part occurs while it is attached to the living body. Gangrene results from a cessation of blood supply, or from obstruction of the outflow of blood from a part. Common among the causes producing such interference are a feeble heart and hard diseased blood-vessels. Other causes are injuries, such as a crush, heat or cold, constitutional disease, such as diabetes.

The aged and enfeebled with hard vessels, should avoid injuries, even slight ones, of the feet. The mere cutting of a corn too closely may lead to gangrene. Such a person should attend carefully to the general health and should especially keep the feet warm and comfortable. The treatment of gangrene demands all the skill of a competent physician.

FRACTURED OR BROKEN BONES.

Kinds of Fracture.—Fractures are classified as of two kinds, the simple and the compound. A simple fracture is one in which the skin is not injured, so that no matter how much the bone is broken up, there is no communication of the fragments with the external air. A compound fracture is one in which the breaking of the bone is accompanied by a wound, caused either by the same force which produced the break, as, for instance, a bullet, or by the ends of the broken bones protruding through the skin. For example, a man may fall from a tree, breaking the femur or large bone of his thigh, and the broken end of the bone may be driven through the skin and into the ground. Compound fractures are much more dangerous than simple ones, chiefly because whenever the skin is broken there gain entrance to the tissues disease-producing germs, which set up the process of suppuration.

Treatment.—Compound fractures are also more likely to be serious because the skin and muscles are much bruised. When, however, the wound which communicates with the fracture and makes it compound is small, an effort should be made to gain the advantages of a simple fracture by covering the opening in the skin with a clean cloth wrung out of corrosive sublimate solution (1 to 2,000) or wet with salt solution (one teaspoonful to the pint) until the surgeon arrives and takes charge of the case. This imperfect effort at antiseptic treatment must often fail, from the impossibility of applying it quickly enough, but it ought always to be tried.

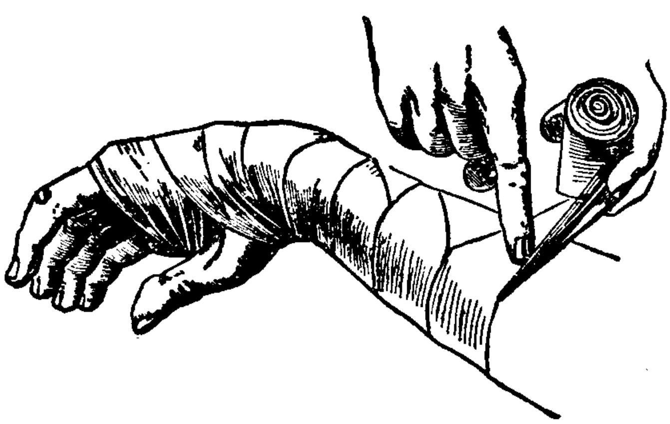
Recognizing Fractures.—We may recognize the fact that a bone is broken by the following indications: first, that the limb is shortened or bent where there is no joint; second, by there being an unnatural degree of movement at the seat of injury; third, by the violent pain which attends a fracture; fourth, by the grating which may be felt, and sometimes even heard, when the limb is moved.

Setting of Broken Bones.—This consists merely in pulling and pressing the fractured extremities of the bone into their proper position. Such an operation, of course, requires a full knowledge of the anatomy of the parts and should, as a rule, be left for a skillful medical attendant, if he can be procured, within twelve hours. In the meantime the wounded part should be placed in the most comfortable, or rather the least painful, posture, wrapped in cloths wet with laudanum, or lead-water and laudanum, and kept cold with ice, in order to prevent swelling and diminish the suffering as far as possible.

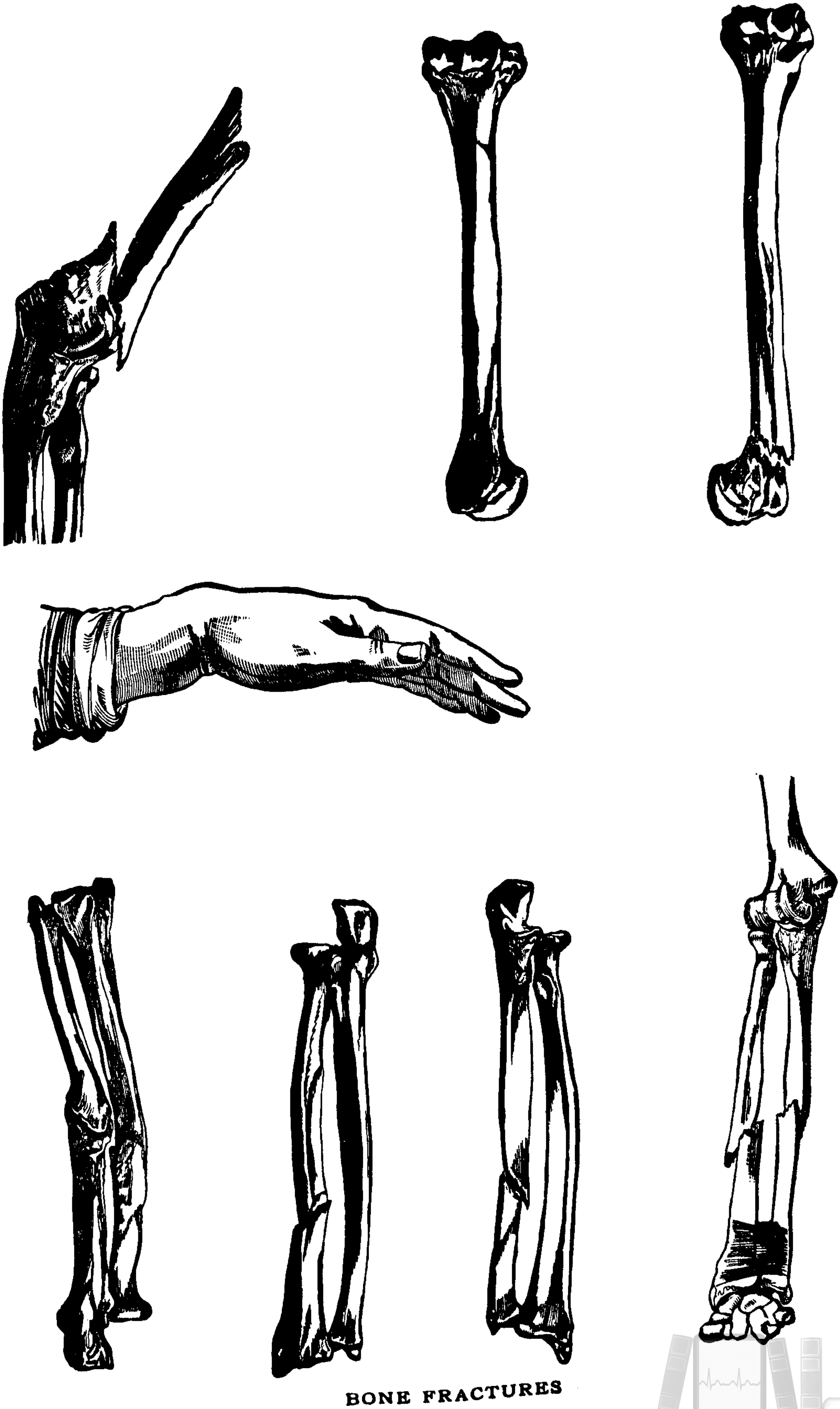
Keeping a Broken Bone in Place.—When the physician succeeds in replacing the fragments, his next object is to secure them from being again deranged. This is usually accomplished by the aid of splints of various kinds, such as are shown applied to the arm on the following page. These splints may be made of wood, tin, pasteboard, or gutta percha, and are kept in place themselves by bandages or knotted handkerchiefs. In certain cases, material, such as plaster of Paris or starch, which stiffens after it is applied to the limb, upon a bandage, can be employed with great advantage.

Injuries Far from Home.—When a person is injured far from any habitation, and must be moved a considerable distance, if it is found that a bone has been broken, the first thing to do is to apply to the fractured limb a temporary splint. This will prevent the injury from becoming compound, if it is as yet only a simple fracture, and will save the wound from being irritated, if the injury is already a compound one.

Bandaging.—For the making of bandages and the various kinds see succeeding chapter. The operation of bandaging requires some practical experience before it can be performed neatly. The idea, however, of the method of procedure, winding the cloth smoothly around the arm, for instance, in a spiral direction, can be gathered from the illustration. Where the limb is conical, increasing in size from below upward, the only way to cause the bandage to lie evenly and be of much use is to make what are technically called reverses, turning the roll of linen over each time as it comes on top, as is



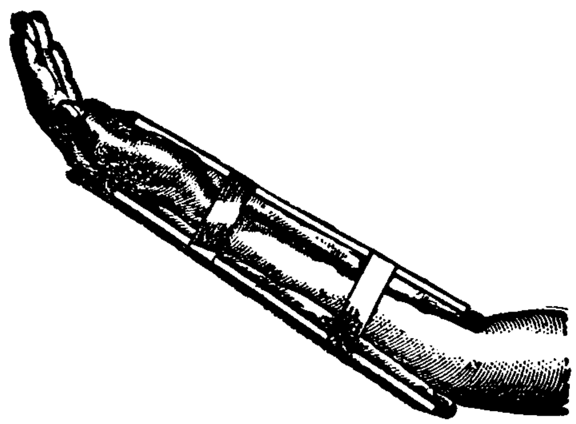
Application of a Bandage.



BONE FRACTURES

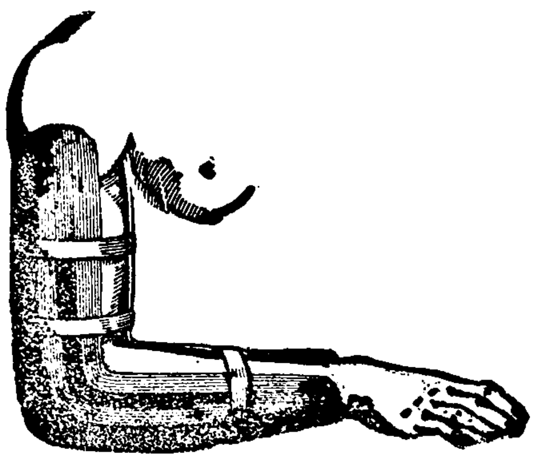
represented in the wood-cut. The artist, however, has delineated the surgeon's fingers as being those of a left-handed man, a variety of the human species which, strange to say, is tenfold more numerous in pictures than in real life. The best substitutes for bandages available at a distance from human habitation are often to be found in handkerchiefs.

Splints.—To obtain splints for the temporary support of fractures, the most varied articles have been pressed into service. Thin, light boards, like shingles or the sides of a cigar-box, which can be cut into any form desired, are often the best, but any object which may be trimmed or bent to suit the exigencies of the case, and is stiff enough to retain the form given to it, can be utilized. After preparing the splint it should be padded, for which purpose cotton-batting, tow, old rags, dried leaves, or hay may serve, these materials being bandaged fast to it on the side which is to come in contact with the injured member. The apparatus is then applied to the limb, an arm, for example, as shown in the figure below, and after carefully adjusting the injured member to the least painful position, as well as to that which is nearest its own natural shape, the splint or splints are fastened in place with several turns of the bandage applied as previously suggested. The adjoining wood-cut shows the method of applying the splints for a fracture of both bones of the forearm. After arranging the arm and splints as depicted, the whole should be covered in with a bandage, and suspended by a sling from the neck in such a way as to be carried by the patient across his chest.



Treatment of Fracture of Both Bones of the Forearm.

Fracture of Arm.—Fracture of the humerus or arm-bone between the shoulder and elbow should have applied curved splints made of thick pasteboard, wet in boiling water and moulded to the shape, sheet gutta percha similarly softened, or tin, one on the inside and another on the outside, as represented in the figure. The fragments of the bone are to be adjusted in proper position, a bandage applied, and then the splints fitted and firmly yet not too tightly bound on with a bandage running from the tips of the fingers to the shoulder. If the roller is applied above only, the hand and fingers will swell up in consequence of the pressure, interfering very seriously with the circulation of the blood. In fractures of the arm it is always advisable to arrange the elbow bent at a right angle, because should the arm be left stiff, as may happen, perhaps with the best treatment, it is much more useful than when straight.



Fracture of the Humerus.

Fracture of Legs.—In fractures of the legs, a contrary rule holds good, and the effort should always be to keep the broken limb as straight as possible.

An excellent temporary dressing for a fracture of the leg below the knee is well indicated in the figure. The injured limb should be drawn out to as nearly its full length as can be borne, measuring it by the sound side to determine this, and then the fragments of the bone pressed, if possible, to their proper places. The pillow which has previously been laid beneath the injured member is then doubled up, as shown in the cut, and fastened with three or four strips of bandage or with handkerchiefs. If the leg is much bruised, or the pain very severe, a soft linen cloth soaked in laudanum, or strong lead-water and laudanum, should be wrapped around it before being bound up in the pillow.

Dislocations.—Continued displacement of the bones comprising a joint, after the ligaments have been more or less torn, constitutes a dislocation, or, as it is popularly described, "out of joint." These injuries are generally the result of external violence, such as falls, blows, twists, and so forth, which have caused the limbs to move in a direction, or to an extent, for which nature had not adapted them. A familiar example of a dislocation is that of the lower jaw, and the position of the bones composing this important articulation in their disturbed or displaced condition is well shown in the marginal illustration.

Dressing for Broken Leg.

Symptoms of Dislocation.—In a general way, a dislocation is recognized, first, by the altered appearance of the joint, which is usually very apparent when compared with the corresponding joint on the opposite side; second, by the movements of the affected joint being lessened; third, by the fact that efforts to move the joint cause much pain; fourth, dislocation can usually be distinguished from fracture, which, when near a joint, is apt to give rise to all these symptoms, by the absence of crepitus, as the grating noise produced by rubbing together the ends of the fragments is called. This sign, however, would, of course, prove falacious and misleading if both a fracture and a dislocation existed.

Dislocation of Lower Jaw.

Treatment.—The obvious treatment for a dislocation is reduction, or a replacing of the bones forming the joint again in their proper relations. In reducing a dislocation, not only should the operator have all his anatomy at his fingers' ends, but a vast amount of practical experience is often necessary to decide whether a dislocation is complicated with a fracture, or whether a dislocation or a fracture is the injury to be treated.

So great and so permanent is the injury likely to result from the blunders of attempting to "reduce" a fracture, erroneously supposing it to be a dislocation, or *vice versa,* that no time should be lost by the sufferer in availing himself of the best medical services procurable.

Foreign Bodies in the Throat.—Foreign bodies in the throat are sometimes substances imprudently swallowed by mistake, such as fish bones, pins, and so forth, or coins, marbles, and other playthings half ignorantly introduced by children. If the breathing is not seriously interfered with, medical assistance, sent for at once, should be awaited, as peculiar forceps and other instruments will probably be necessary to extract the intruders. If choking to death seems imminent from pressure on the windpipe, thumping on the back, holding the patient up by the heels, and striving to hook out or push the foreign body, if it is not intrinsically dangerous, down into the stomach, may be tried. At the last gasp the operation of tracheotomy, or opening the windpipe, should be performed by any one who has the knowledge and the courage to attempt it.

Rupture or Hernia.—By the above is commonly meant the protrusion of some organ of the abdomen through the walls of the latter. The most common contents of hernia are bowel or omentum. The commonest sites are at the navel and the groin.

The fact that persons so affected are often induced to entrust themselves to the treatment of quacks or charlatans is deplorable. Serious results often occur. There are only two forms of proper treatment, namely, either the wearing of a truss fitted and adjusted by a skilled person or submission to surgical treatment at the hands of a reputable surgeon for the radical cure of the condition.

PART XV OF BOOK IV

Treats of the anesthetics and soporifics, their properties and the manner in which each is used.

CURATIVE MEDICINE

PART XV.

ANESTHETICS AND SOPORIFICS.

Discovery of Anesthetics.—The victories of peace often far surpass in result the renown which they receive. Such was the achievement of Thomas G. Morton, a dentist, who, October 16th, 1846, for the first time produced complete anesthesia or insensibility to pain under a major surgical operation. This occurred in the clinic of the celebrated surgeon, Dr. John C. Warren, at the Massachusetts General Hospital. These men, by their discovery, not only wrought a revolution in surgery, but were victors over the horrible agony previously suffered at the hands of the surgeon. Their labors have brought to pass what Dr. Oliver Wendell Holmes has written: "The fierce extremity of suffering has been steeped in the waters of forgetfulness, and the deepest furrow in the knotted brow of agony has been smoothed forever."

Spread of the Discovery.—News of this remarkable discovery seemed to be carried by the winds, and soon anesthesia was used in the clinics of the world. The following year, chloroform was introduced by Sir James Simpson, of Edinborough. Such a boon to humanity is beyond estimation. The agony suffered under a severe surgical operation only the few courageous ones enduring it and yet surviving can tell. Anesthesia now renders comparatively easy very many new procedures, especially those requiring the greatest delicacy of touch and accuracy in dissection of brain or amid vessels and nerves—procedures not possible in the haste necessary before the days of anesthesia. Then, too, the operations were formerly few; now relief is for the many. The numbers rapidly multiplied, many fold. For example, in the Massachusetts General Hospital during five years previous to the introduction of anesthesia, only 184 persons were willing to submit themselves to the ordeal of an operation.

In the five years following. 487 operations were done, and, in 1899, in the same hospital, 3700 operations were performed. Anesthesia is a benign alleviator of suffering, a merciful prolonger and saver of life.

ANESTHETICS.

Anesthetics, artificial means of producing insensibility or loss of feeling, are general and local.

General Anesthetics.—The more common ones are ether, chloroform, nitrous oxide, and ethyl bromid. They are given by inhalation, and commonly more or less mixed with air or oxygen. The chief uses of general anesthesia are, to abolish the pain of labor and surgical procedures; to produce muscular relaxation in ruptures, fractures and dislocations; and to enable the physician to make examinations otherwise painful.

Preparation of Patient.—In emergencies, a patient sometimes must needs be given an anesthetic without previous preparation, but, when time affords, preparation should never be omitted. The dangers from an anesthetic are commonly magnified by the laity, yet a skilled anesthetizer, while not afraid, should have a wholesome respect for the complications which are always possible to arise. The better condition a patient is in at the time of giving an anesthetic, so much the less likely are serious results. Therefore the advisability of attention to the patient and his preparation previous to operation. The condition of lungs, heart, and kidneys is especially to be noted, the urine examined for albumen, casts and sugar. While the presence of the latter do not absolutely contraindicate the giving of an anesthetic, yet they may at least influence in the selection of the kind, and lead to special necessary precaution in its giving.

The Bowels.—The bowels should be freely emptied the day before or the morning of operation. This is well done by epsom or rochelle salts, one to two tablespoonfuls, supplemented, if need be, by an enema of soap-suds one quart, glycerin two tablespoonfuls, epsom salts two tablespoonfuls. The injection should be given a few hours before operation. The bladder should also be emptied immediately before operation.

Rest and Sleep.—The patient should rest for twenty-four hours previous, preferably in bed. He should have a general bath, that the skin may be active. Sleep should be secured the night previous; if there is nervousness, a warm bath at night may quiet, or it may be necessary to give a powder of potassium bromide, ten grains, or of trional, ten grains.

in a little hot broth or hot tea; either may be repeated. The anxiety of the patient may interfere with digestion. At any rate, the diet for a day previous should be light, for example, broths, soups, soft eggs, bread and butter, toast. At the time of giving an anesthetic the stomach should be empty. If operation is to be early in the morning, no breakfast should be given. A small quantity of beef tea or of broth and a little brandy may be well. If the operation is not until midday, a light breakfast of beef tea or of broth and toast or a roll had best be taken. Never give any food within three hours of operation, and only a very moderate quantity of water within the same time. Matter in the stomach induces vomiting, and this endangers the patient to the entrance of portions of food into the windpipe.

Temperature of Room.—The room should be warm, not less than 70 degrees Fahrenheit, and the patient protected with sufficient blankets. If a light in the room in necessary, it should be above and some little distance from the patient. Ether is inflammable, and the vapor explosive, but the latter sinks to the floor. The clothing should be loose, particularly about the neck and body. If a woman, the corset should of course be removed to give opportunity, if only this once, for free breathing. The hair should be braided. A third party should always be present. The patient should lie upon the back with only a small pillow beneath the head. Take care that the limbs are not cramped or pressed upon. The lips and nose should be anointed with vaseline. Having spoken some cheerful, encouraging word to the patient, the anesthetizer examines the heart, notes the condition of the pulse and respiration, and, without fail, sees that any foreign bodies in the mouth, including false teeth, are removed. He is now ready for the administration of the anesthetic.

Giving Ether.—The writer desires to state, in most emphatic terms, that an anesthetic should never be given by any but a skilled person or under the direction of such a person—one who can interpret danger signals, and can act promptly and intelligently. The limits of this work forbid giving detailed directions. Some of the salient points regarding the giving of ether may prove of benefit as well as of interest.

What the Operator Will Have at Hand.—The anesthetizer will have at hand stimulants—brandy, strychnine, atropine, digitalis and a hypodermic syringe in working order. He will have a mouth-gag and tongue forceps, and needs at hand two or three small towels. Ether is best given upon some simple inhaler, such as an Allis, but may be well given upon a towel folded into a cone, or, if the face be anointed, the folded towel may be placed flat over the patient's nose and mouth. Having gained the confidence of the patient, by assurances that he will give the anesthetic slow and will not choke him, the anesthetist says, "I want you to breathe through the inhaler a few moments to get used to it before I put any ether upon it. Now just a drop or two." So beginning, and continuing very slowly, "feeling" his way, the anesthetist may have reasonable hope that he will avoid any serious trouble in the stage of excitement. If choking or coughing occurs at first, proceed very gradually, giving a breath or two of pure air, and the throat will soon become accustomed to the drug which at first irritates. Vomiting thus early demands the withdrawal of the drugs for a few moments, until the throat and mouth are freed from the vomitus.

Pushing the Anesthetic.—After primary irritation ceases, the anesthetic may be "pushed," more and more being added, until, when the patient is in the second semi-conscious excitable stage, he may be getting a large quantity. "Pushing" the drug at this point will quickly send the patient over the period of disturbance into the quiet of complete anesthesia. If, however, very violent struggling with ridigity and great cyanosis, or blueness occurs at this time, it is generally wise partially to withhold the anesthetic for a few moments.

Signs of Perfect Anesthetization.—A patient is known to be completely anesthetized by the loss of consciousness, loss of motion, relaxation of the muscles, loss of certain movements, *e. g.*, that of winking when the eyeball is gently touched. The breathing should be regular and quiet. The anesthetizer not only observes the movements of the chest in respiration, but notes by touch and sound the rhythmical inflow and outflow of air. The breathing and circulation are especial indexes as to the condition of the patient. The regularity, rate, and strength of the pulse should be frequently noted. Any marked variation from the normal should receive immediate attention. Stimulation may be needed or withdrawal of the anesthetic demanded. The color of the patient is also a valuable index. Great pallor generally indicates failure in the circulation; cyanosis or blueness, that the inhalation of oxygen is insufficient. The latter generally calls for removal of the drug and a determination and correction at once of the cause of imperfect inspiration.

Complications.—Irritation apt to arise early in the administration has been alluded to. If vomiting occurs, the head is always to be turned to one side and the mouth wiped out. In a large majority of cases vomiting may be stopped by increasing the quantity of the anesthetic.

The Respiration.—Before complete anesthesia occurs the patient may "forget" to breathe; the word "breathe" spoken loudly into his ear will generally arouse him to efforts of respiration. If after complete anesthesia the respiration is abnormal, the immediate determination of the cause and its correction are imperative. A muscular movement at such time will generally indicate recovery from the anesthesia and the necessity for an increased quantity of the drug. Otherwise, the anesthetic should be stopped, the mouth gagged open, the tongue pulled forward with forceps or towel, and mucus collected in the throat wiped out. This will generally be sufficient to restore breathing and to relieve the cyanosis, allowing the administration soon to be resumed. Should these means fail, artificial respiration should be instituted (which see below). The foot of the bed should be raised, fresh air admitted to the room, the patient well protected and surrounded by hot-water bottles. Meanwhile, various means of stimulation should also be used—hypodermic injections of strychnine, atropine, digitalis, ammonia; injections into the bowel of hot black coffee and brandy; a mustard plaster applied over the heart.

Artificial Respiration.—Laborde's Method. The jaws are held apart and the mucus wiped from the mouth and throat. The tongue is grasped with forceps or the fingers covered with a towel, and is drawn every four seconds, strongly and quickly forward, and each time allowed to go gradually back.

Sylvester's Method.—The former method should be used in conjunction with this. The patient is in a recumbent posture. The operator grasps both the patient's arms near the elbow and draws them gradually outward and upward until they nearly touch the patient's head. They are thus held for two seconds, while air enters the lungs. The arms are then gradually lowered and pressed firmly against the side and front of the chest for two seconds, thus forcing air out of the lungs. The movement of elevation and depression should be made not more than fifteen or eighteen times a minute.

Giving Chloroform.—Ether is a safer anesthetic for most purposes than chloroform. The latter is preferable, however, in a few conditions, *e. g.,* in infants and the very old; in serious lung and kidney trouble chloroform, because of the less quantity required, is less irritating. In certain operations about the face the patient can better be kept anesthetized by chloroform, and it is often better suited for employment in labor, because more quick in action and more relaxing.

Giving Ether.—The general principles for giving ether apply to the giving of chloroform. However, because chloroform is quicker in action, it should be given with greater care. Ether, like alcohol, is a stimulant to the heart, and is therefore generally preferred in heart disease. Chloroform has clinically a distinct depressant action upon that organ.

How to Give Chloroform.—Chloroform may be well given upon a folded towel or napkin, or piece of cheese-cloth. The object from which the chloroform is inhaled must not be held in contact with the face but an inch or more above the nose so that the vapor may be freely mingled with air. Chloroform should be given drop by drop, cautiously, and particular watch-care given for danger signals. If struggling occurs it is imperative that the drug be not "pushed" lest, at this time, when breathing deeply, the patient inhales at a few breaths an overwhelming quantity. Eternal vigilance is the price of safety in anesthesia and especially so in the giving of chloroform.

Nitrous Oxide.—Nitrous oxide or laughing gas is perhaps the safest general anesthetic. Its action is rapid, anesthesia resulting in one minute. But its effect is fleeting, lasting less than one minute, thus rendering it unfit for major operations. It is much used by dentists for the extraction of teeth and has been used with advantage in minor surgery, such as opening an abscess. The gas (a liquid under pressure in steel cylinders) is bulky and not readily carried by the surgeon; the apparatus necessary for its use together with other agents is complicated, so that this drug is not likely to become popular in surgery.

Ethyl Bromide.—This, a colorless agreeable liquid, has not been widely used. In giving it to an adult it is well to pour from four to six teaspoonfuls, the whole amount to be given, upon a folded towel, and to apply the saturated surface directly to the nose of the patient, pressing the edges of the towel down upon the face to exclude the air. Unconsciousness is obtained in about half a minute. The anesthesia is rapidly recovered from, and after ill-effects are almost nil. This agent is adapted to cases needing anesthesia for examination, to the incision of abscesses, and for the relief of suffering in labor. It is considered comparatively safe by those who have used it. The favorite general anesthetics have been referred to.

Care of Patient After Anesthesia.—The patient must be carefully watched until he regains complete consciousness. He should, of course, remain recumbent. The erect attitude might result in heart failure. The head should be higher than the body. He should be warmly covered and perhaps be surrounded by hot-water bottles. The inhalation of oxygen is best, but an inhalation of vinegar is an excellent procedure to prevent nausea and vomiting. If the latter occurs, the head should be turned well to one side, the vomitus caught in a towel or basin. Food should not be given for several hours and if water is allowed it should be given only in teaspoonful doses quite hot, frequently repeated. If vomiting continues a mustard plaster should be put over the stomach, fresh air admitted to the room and a little hot black coffee given.

Local Anesthetics.—The chief ones are ethyl chloride, ether and rhigolene sprays, ice and salt, carbolic acid, eucaine and cocaine.

Freezing Agents.—These agencies are employed in the lesser operations, and occasionally when there is some complication preventing a general anesthetic.

Ice and Salt.—If one-quarter pound of ice be broken into small bits, and one-eighth pound of common salt added and the mixture be put in a thin bag and laid upon the skin surface, the area will become anesthetic in ten or fifteen minutes.

Ether, Rhigolene and Ethyl Chloride directed upon a part in a fine spray produce anesthesia by their cold effect. The latter is put up in a convenient glass tube with a metal cap. A part touched with pure carbolic acid becomes blanched and anesthetic.

Cocaine Hydrochlorate in a watery solution is quite commonly used for injecting into the skin, for applying to the mucous membrane, the latter absorbing it. It is applied to the nose, mouth or throat by a spray or swab, or dropped into the eye. For injection a two per cent. solution is generally sufficient. For application to the eye a four per cent. solution may be necessary, and for the nose and throat a ten or even twenty per cent. solution may be cautiously used. Da Costa says that never more than two-thirds of a grain should be painted upon a mucous surface and never more than one-third of a grain should be injected into the tissues. Examples of useful purposes to which cocaine may be put are, for instance, the removal of a wen, or a wart, the correction of a small deformity of the bones of the nasal cavity. A finger or toe can be comfortably amputated by its use, a constricting band meanwhile being placed about the root of the part to prevent the absorption of too great a quantity of the drug. The whole area supplied by a large nerve may be anesthetized by injecting cocaine about the nerve trunk.

Eucaine Hydrochlorate.—Eucaine hydrochlorate has practically the same action and may be used in the same way as cocaine.

Infiltration Anesthesia.—Infiltration anesthesia, commonly called

Schleich's method is produced by injecting into a part several ounces of a weak table salt solution to which a minute quantity of cocaine, morphine and carbolic acid has been added. The method is very efficient and has been successfully used for major operations. The anesthesia is partly due to the pressure upon the tissues, especially the nerves, by the injected fluid.

Spinal Anesthesia.—A method lately much talked about and one practiced considerably in France, is one in which a small quantity of a one-half or one per cent. solution of cocaine is injected by a syringe through a hollow needle into the spinal canal. In about five minutes loss of sensibility occurs in the parts supplied by nerves given off below the point of injection. All of the body below the diaphragm can thus be rendered anesthetic. Anesthesia lasts about forty-five minutes. It has been employed successfully in labor and in various grave operations. But it is not without its dangers, and, though relieving pain, it does not remove the horrors of an operation which consciousness must give. This method will probably never supplant general anesthesia. The ideal anesthetic is one without danger which abolishes both consciousness and sensation, thus giving the surgeon the absolute control of his patient—a condition essential to the accomplishment of the best result. May the twentieth century see the discovery of the ideal anesthetic.

SOPORIFICS OR HYPNOTICS.

The Sleep Producers.—The class of remedies so-called are sleep producers. They may be divided into those which not only cause sleep but also relieve pain and those which have no pain-relieving properties. Of the former opium is the best example, and should be given where sleeplessness is due to pain, whereas, if due to other causes opium should never be given.

Insomnia.—Insomnia is such a distressing experience that people will go to extremities to relieve it, sometimes being led to use carelessly the most powerful and harmful remedies. The warning cannot be too emphatic to the laity against such a practice, for this class of drugs should rarely be taken except by the advice and under the direction of a skilled physician. The physician himself should be keenly alive to the especial danger of most direful drug habits. For the treatment of insomnia diligent search should be made for the cause and the latter removed. If due to coffee-drinking at night the habit should be abandoned. If to nervousness because of overwork or excessive social duties proper rest from such strain will probably relieve. If weariness or exhaustion be the cause, moderate stimulation with some hot drink, a little coffee or a small quantity of brandy, will help. A warm bath before retiring is sometimes efficacious. Some occupation before retiring, *e. g.,* the perusal of some light but interesting book will often suffice.

Insomnia from Pain.—However, insomnia from pain must be relieved by opium or some of its derivatives, codeine, morphine or heroine. Long continued administration of opium, except in hopelessly incurable cases, is to be strongly condemned. The cause of pain should be removed, then the need of a hypnotic is gone. In emergency, for the relief of severe pain, there need be no hesitancy in giving to an adult one-fourth to three-fourths of a grain of opium, one-sixth of a grain of morphine, or ten drops of the tincture of opium (laudanum), repeating either dose in an hour if relief is not obtained. Meanwhile a physician should be summoned. When opium is given, it should be with the clear understanding of the probable ill-effects of mental depression, and of nausea and vomiting, and the danger of the habit ever in mind.

Chloral.—Chloral is perhaps the purest soporific. It is poisonous, however, when taken in excessive dosage, causing weakness of the heart or even heart failure. When insomnia is due to nervousness Hare recommends the following:

Chloral	1 or 2 drachms
Bromide of potassium	2 drachms
Syrup of wild cherry	1 ounce
Water sufficient to make	3 fluid ounces

MIX. Directions: Take a dessertspoonful in water at night.

Sulphonal.—Sulphonal has sleep producing powers perhaps not equal to those of chloral. It finds its chief usefulness in nervous insomnia and especially in that occurring with those of unsound mind. It is commonly given in powder, ten grains to a dose. As it is insoluble in cold water it should be given in hot water or hot milk. The drug is slow in effect and therefore should be taken two or three hours before retiring.

Trional and Tetronal.—These are closely related to sulphonal and are almost identical with that drug in their action. Their effect is felt in thirty minutes or less. The dose of each is ten to fifteen grains agreeably given in hot broth or tea.

The Bromides.—The bromides of potassium, of sodium or of ammonium, the three being practically identical in action, are drugs very commonly used as quieters and sleep producers. The former is most frequently used. It is indicated where there is undue excitement of the nervous system, but never where the nervous symptoms are due to depression. It is a useful remedy for hysterical women, for the disagreeable nervous symptoms often accompanying the climacteric, and is a soporific for the over-worked and nervous, provided it is not long continued. It is useful in neuralgias and nervous headaches and frequently quiets the excessive nervousness of drunkenness. The dose of either is ten to thirty grains taken dissolved in water.

PART I OF BOOK V

Treats of Accidents and Emergencies. The articles are alphabetically arranged, so as to be convenient for quick reference. This chapter should be studied carefully, especially the articles on Rescue from Drowning and on Hemorrhage.

ILLUSTRATIONS

Book V

ACCIDENTS AND EMERGENCIES

PART I.

FIRST AID TO THE INJURED.

The fate of an injured person frequently depends largely upon the acts of the one into whose hands he first falls. If proper immediate assistance be given, serious consequences may be avoided. Everyone is liable to be called upon at some time to administer first aid, and therefore, it is a duty with all to be so prepared that whatever and whenever the emergency, further harm may at the time be prevented, suffering relieved and perhaps life saved by quick and proper action.

In this present chapter, in conjunction with that on poisons and their antidotes and that on the diagnosing of disease by symptoms (see general index at back of book), will be found a fund of information so arranged as to be especially available for quick reference in times of accident and emergency. It will also be found of great advantage if the chapter on Anatomy and Physiology (see Index) has been previously studied, as it will give a knowledge of the body that may prove invaluable in case of accident.

In cases of severe injury no time should be lost in sending for a physician, and it is to be borne in mind that it sometimes happens that an injury which to the non-professional seems trivial, may be recognized by the physician as extremely grave. But until the physician arrives there is need of doing many things which anyone can do, and the immediate doing of which often is the necessary preliminary in the saving of life, such as putting out burning clothing, stopping bleeding, rescuing people from drowning, extricating them from machinery, removing them from contact with electric wires, etc., and then attending to the immediate relief of their sufferings. Then, too, it frequently happens that no professional aid can be obtained, and the care of the injured and the ill devolves upon those who happen to be at hand.

Whether physician is expected or not, make the sufferer comfortable to start with, by laying him down gently, straightening his limbs, raising or lowering his head and such like things, as the case may require. If the injured part is covered with clothing, remove it by cutting or carefully tearing, but do not remove more clothing than necessary, as one of the results of injury is to make the injured person feel cold. Shoes or boots should be cut away in severe injuries about the feet. Do not try to do too much. Do nothing for the sake of doing something. Yet, remember, that the right thing done at the right time relieves suffering and may save life. The great thing is to know the right thing to do and when to do it. Be cool. Act quickly but not hurriedly. Make everything you do count for something in relief.

The following advice as to what to do in certain specific cases should be known by everyone and is here arranged in alphabetical order for ready reference.

ALPHABETICAL REFERENCE LIST WITH EXPLANATIONS AND TREATMENTS.

Acid Burns.—See Burns.

Asphyxia or Suffocation.—Proceed to restore breathing by artificial respiration, as in drowning. See Rescue from Drowning and Gas Poisoning.

Arms, Broken.—See Fractures.

Arterial Hemorrhage.—See Hemorrhage.

Artificial Respiration.—See treatment in Rescue from Drowning.

Apoplexy.—This state is caused by the rupture of a blood vessel within the skull and consequent escape of blood and pressure on the brain, or by the clogging of a blood vessel, thus cutting off the blood supply to some part of the brain. The result is the same in either case: a part of the brain ceases to perform its functions owing to pressure of the clot. If the clot be small the effect will be slight; if it be large the effect will be grave if not fatal. The sufferer loses consciousness, sometimes falling as if felled by a heavy blow, sometimes becoming insensible more slowly. In well-marked cases, no effort will arouse the patient from insensibility. The face is flushed and the pupils of the eyes generally dilated, or one may be dilated and one contracted. Breathing is slow and labored; snoring may occur; cheeks are often puffed out with each respiration, the air being blown through the lips. Pulse is slow, full and hard. Paralysis is an important symptom and must be looked for. Paralysis generally is only on one side—the face, arm and leg on the same side being commonly affected. The mouth is usually drawn away from the affected side of the face.

TREATMENT.—Lay patient down, head and shoulders slightly raised; loosen clothing about neck and body; wrap cracked ice in a towel and place it on the head, or wrap head in cold wet cloths and keep them cold until arrival of the doctor. If without medical advice for long period, empty the bowels by giving an injection of soap and warm water, at the same time giving a cathartic, castor oil or salts, if the patient can swallow. Keep the patient quiet. *Do not give any stimulant.*

Bandaging.—See special article on bandaging.

Bleeding of all Kinds.—See Hemorrhage.

Brain, Concussion of.—See Concussion of the Brain.

Brain, Compression of.—See Compression of Brain.

Bites of Dogs.—Dog bites may be of trifling import or of serious consequence. Usually the fright they cause is unwarranted. If the dog is not diseased all that is requisite is such treatment as would be given any lacerated wound. In view, however, of possible seriousness it is well in all cases to immediately consult a physician, and if there is the slightest suspicion that the dog has rabies or is "mad" or even if it is sick in any way, this should be done at any cost or trouble, and if for the moment impossible, then in the meantime, the wound should be cauterized at once. If there is evidence that the dog had rabies the Pasteur treatment should be taken without delay. If commenced within a few days after the bite (the sooner the better), the Pasteur treatment is an almost certain preventive of the development of hydrophobia. Other animals as well as dogs suffer with rabies and may communicate it to human beings. (See general index at back of book for special article on Hydrophobia.)

Bites of Venomous Insects, Snakes and other Reptiles.—In all such bites the prime object is to prevent the spreading of the poison through the system, and after that to get it out of the wound. Bind a stout cord, string or anything at hand very tightly around the limb, a few inches above the wound, remembering, however, that there is danger in making it too tight and also in keeping it tight too long. Then suck out the poison—it is harmless in the mouth. If physician near at hand, hasten to him; if one cannot be secured without delay, the poison may be removed or neutralized by prompt incision and application of some caustic. Dip a bit of soft stick in strong carbolic acid and rub every part of the inside of the wound with it, or with any caustic at hand. If a caustic cannot be obtained, heat a piece of iron or steel to white heat and thrust the white-heat end into the wound. A knitting needle or small knife blade will answer the purpose. After cauterization, treat as an infected wound. This done relax the cord or ligature above the wound and again tighten it and watch for a few minutes for symptoms of general poisoning. Repeat this until sure that the patient is out of danger. If symptoms of general poisoning do come on similar to those of shock, keep the ligature tight and treat the patient as for *Shock,* giving whiskey or other alcoholic liquors in sufficient quantity to sustain the system; but there is no advantage in absolute intoxication.

MAD DOG OR POISONOUS REPTILE BITES.

What to Do.—This class of common and dangerous emergencies may be successfully met on the moment by the simple means shown in the adjoining plate. By preventing the poison from entering the system, time is gained for the use of the proper remedies.

The Band.—The band, fillet or ligature used may be a strap, cord, rope or handkerchief—anything, in fact, which can be drawn and tied tightly; or which, if tied loosely, will permit of a stick being placed within it, and a tight twisting of the same, after the manner of a *tourniquet,* in order to stop the blood circulation more effectively.

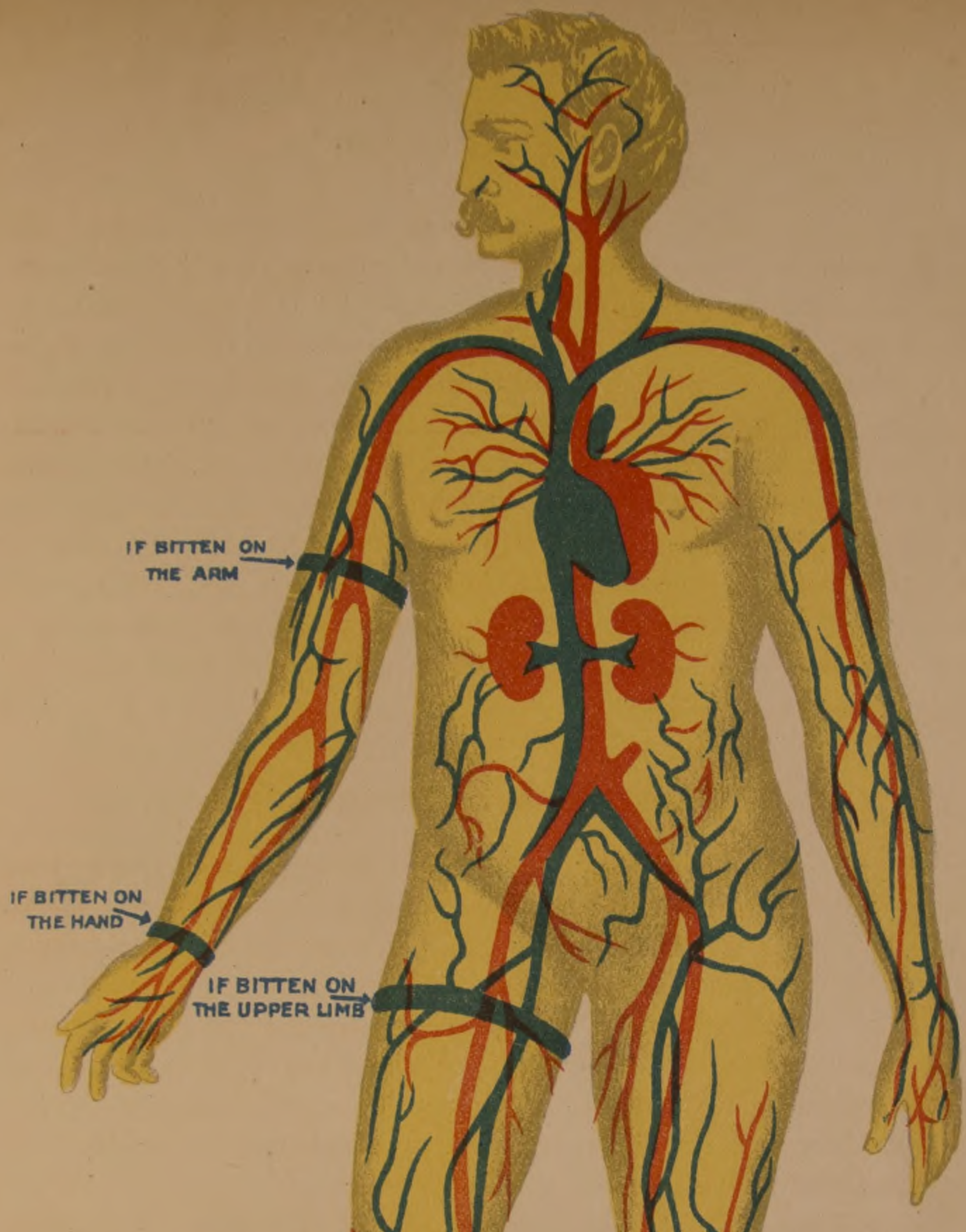
How to Do.—1. If the bite be on the arm, bind the cord, or ligature, tightly around the limb at the point indicated by the head of the *"arm"* arrow.

2. If the bite be on the hand, bind the cord tightly around the wrist at the point indicated by the head of the *"hand"* arrow.

3. If the bite be on the upper part of the leg, bind the cord tightly around the limb at the point indicated by the head of the *"upper limb"* arrow.

4. If the bite be below the knee, bind the cord tightly around the limb at the point indicated by the head of the *"lower limb"* arrow.

5. *Further Precautions.*—It is perhaps unnecessary to add that in the emergency of a mad dog bite the band for preventing the virus from entering the system should be applied as quickly and tightly as possible. If the material is at hand, several of such bands, tied one above the other,



ACCIDENTS AND EMERGENCIES - WHAT TO DO IF BITTEN BY A MAD DOG OR POISONOUS REPTILE will prove more effective than a single one. An additional emergency measure, and a very proper one, is to quickly cut the wound out with a sharp knife, and then to cauterize it with a hot iron, or such other means as may prove to be at hand. Make all haste to get the victim within reach of the proper remedies. (See Index.)

The Snake Bite.—The snake bites that are dangerously poisonous are those of the copperhead, water-moccasin, rattlesnake and viper. As in the case of the mad dog bite, several bands, tied one above the other, are better than one. The wound should be cut out, and then sucked. No harm can come from this if the mouth be free from sores, or the poison is not swallowed. In the absence of other means of cauterizing a snake bite wound, hunters pour powder upon it and explode it with a spark. The band or bands used should not be removed for some time, and in case of more than one, the uppermost one should be removed first.

Breathing, Restoration of.—Proceed as in Drowning.

Bruises.—See Contusions.

Broken Bones.—See Fractures.

Burns and Scalds.—These may be caused by contact with flames, hot metals, hot liquids, steam, electricity or chemicals. They are dangerous according to depth and extent. The skin may be but slightly inflamed or it may be blistered or charred. If the extent be large and the burn deep, it is apt to be fatal, especially in children. Shock is common after severe burns. If a person's clothes be on fire, throw him down and smother the fire with coat, blanket or rug (see Burning Clothing). The clothing should be cut away with sharp scissors. If any part of the clothing adheres to the flesh, do not attempt to remove it. In severe burns the patient may be put into a warm bath with the clothes on and then the clothing removed while he is in the bath.

Treatment.—In slight burns a piece of antiseptic gauze moistened with salt solution (1 teaspoonful of salt to a pint of warm water) will relieve pain, or it may be alleviated by covering with clean cloths wet with a warm solution of washing or baking soda, putting in as much soda as will dissolve. When pain is relieved, dress with boric acid ointment or vaseline. Kerosene oil or two parts of kerosene to one part of sweet oil also relieve pain. Other applications are carron oil, made by shaking together equal parts of linseed oil and lime water. This is a good household remedy to have ready made and always on hand for emergencies, but the bottle containing same must always be kept tightly corked or flies will deposit their eggs and make it dangerous for use. Castor oil, fresh lard, cold cream or any fat that is not rancid are good applications.

Severe burns or scalds must be kept warm and the air excluded. They may be dressed with salt solution or with soda solution as described, if possible sterilized dressings, and then covered warmly with cotton and lightly bandaged.

Burns by sulphuric or other strong acids should be washed immediately and plentifully with an alkali such as the soda solution, lime water or milk of magnesia or covered with baking soda or powdered magnesia. Afterward follow the general treatment for burns.

Burns made by lye, caustic lime, soda or potash should be at once washed with a weak acid, such as vinegar or lemon juice in water, and then followed by general treatment.

External burns made by carbolic acid should be washed at once with alcohol, whiskey or brandy, or better still, quickly apply baking soda. If the acid has been taken internally, administer whiskey or brandy.

Burns by Powder.—*Characteristics.*—When it has been sufficient to produce rupture of the small vessels in the skin and subcutaneous tissue, an "ecchymosis" or bruise is present. The skin is darkened and discolored, and grains of powder are plainly discernible in the skin. When it so injures the deeper tissues as to cause effusion of blood from rupture of some of the larger vessels "extravasation of blood" is said to be present.

Symptoms.—Burns from powder produce an effusion of blood into the skin according to the force and distance employed, first as a livid red, deep blue or black patch, which in the course of twelve or eighteen hours becomes larger and lighter at its margins. About the third day it assumes a violet tint, on the fifth an olive brown, on the sixth a green, on the seventh or eighth it has a yellow aspect.

Consequences.—A severe burn may cause a rupture of a large artery or vein, under which circumstances a fatal extravasation may ensue. The effects also vary as regards locality. For instance, in an adult a burn of this character over the scalp may be followed by a local effusion of blood, and in a child this effusion may go on so as to form a swelling which in some portions of the body may give rise to enormous enlargement. In some cases the blood thus extravasated breaks down, as it were, and considerable suppuration takes place.

Treatment.—1. In the treatment a slight burn requires but mild treatment, cooling applications, and if advisable the grains of powder carefully removed. If extravasation of blood has taken place, it is to be checked by a mixture of two parts common salt to three parts saltpetre applied to the surface, or the iced poultice made as follows:—Take of flaxseed meal a sufficient quantity to form a layer from three-quarters to an inch thick. Spread a cloth of proper size. Upon this at intervals of an inch or more place lumps of ice, the size of a marble. Then sprinkle them lightly over with the meal. Cover with another cloth, folding in the edges to prevent the escape of the mass, and apply the thick side to the surface of the wound.

2. A lotion of tincture of arnica, one ounce to a pint of water, appears to be beneficial in hastening the absorption of blood, removing pain, and so forth. Some of the stimulating liniments, such as the soap of opium, may likewise be employed. In more severe cases cotton, wool or lint soaked in oil and covered with oiled silk are the best dressings. Moist applications here rather do harm and should be avoided.

In all cases of severe burns a physician should be secured with least possible delay. If away from medical help and there is great suffering, one-quarter grain of morphine, twenty drops of laudanum or a tablespoonful of paregoric may be given an adult and repeated once or twice at half hour intervals if necessary. For children, the dose must be properly reduced. See general index for table of children's doses. An important matter in case of burns is treatment of the accompanying shock. See *Shock*.

Burning Clothing, How to Put Out.—If your own clothing catches fire do not run for help, as this will fan the flame. Lie down and roll up tightly in an overcoat, blanket, rug or anything of a woollen or cloth nature you can lay your hands on. If nothing obtainable to wrap in, lie down and roll over, slowly beating out the fire with the hands. If another person's clothing is on fire throw him to the ground and smother the fire with coat, blanket, rug, table cover or whatever of the kind at hand. When flames are extinguished, pour water on burning parts until last spark has disappeared.

Carrying the Wounded or Injured.—See Transportation of the Injured.

Choking.—It is a common experience to have something stick in the throat, especially with children. All sorts of things get in that are liable to cause suffocation. The sufferer turns purple in the face, the eyes protrude, he throws his arms about and sometimes falls unconscious. In other cases the obstruction lodges in the larynx or the windpipe, causing great distress and violent coughing.

TREATMENT.—Slap the sufferer forcefully on the back, or stand him up face to the wall, his chest resting against it, and give him a severe blow between the shoulders. If a child, place one hand on each side of the chest and squeeze it vigorously and suddenly; or hold it with the head hanging down and slap the back while in this position. If something is supposed to be in the throat, perhaps a piece of meat, try to grasp by thrusting the thumb and forefinger down as far as possible, or try to hook it out with the forefinger. When the breathing is not seriously affected it is best to wait for medical aid, for unskilful handling may increase the difficulty, and it not unfrequently happens that the obstruction has passed down, leaving only an irritation that is mistaken for its actual presence.

When a button, coin or other such article has been swallowed by a child, do not give oil or other purgatives. If the object swallowed is sharp or angular it is a good method to give the victim rye bread, potatoes and cheese to eat, the idea being that the edges which might wound may become coated or enmeshed with these substances in such manner as to protect the stomach and intestines.

Circulation, Restoration of.—Get the patient into warm place. Remove clothing. Rub with hands or hot flannels and give alcoholic stimulants in small doses, or half a teaspoonful of aromatic spirits of ammonia in one or two tablespoonfuls of water, repeating dose if necessary; also hot tea, coffee, broth or hot water. A very efficacious remedy is a glass of hot milk in which half a teaspoonful up to one teaspoonful of cayenne pepper or paprika has been thoroughly stirred. Apply hot water bottle or other dry heat to the feet.

Cold, Exposure to.—See Exposure to Cold; also Circulation, Restoration of; also Frost Bites.

Compound Fracture.—See Fracture, Compound.

Compression of the Brain.—When by a blow or fall a fracture of the skull has occurred and there is a piece of bone pressing on the brain substance or an escape of blood within the skull, causing pressure on the brain, it is called compression of the brain, and the symptoms are the same as those of Apoplexy. In some cases the fracture is not apparent by any examination. It may be situated at the base of the skull. Bleeding from the nose or ears, or blood in the whites of the eyes may indicate such fractures. Emergency treatment is the same as for Fracture of the Skull, which see; also see Apoplexy. Do not give stimulants.

Concussion of the Brain.—This may be result of a severe blow upon the head or by falling on the head. The sufferer is stunned, is stupid, confused, sick at stomach, often vomits, lies pale and shivering, sometimes faints and is more or less insensible, sometimes completely so, depending on severity of injury. Recovery is usually rapid, but after effects may last a long time.

TREATMENT.—Place patient in cool, quiet, dark room on his back, with head slightly raised. Unfasten any clothing that is tight about neck or waist. If patient shivers or seems faint and cold, apply heat as described under *Shock*. *Do not give stimulants in any head injuries.* After first shock has passed away apply ice to the head.

Contusions.—Ordinary bruises or contusions caused by falls or blows, consist of the rupture of small blood vessels under the unbroken skin and are indicated by the familiar black and blue marks.

TREATMENT.—Lay over the bruise a cloth saturated with hot water, or with half hot water and half alcohol, or either with witch hazel or tincture of arnica. Hot poultices lessen pain and aid in absorption of the blood. Frequently no treatment is needed.

Contusions with Injury to Internal Organs.—These may be serious and manifest various symptoms. If contusion of chest or abdomen there may be spitting or vomiting of blood or blood may be passed from bowels or bladder. There may be violent pain, paleness, fainting, depression and all signs of shock.

TREATMENT.—Treat the shock and hemorrhage as described under those headings.

Contused Wounds.—See Wounds.

Convulsions in Children.—Inject five grains chloral into rectum. Place child in warm mustard bath and then apply ice bag to spine. Another treatment is to dip a blanket in hot water and wrap child's naked body in it, taking great care not to burn. Cover this with a dry blanket. Next lay cloth in cold water on the head. If spasms continue, give teaspoonful of syrup of ipecac if it can swallow and follow with a tumbler of warm water. Then thrust finger down throat to hasten vomiting. Repeat ipecac every fifteen minutes if necessary for three or four doses. If spasms continue after child is in blanket fifteen minutes, give injection of soap and warm water and tablespoonful of castor oil as soon as he can swallow. Also see Index for other treatments. Remember that while one of these treatments should be commenced without a moment's delay, yet a physician should at the same time be immediately sent for, as although convulsions in children are most frequently due to some undigested substance, nevertheless, they are sometimes forerunners of serious diseases.

Cramps, Muscular.—When these occur in one of the legs (which is most frequently the case) take a strong cord, wind it around the leg where it is cramped, and taking an end in each hand give a sharp pull, strong enough to produce some pain. This will not only afford relief, but will generally prevent repetition for some hours. Another method is to press the toes forcefully on the floor or against end of bed, if occurring in night. These methods are not available with those seized with muscular cramps while swimming. In such case the swimmer should turn on his back and use his arms to keep himself afloat until the spasm is over.

Crushed Limbs.—See subheading under Wounds.

Cupping.—Where possible, cuts, wounds, etc., should be immediately sucked to draw out poison and frequently the patient can do this himself, but in many instances the wound is so situated that he cannot do so, and because of disease or for other reasons it may be dangerous or undesirable for anyone else to do so. Like results, however, may sometimes be obtained by "cupping," which in effect is a drawing of blood from a wound by vacuum, and thereby the poison fully or partially taken from the system before it has had opportunity to circulate. The inside of an ordinary tumbler is swabbed with alcohol just sufficiently to blaze when ignited and just before the flame dies away the tumbler is inverted and placed over and surrounding the wound, where it is firmly pressed. A partial vacuum forms within the cup (glass) as the air cools, and the poisonous blood from the wound and its adjacent parts is more or less thoroughly drawn up into the cup, either through the already open wound or through small cuts specially made for the purpose. Great care must be exercised in swabbing the glass that there is not sufficient alcohol to run to the edge of the glass or bad burning may result.

Cuts.—Simple cuts should be washed in clear water and allowed to bleed for a brief time that any poison may be expelled with the flowing blood. If cut caused by rusty or dirty instrument, wash with peroxide of hydrogen or other antiseptic, and dust with borated talcum or boric acid powder. Even the smallest cut, prick or scrape should be carefully treated, for blood poisoning may result from the most trifling wound. One of the most efficient means of extracting poison from small wounds is to suck them vigorously. If a little cut gapes open it may be brought together with a piece of sticking plaster through the middle, but never cover any wound entirely with plaster, though to protect it, a small, sterilized bandage or pad should be utilized.

If the wound is deep or an artery has been cut so that blood spurts out, follow directions given under Hemorrhage.

Dislocations.—If one bone is displaced from another at a joint the injury is called a dislocation. The ligaments that hold the joint in place have been torn, and there is pain, deformity and stiffness. It is sometimes difficult to distinguish dislocations from fractures near the joint, and for this and other reasons it is very unwise for any unskilled person to undertake treatment of any dislocation unless doctor cannot possibly be obtained. Pending arrival of physician, simply make the sufferer as comfortable as possible and lay a wet cloth over the affected joint. If it happens that professional aid cannot be secured, then be guided by the instructions given under respective subheadings as hereafter following, being very careful not to confuse fracture with dislocation.

1. **Dislocation of the Shoulder.**—Sometimes this is easily replaced, especially if dislocation has occurred previously. Lay patient on back and sit down on the injured side, facing his head. Draw down his arm, and while drawing down draw it over in front of his body to the other side. This will often pry the head of the bone into its place. As a fulcrum, you may take off your shoe and place your stockinged foot in the arm pit. Or, standing beside the patient as he lies on his back, draw the arm vertically upward. These manipulations should be executed with the greatest gentleness, yet with absolute firmness. If any difficulty be experienced, the attempt should be given up unless you can find out the cause of the difficulty beyond question. Follow with cold applications.

2. **Dislocation of the Fingers.**—This may be treated by pulling bones into place and following with cold applications.

3. **Dislocation of the Lower Jaw.**—The mouth is wide open and the lower jaw immovable and projecting. Place your two thumbs in the sufferer's mouth, one on each side and both resting on the lower back teeth. Press steadily but firmly downward, then a little backward, and the jaw should go into place with a snap. But before putting your thumbs in the mouth, protect them by wrapping them in handkerchiefs as otherwise, when the jaw goes into place, the thumbs are apt to be caught between the teeth and be more or less seriously injured, and there will be two patients instead of one.

4. **Other Dislocations.**—Excepting under most exceptional cases, dislocations other than those of shoulders, fingers and lower jaw had much better be left alone until surgeon arrives, even if much delayed, as more

harm is apt to be done by unskilled handling than by waiting. If situated where impossible to obtain medical aid, consult chapter on surgery.

Dog Bites.—See Bites of Dogs.

Drunken Stupor.—See Intoxication.

Delirium Tremens.—See special article as per general index at end of book.

Drowning.—See Rescue from Drowning.

Electricity, Accidents from.—First remove sufferer from influence of current; but for his own safety and that of others present, the rescuer must use the greatest precautions, as it often entails great danger. Beware of third rails, swinging wires and wires of all kinds. Unless proper precautions are exercised a person in contact with a wire or rail will transfer the current to the rescuer. He must not touch the unfortunate victim unless his (the rescuer's) own body is thoroughly insulated. The rescuer must act very promptly, for the danger to the victim is much increased the longer the electric current is allowed to pass through his body. If possible, the rescuer should insulate himself by covering his hands with a mackintosh, rubber sheeting, several thicknesses of silk or even a dry cloth. In addition, he should complete his insulation by standing on a dry board, a thick piece of paper or even on a dry coat. Rubber gloves and rubber shoes or boots are still safer, but cannot usually be procured quickly. If a live wire is under the victim and the ground is dry, it will be safe to pull him off the wire with the bare hands if care be taken to touch only his clothing, but this must not be attempted if the clothing be wet or damp. A live wire lying on a patient may be flipped off with a dry board or stick. Do this with one motion, as rocking the wire to and fro will increase shock and burn. A live wire may be cut by an axe or hatchet with dry, wooden handle. The electric current may be short-circuited by dropping a crow-bar or poker on the wire. These must be dropped on the side from which the current is coming and not on the farther side, as the latter will not short-circuit the current until after it passes through the body of the victim. Drop the metal bar; do not place it on the wire or you will then be made a part of the short circuit and receive the current of electricity through your own body.

Always send for a doctor, but do not wait for him. Treatment should be given even if the victim appears to be dead. Loosen the clothing around neck and body and then proceed to restore breathing by artificial respiration as in Drowning.

Ear.—See Foreign Bodies in Ear.

Eye.—See Foreign Bodies in Eye.

Epileptic Fits.—Those who are subject to epilepsy usually know by a peculiar feeling that an attack is about to come on. Following this the face becomes pale, and sometimes uttering a peculiar cry, the victim falls unconscious. The face now becomes congested and violent convulsions follow. The tongue is sometimes bitten and bleeds, there may be frothing at the mouth, the eyes roll and are turned upward. A single attack lasts from a second to several minutes, but there may be a series of attacks, one succeeding another with scarcely appreciable intervals for an hour or more. After an attack the victim usually has a headache and a great desire to sleep. Sometimes, however, he becomes violent and dangerous.

Treatment.—See that the victim lies flat, and guard him against injuring himself. If possible place a cork or piece of folded cloth between his teeth to prevent him from biting his tongue. Do not endeavor to break his "grip" as it is called. Oftentimes people think this necessary, and a strong man will sometimes force open a delicate hand with a violence that may lame it for weeks. When the fit is over permit the patient to sleep in a cool room as long as he will. Be on your guard for periods of violence.

Expiration.—See Respiration.

Exposure to Cold.—During intense cold frost bites and the freezing of nose, ears and other extremities quite commonly occur. Usually they do not affect the system generally and require but simple local treatment. (See Frost Bites.) But exposure to cold weather, accompanied by actual freezing of any part of the body or not, may affect the whole system and require special treatment. Even when the temperature is not excessively low, long exposure may cause a general chilling of the whole body, resulting in depression and sometimes in insensibility or even death, although no part may be frozen. Especially is this apt to occur during exhaustion from overwork, long exposure in an open boat, long marches, and in those whose vitality is lowered by lack of food or any other cause. Chilling may take place insidiously and without the person being aware. The blood becomes chilled, circulation is impeded, and there is grave danger of general collapse.

Treatment.—If there are no frozen parts, treat as for restoration of circulation—that is, get the patient into a warm place, remove clothing, rub with hands or hot flannels and give alcoholic stimulants in small doses, also hot tea, coffee, broth or hot water. A glass of hot milk in which half a teaspoonful up to a teaspoonful of cayenne pepper or paprika has been thoroughly stirred usually gives excellent results. Apply hot water bottle or other dry heat to the feet. If the person is insensible, artificial respiration may be necessary (see artificial respiration in drowning accidents).

If any part of the body be frozen, this must be given first attention. It has been taught almost universally that a frozen limb should be put into cold water or rubbed with snow, and while this method may be safely adopted in the case of frost bites to nose and ears, it may prove dangerous to a person who is seriously frozen, and especially if exhausted, and it is now recommended that the patient be immediately immersed in a warm bath, which should be made gradually warmer until it is as hot as can be borne. This method has been endorsed by surgeons accompanying arctic expeditions, and has been adopted by some of the world's best life-saving societies, such, for instance, as the New York Society for First Aid to the Injured. But it is to be borne in mind that under no circumstances should dry heat be applied to frozen parts. See Frost Bites.

Factory Accidents.—See Wounds.

Fainting.—The pale, bloodless face in fainting is well known. It indicates a like bloodless state within the brain. The action of the heart has been weakened for the time and there follows a lessening of the blood supply to the brain. This causes a loss of consciousness. The pulse is slow, feeble and sometimes absent.

Treatment.—Lay the fainting person down at once. If on a sofa or bed let the head hang over so that it will be lower than the body, and raise the feet on a couple of cushions or pillows. This position enables the heart to more easily send blood to the brain. Expose the face to cold air, sprinkle it with cold water and hold ammonia or smelling salts to the nose, and also administer internally half a teaspoonful of aromatic spirits of ammonia in one or two tablespoonfuls of water. If the fainting spell continues, treat it like a case of shock. Remember as of vital importance that the person who has fainted must be laid down flat and the feet raised higher than the head, in order to increase the flow of blood to the brain.

Fish-Hooks, Extraction of.—When a fish-hook becomes imbedded in the flesh beyond its barb, it is a very painful matter to extract it without proper instruments and knowledge of their use, and so if a physician can be seen within a reasonably short time, it is better to leave the hook in the flesh until he can give it attention, as by a very simple incision with proper and aseptic instruments he can remove it with little pain and no danger of after poisoning. However, where resort cannot be had to a doctor the hook must be taken out. To pull it out in the ordinary way tears the flesh, is very painful and leaves a nasty wound. The following is therefore recommended as a more satisfactory method: Turn the hook in the flesh until the barbed point is directed outward to a different part from that at which it entered and push it through the skin at this new point until the barb is clear. Then with a pair of wire clippers, snip off the barbed end, when the hook may be drawn through its original entry point without difficulty. (If no clipper is at hand, the barb may be filed away with same results.) Then thoroughly suck the wound to withdraw any poison. Bandage and treat as an ordinary wound.

Foreign Bodies in the Eye.—In case of a foreign body in the eye attempts may be made to remove it as follows: Wink rapidly a few times, at the same time blowing the nose, and it may be carried to the corner of the eye, where it may be removed with the corner of a handkerchief or a bit of cotton twisted about the end of a match. Draw down the lower lid and if the body is seen remove it in the same way. Drawing the upper lid over the lower by means of the eyelashes will sometimes remove the body. If this fails, the eyelid may be rolled over a pencil or match by pulling the lid away from the eye and, having the patient look at his feet, you press the back part of the lid down with the pencil laid across it above the eye. The particle will often be found adhering to the inner surface of the lid, and when detected can generally be wiped off with a bit of absorbent cotton or soft cloth, care being taken not to touch the ball of the eye. A drop of castor oil may be put in the eye to relieve irritation and a grain of linseed placed in the corner of the eye and the lid gently worked with an inward rotary motion often proves successful when other methods have failed. If these simple methods are not availing, see a doctor at once.

Foreign Bodies in the Nose.—These are frequently in the form of beads, buttons and so forth pushed up by children with desire to see what they may do. They may sometimes be driven out by violent sneezing produced by snuff or by tickling the inside of the nostril with a feather. If such means are ineffective, call a physician at once. He can generally readily remove such objects with suitable instruments.

Foreign Bodies in the Ear.—Insects and certain other foreign bodies in the ear may generally be removed by syringing with warm water (be very careful it is not hot). If no syringe at hand, let the patient lie down on the opposite side and fill the auditory canal with warm water, but while this is perfectly safe in case of an insect or any foreign body that will not swell, it must be remembered that if the foreign body be of such nature that water will make it swell, then this method must not be used. No further attempts should be made except by physician, whom see at once.

Fingers, Dislocation of.—See Dislocations and Wounds.

Fits.—See Epileptic Fits.

Fits in Children.—See Convulsions.

Fractures.—A fracture is a broken bone. There are different kinds of fractures, but in general classification they are either simple or compound. A simple fracture is one in which the skin is not injured, so that no matter how much the bone is broken up, there is no communication of the fragments with the open air. A compound fracture is one in which the breaking of the bone is accompanied by a wound, caused either by the same force which produced the break, as, for instance, a bullet, or by the ends of the broken bones protruding through the skin. Compound fractures are much more dangerous than simple ones, chiefly because whenever the skin is broken disease-producing germs are apt to gain entrance to the tissues and set up the process of suppuration, or forming of pus.

It is sometimes very difficult to tell whether or not there is a fracture, but it may usually be recognized by the following indications: First, that the limb is altered in shape, bent or shortened at a point where there is no joint, inequality often being felt on running the finger along the broken bone; second, by there being an unnatural degree of movement at the seat of injury; third, by the inability of the patient to use the part; fourth, by the patient feeling severe pain at a particular point, and this point being painful to the touch; fifth, by the grating of the broken ends of the bone, which may be felt and sometimes even heard when the limb is moved; sixth, by a careful comparison of the injured limb with the sound one. The person who extends first aid, however, should never try to diagnose by trying for false or unnatural movement nor by causing the grating of the bones just described, as so doing may result in getting the bones still more out of place.

Treatment.—Where fracture is suspected have the patient lie down in as comfortable position as possible. Then very gently and slowly remove enough clothing to expose the injured part, cutting or ripping if necessary with knife or scissors. If the limb is very visibly deformed, try to straighten it by grasping the limb below the deformity and pulling gently and steadily in a straight line with the limb. Support the limb in its corrected position by slipping a pillow or cushion under the injured part, and tie it around the limb with two or three handkerchiefs, suspender straps or strong cords. A folded coat or two may be made to answer the same purpose. One should have an assistant in this. Then await the arrival of the doctor. There is no need for hurry in further setting the fracture, but if a physician cannot be obtained, or the patient must be moved, improvise a splint suitable for the fracture. Splints may be made of anything that is stiff and rigid. Something flat like a board is better than a pole or staff, yet limbs broken off a tree will do if nothing else can be found. Shingles make excellent splints. In applying splints, remember that they should extend beyond the next joint above and the next joint below, otherwise movements of the joints will cause movement of the broken point. If possible secure two pieces of thin board as wide as the limb is thick and long enough to extend beyond the joints above and below the fracture. Cover one side of each splint with a pad made by folding up pieces of cotton batting or a number of thicknesses of the softest cloth at hand. Now tie the splints firmly one on each side of the injured limb, with several strips of cloth, handkerchiefs, bicycle tape or other like binders, in such manner as to keep the broken ends of the bone immovable. If single pieces of board of proper length are not available, a number of smaller pieces of even thickness may be laid side by side (such as shingles) and the whole held firm by canes or poles of sufficient length being bound on the outside. In emergency, almost anything may be used, barrel staves, pasteboard boxes, cigar boxes, pieces of sole leather from nearest shoemaker, stockings stuffed with bran, sand or other material. For padding inside the splints and against the injured limb, use cotton batting, cloth, hay, straw, leaves folded up in handkerchiefs, a piece of a shirt, or leaves or grass stuffed into a shirt sleeve or coat sleeve. In railway accidents stuffing out of the seats is often used. Never bandage a fractured limb before applying splints unless to hold a necessary dressing in place, and in such case the dressing should be large and thick and the bandage only applied over the dressing, the reason being that otherwise, after swelling of the limb may cause the bandage to become too tight. Never move an injured patient until careful examination for fracture has been made and splints applied, if necessary. The best way to move a patient is on a stretcher, which may be improvised from shutters, doors, etc. See instructions in Transportation of the Injured in this same chapter. Read also article on Bandaging; also examine following particulars as to specific fractures.

Fractures, Compound.—Should there be a wound in connection with any fracture, place a large pad or compress of sterilized gauze, or other sterilized material, over the wound and bandage in place. This is of great importance. It is wiser to leave the wound untouched until sterilized material can be secured, or prepared by boiling, than to dress with unsterilized material. Then proceed in same manner as with simple fractures. (See preceding item.)

Fracture of the Arm.—A padded splint should be placed on the arm from the highest part of the shoulder to the point of the elbow, then place a shorter one on the inside of the arm, taking care that it does not cut into the arm pit or the bend of the elbow. Then put the hand in a sling. Read carefully the general instructions regarding fractures in this emergency chapter.

Fracture of the Forearm.—First bend the elbow at a right angle and place a broad, well-padded splint, reaching to the ends of the fingers along the back of the forearm and hand. Now, place another splint on the front of the arm and bind them on firmly. Be careful that the splint does not cut into the bend of the elbow. Read carefully the general instructions regarding fractures in this chapter.

Fracture of the Elbow.—Put the arm in as comfortable a position as possible, apply cold cloths and await arrival of physician. This fracture requires the most skilled work and only under extraordinary circumstances should a non-professional person attempt any treatment.

Fracture of the Ribs.—See general article on Fractures in this emergency chapter. In addition to some of the usual signs of fracture there is commonly difficulty in breathing and sometimes spitting of blood.

TREATMENT.—The whole chest should be firmly bandaged with a roller bandage. If there be spitting of blood, keep the patient quiet. Secure aid of physician as soon as possible.

Fracture of the Spine.—If the neck or back has been injured and the patient cannot move the lower limbs, fracture of the spine may be suspected. In this case if the patient be in a safe and sheltered place do not move him at all, but await physician. If environment makes it necessary to move him, then endeavor to place him on stretcher with the least possible movement of the head and body.

Fracture of the Thigh.—A long splint should be applied from the arm-pit to the foot and another on the inner side of the thigh from the crotch to the foot. Place bandages around body, thigh and leg. In women the other leg may be used for an inner splint and the bandages placed around both legs and the outside splint. Read carefully the general instructions regarding fractures in this emergency chapter.

Fracture of the Jaw.—Close the jaw so as to bring the teeth against each other and bandage with four-tailed bandage described in article on bandaging (see general index).

Fracture of the Collar Bone.—The patient should be placed on his back on the floor with a blanket beneath him and have him remain there until physician arrives. If necessary to move him, bind the elbow to the side and support the hand and forearm in a sling. See instructions regarding Fractures.

Fracture of the Leg.—Follow instructions as to splints, etc., as described in general instructions regarding fracture in this emergency article.

Fracture of the Nose.—Apply cold compresses and see physician.

Fracture of Skull.—This may be caused by a fall or a blow on the head, and there may or may not be a wound. Symptoms of concussion or compression of the brain may appear. (See Compression and Concussion of the Brain.)

TREATMENT.—If fracture is suspected, carefully dress any wound on the head and place the patient in a cool, dark, quiet room. He should lie on the back, the head slightly raised. Apply wet, cold cloth to the head. Do not give any stimulants. Secure physician at once.

Frost Bites, Frozen Limbs, etc.—In severe winter weather any exposed or insufficiently clad part of the body is liable to become frozen, and this is especially likely with the extremities such as nose, ears, fingers, toes, etc. The parts first become blue, then purple and then white and stiff. When solidly frozen the part becomes as hard as stone and at the same time is very brittle so that, for instance, were you to strike a solidly frozen ear, it would break off. Freezing is apt to occur without the victim being aware of the fact. It may usually be prevented by rubbing any part which feels very cold, as this brings warm blood to the surface. The danger is when after being cold the part suddenly has no feeling. The object of treatment is to gradually restore circulation to the congealed part. Application of snow or cold water to the frozen part, gently rubbing and pinching it, is the most common method of restoration, but care must be taken in severe cases to do this so gently as not to break off any brittle part. Under no circumstances should dry heat be applied nor hot water, as either of these methods is apt to cause mortification of the frozen part; but it is now recognized that the most efficacious treatment is that of commencing the thawing process with water that is merely warm and then gradually as the thawing takes place making the water warmer until it is as hot as may be borne. See full dissertation on this point under Exposure to Cold.

Frozen Limbs, etc.—See Frost Bites and Exposure to Cold.

Gas Poisoning or Asphyxiation from Gas.—This may occur from escape of illuminating gas from incompletely turned off jet, leak in gas pipe, etc., or from escape of coal gas from stoves, from the burning of charcoal and in other ways. If gas is in evidence be very careful not to take a lamp into the room nor to strike a match, as explosion may occur. The first thing is to get air to the victim or else the victim into the air—raise or smash windows or do anything necessary to let in the air. On entering gas filled room for purpose of rescue, beware of being overcome yourself. Generally less gas will be found near the floor of a room, and so one may be able to creep where it would be dangerous to walk. Fresh air having been gained and the victim being unconscious, proceed at once to restore breathing as described in respect of drowning. Use stimulants moderately and work to restore perfect circulation. Keep patient awake.

Hanging.—Cut patient down, then use treatment for Drowning and Gas Poisoning.

Heatstroke or Sunstroke.—This is induced by exposure to excessive heat, either with or without direct rays of the sun. There are certain general symptoms of its oncoming which should serve as a warning—headache, a sense of weakness at the pit of the stomach, a weakness of the knees, dizziness and sometimes vomiting and disturbed vision. These symptoms may gradually merge into unconsciousness or without warning the stricken one may suddenly collapse and lie insensible. A characteristic condition is the intense, burning dry heat of the face, head and body. The face itself becomes red and flushed; the pulse is full and rapid; convulsive twitchings of various parts of the body are frequently observed.

TREATMENT.—Endeavor at once to reduce the heat of the body. Undress the patient, wrap the body in a sheet and keep the sheet wet with cold water by frequent sprinkling. Continue this until consciousness returns and the body feels cool. If after becoming conscious the patient relapses into unconsciousness, the cold water process must be repeated. If impossible to immediately follow the above treatment, then wring out cloths in ice water, or coldest to be had, and place them on the head, back of the neck and around the wrists.

NOTE.—Sunstroke or Heatstroke is quite different from *Heat Exhaustion*, for which see next following item.

Heat Exhaustion.—This is due to similar cause, but is characteristically different from Heatstroke. The face instead of being greatly flushed will at most be but slightly so, and is more apt to be pallid, while the skin instead of dry and burning will be found moist and even cool—the pulse is frequent and feeble.

TREATMENT.—Do not apply cold, as temperature is not to be reduced. Place sufferer in a cool, quiet room and give stimulants gradually. Keep patient warm by use of hot water bottles or other dry heat, but do not bring on perspiration. Build up with broths and light, nourishing food.

NOTE.—Heat exhaustion is far more common than heatstroke. Usually cases only occur after several days of continued heat. Debility and alcoholism strongly predispose attacks. (See Heatstroke.)

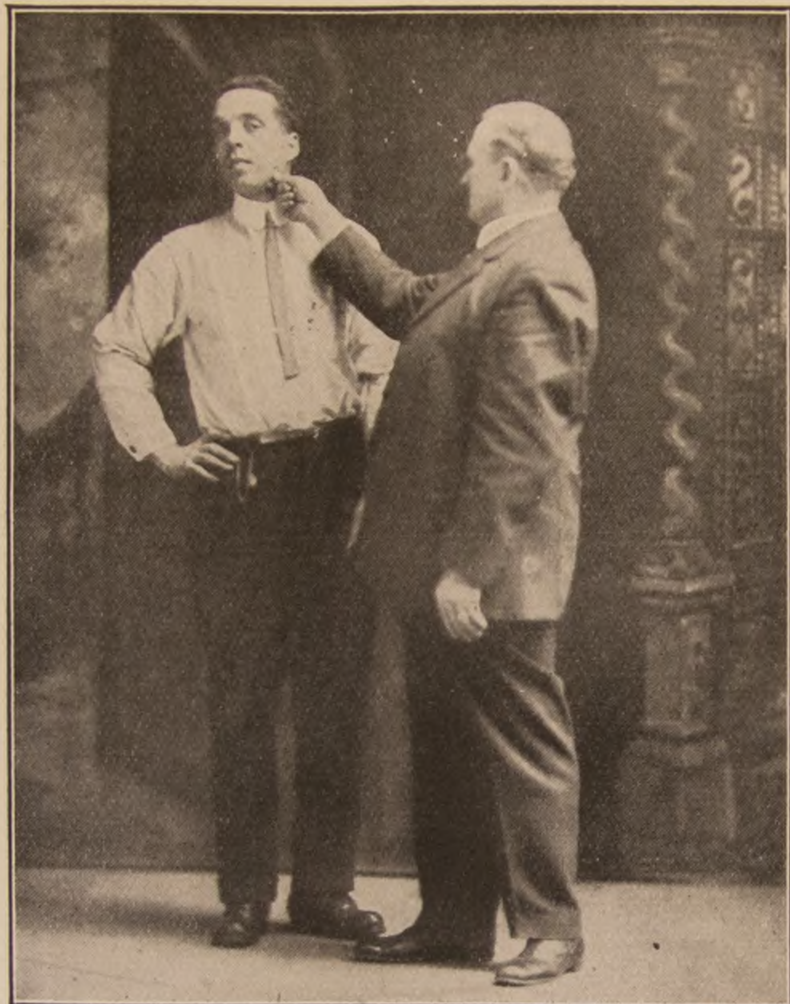
Hemorrhage, or Bleeding from Wounds.—All wounds, even a pin prick, will bleed, but unless an important vein or an artery is penetrated, the bleeding will usually stop of itself if the blood be allowed to clot and so close the aperture of escape. It follows that to keep wiping and bathing a simple wound, as so frequently is done, hinders nature in its method of stopping the flow by clotting or coagulation of the blood. Bleeding to death even from the slightest of wounds would be a common occurrence were it not for the clotting of blood. While on general principles this shows the vital importance of leaving it to nature to stop the bleeding by coagulating the blood in the wound, yet it must always be borne in mind that there are rare cases where the blood has no power to coagulate, and with individuals so affected there is danger of bleeding to death even from slight wounds if extraordinary precautions are not taken. But remember that a very little blood makes great showing and people are often unnecessarily frightened by a flowing of blood that will soon stop of itself if left alone or if the part be elevated as by holding a cut finger above the head, or if a small compress and bandage are applied, or light but steady pressure made in any way on the part which bleeds.

To stop bleeding from any external wound, the patient should first lie down, the bleeding part raised as high above the rest of the body as possible. This of itself will sometimes check the bleeding if the blood vessel wounded is but a small one or a vein. Cut away or otherwise remove any clothing necessary to fully expose the wound. If the bleeding continues after lying down, make a compress with a sufficient quantity of sterilized gauze or absorbent cotton or if these are not obtainable, then by folding any clean cloth, as a couple of clean handkerchiefs or a piece of a clean shirt or skirt. Make a rather thick pad somewhat larger than the wound and place it over the wound, binding it on tightly with a handkerchief, strip of cloth, pair of suspenders or anything of sufficient length that may be used as a bandage. Watch closely for a few minutes and if blood continues to flow freely through or around the compress, apply another on top of the first one, binding it on more tightly, and with the fingers make steady and continuous pressure on the compress. If the wound in a limb still continues to bleed freely, apply a tourniquet (see description regarding "tourniquet"), still keeping the limb elevated. A tourniquet may be very painful and moreover may do harm. It is frequently needlessly used to stop bleeding that a compress and bandage with finger pressure would easily control, and so the tourniquet should only be resorted to when these methods have failed. In the case of hemorrhage from a wound on any part of the body where a tourniquet cannot be readily applied, such as head, neck, trunk, or limb wounded too high up, the compress and finger pressure are the only practical methods for other than a doctor to attempt. In cases where use of the tourniquet seems necessary, the following instructions may aid:

1. **The Tourniquet.**—Take a strip of strong cloth, handkerchief, towel, pair of suspenders or other material immediately at hand, wind it loosely one or more times about the limb between the wound and the body and tie the ends together. Take a smooth, round stone, apple, potato or any hard, smooth object (or lacking such a tight wad of cloth) and place it under the bandage between it and the skin and over the seat of the main artery. Then pass a cane, umbrella, ruler, stick, or rod of any kind, under the bandage on the other side of the limb and twist the bandage with the rod until the stone or wad is pressed firmly into the limb and the bleeding stops. The tourniquet may be left in place until the physician comes, or, if very painful, or after half an hour has elapsed, may be very slowly relaxed, tightening it again if the bleeding recommences. *If the position of the main artery is not known or cannot be remembered, apply the tourniquet without the stone or wad.*

2. **To Locate Main Arteries.**—*a. Hand or Arm.*—Apply tourniquet to upper arm above wound, with the stone or wad on the inner side of the arm.

b. Foot, Leg or Thigh. Apply tourniquet at upper end of the thigh with the stone or wad placed one inch below the centre of the crease of the groin.



No. 1.—Bleeding of the nose may be checked by pressing with the thumb and finger upon the sub-maxillary artery under the lower jaw, about half way between chin and ear. It may be identified by a slight indentation of the lower jaw at this point.

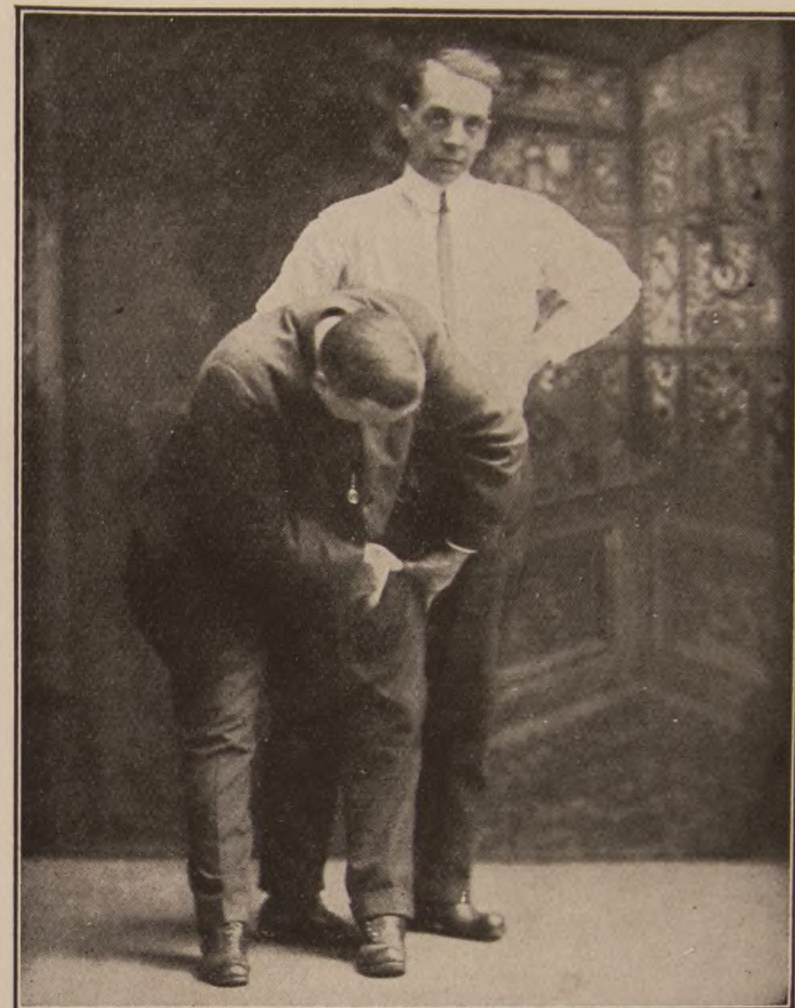
No. 2.—Bleeding of the artery of the thumb or of the forefinger may be checked by pressure upon the wrist above the thumb.

© E. J. S.

No. 3.—Bleeding of the artery of the second, third and fourth fingers may be checked by pressure upon the wrist above the little finger.

No. 4.—When artery in forearm is affected or limb torn off below the elbow, bleeding may be checked by firm pressure just above the joint.

No. 5.—Bleeding of an artery below the knee may be checked by firm pressure on the inside of the knee about three and a half inches from the knee-cap.



No. 6.—Bleeding of artery in the thigh may be checked by placing the thumbs in center of the thigh one inch below the groin and pressing them with force to the bone. Immediate action is necessary as patient may bleed to **death in four** minutes if flow of blood continues.

3. While the tourniquet is being prepared and applied, pressure must be made by another person, or even by the injured person himself if no one else available, the thumbs or fingers being pressed tightly against the place which the stone or wad of the tourniquet is to occupy.

4. A careful previous study of the colored plates 1 and 2 in this chapter in conjunction with the descriptive matter on the opposite pages will give a knowledge of the location of veins and arteries that may prove invaluable.

Hemorrhage of the Lungs.—This is generally shown by the coughing up of bright, frothy blood. It often gives much alarm, but is not usually dangerous.

Treatment.—Perfect rest in bed in a cool room, with head and shoulders raised. Give patient small piece of ice to swallow and small doses of dry table salt and reassure him by telling him there is no danger. See special medicinal treatment per general index.

Hemorrhage of Varicose Veins.—Swollen or varicose veins in the legs, when ulcerated, sometimes burst and even fatal hemorrhage may result if the accident is not properly treated. The bleeding, however, may be stopped immediately by placing the tip of one finger on the bleeding point. The patient should be lain down and the leg raised perpendicularly and a compress and firm bandage applied over the ruptured vein. Ordinary position may then be resumed. The simple elevation of the leg will usually stop this hemorrhage.

Hemorrhage of the Stomach.—Dark blood in clots is vomited, usually resembling coffee grounds, but sometimes mixed with bright blood.

Treatment.—Same as for Hemorrhage of the Lungs.

Hemorrhage of other Internal Organs.—Bleeding from other internal organs should be treated much as in case of stomach and lungs. Get the patient to bed and insure perfect rest in a cool room.

Special Note.—In all internal hemorrhages summon a physician, informing him of the exact nature of the trouble at the time of calling him.

Hemorrhage Through the Nose, or Nose-Bleed.—Frequently this is nature's way of relieving some internal condition, and within reasonable limit is often of considerable benefit. Usually it will stop of itself in a few minutes. It is seldom serious, yet with weak or anæmic patients or where the blood continues to flow copiously for a considerable time it may prove so.

Treatment.—In ordinary cases of bleeding of the nose a well-recommended remedy is the following, in respect of which for clearness of de-

HOW TO STOP BLEEDING FROM WOUNDS.

The Emergency.—In case of severely bleeding wounds, quick work is required to save life. One must know not only what to do, but how to do it.

The Arrows.—The arrows in the adjoining plate show the places on the body where pressure is to be made in order to stop the flow of blood.

Kinds of Pressure.—In ordinary wounds the pressure may be found sufficient when made with the index finger or the thumb. In severe wounds, and where the arteries or veins lie deep, the firm pressure of both thumbs may be required. In still more severe wounds or where the thumbs becomes tired resort may be had to the tourniquet. The following illustrations are from actual photographs showing exactly where pressure should be brought to bear and giving explanation under each illustration.

Places of Pressure.—1. If the wound is upon the forehead, place the index finger or thumb upon the spot indicated by the head of the *"forehead"* arrow, and exert firm pressure.

2. If the wound is upon the scalp, place the index finger or thumb upon the spot indicated by the head of the *"scalp"* arrow, and press firmly.

3. If the wound be upon the face, press the index finger or thumb upon the spot indicated by the head of the *"face"* arrow.

4. If the wound be upon the head or upper part of the neck, in other words, above the shoulders, the pressure must be made on the spot indicated by the head of the *"neck and head"* arrow. Press hard.

5. If the wound be on the arm, make the pressure on the inside of the arm, at the spot indicated by the head of the *"arm"* arrow. This pressure will stop the bleeding of a wound anywhere below the neck and above the heart. It must be made on the inside of the arm nearest wound.

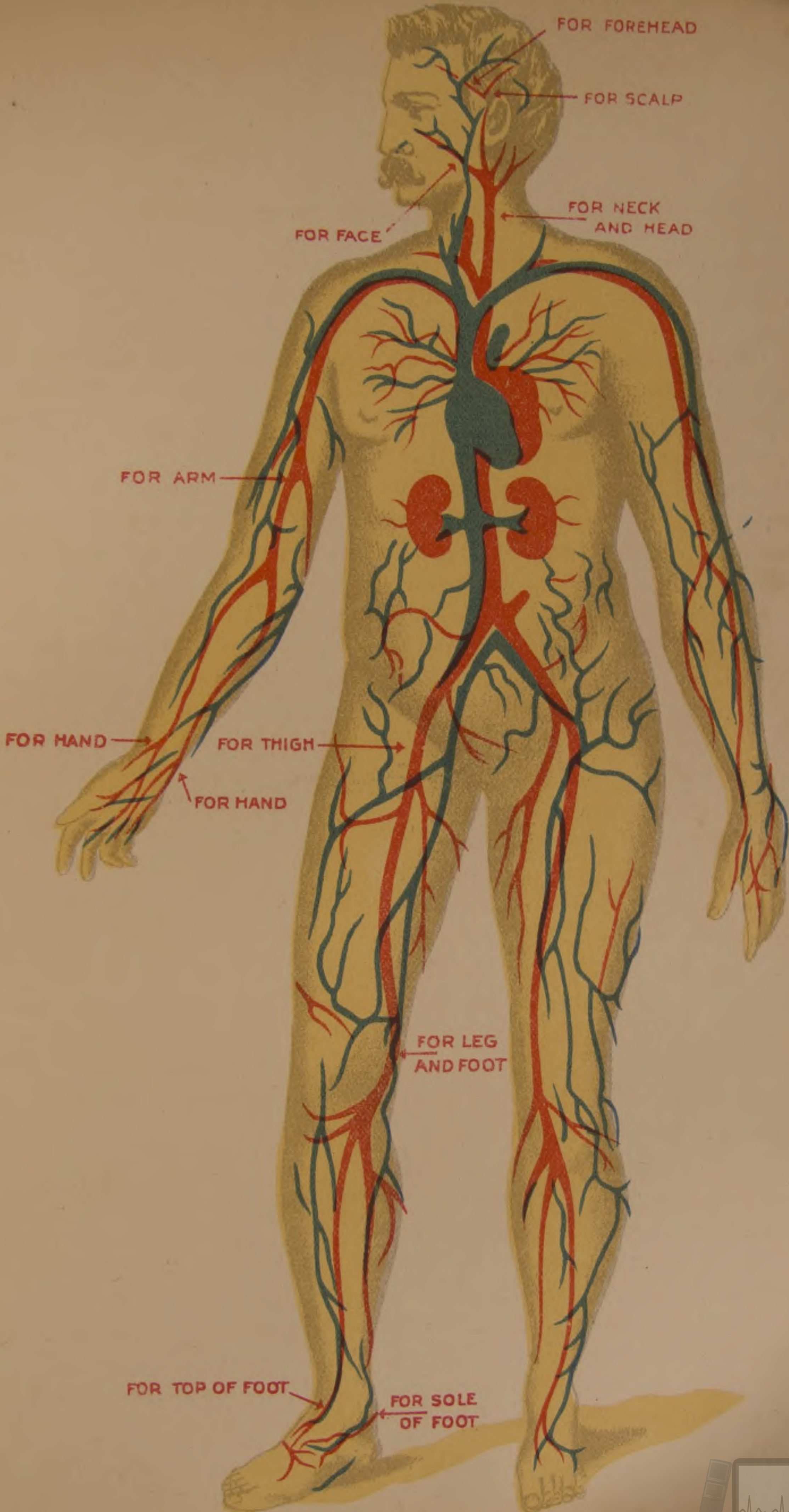
6. If the wound be on the hand, make the pressure on the places indicated by the heads of the *"hand"* arrows.

7. If the wound be on the body anywhere below the region of the heart, the pressure must be exerted very firmly on the inside of the thigh, at the point indicated by the head of the *"thigh"* arrow.

8. If the wound be on the lower leg or foot, the pressure must be made on the spot indicated by the head of the *"leg and foot"* arrow.

9. If the wound be on the top of the foot, make the pressure at the spot indicated by the head of the *"top of foot"* arrow.

10. If the wound be on the sole of the foot, make the pressure on the spot indicated by the head of the *"sole of foot"* arrow.



ACCIDENTS AND EMERGENCIES–How to Stop Bleeding scription we will assume blood to be flowing from the right nostril: The sufferer stands and in first place cleans the nostrils by a good blowing into handkerchief, then with head erect he places the forefinger of the right hand against the right or bleeding nostril and presses tightly, while at the same time he raises his left arm upward as if he were reaching strenuously for something above him, the palm open and fingers extended. Continue fixed in this position for one full minute, then release the nostril, when the flow will usually have stopped. If not, continue for another minute. Three minutes is an outside limit for results. If it be the left nostril that bleeds the position of the hands would simply be reversed. This method has the great advantage that when the bleeding has stopped there is no clotted blood or bloody mucous in the nostril, the air passage being left as clear and free as if there had been no bleeding.

The following are usual methods, but all have the disadvantage of leaving more or less clotted bloody mucous in the nostril:

1. Do not blow the nose. See that there is nothing tight about the neck. Keep quiet, either sitting or standing, with head bent slightly forward. Apply something cold to bridge of nose and back of neck. Breathe in cool air through the nose and breathe out through the mouth.

2. Put hands in a basin of water as hot as can be borne.

3. Sniff ice water up the nose a few times and then hold the nostrils closed with the fingers for five minutes.

4. Place a piece of blotting paper between the upper lip and the gums and leave it there for a considerable period. If no blotting paper at hand, coarse brown or any paper of absorbent nature may suffice.

If none of the foregoing measures are successful in stopping the flow of blood then summon a physician without delay, informing him of the nature of the trouble when doing so.

Hydrophobia.—See Bites of Dogs.

Hysteria.—See special article in chapter on Nervous Diseases; also index for other references, treatments, etc.

Hysterical Unconsciousness.—The patient, usually a woman, may appear to be insensible or to wish to be thought so; the body being limp and the eyes closed. However, if any attempt be made to open the eyelids to examine the eyes, it is resisted and the eyeballs are kept rolled up in the head, a characteristic sign of hysteria which is not in evidence in unconsciousness from other causes. The usual pallor of fainting is not present, the pulse is apt to be natural, certainly not absent nor very feeble or slow, and inquiry will generally elucidate the fact that the patient is subject to hysterical attacks.

Treatment.—The best treatment is to leave the patient in charge of a quiet, kindly, unexcitable attendant, who should speak firmly and endeavor to make patient gain self control. (See Unconsciousness.)

Insensibility.—See Unconsciousness.

Internal Bleeding.—See Hemorrhage.

Internal Organs, Injury to, Protusion of, etc.—See Wounds of Internal Organs, etc.

Intoxication—Drunken Stupor, etc.—A person in a drunken stupor closely resembles one in a fit of apoplexy. When the breath does not smell of liquor it is not drunkenness. But the mere fact that the breath smells of liquor is not evidence that the patient is drunk. A man may have taken a drink without its making him drunk and without his being in any sense the worse of liquor, yet with the odor on his breath, he may have an apoplectic fit, or liquor may have been administered to him after the fit. These facts sometimes make it difficult to distinguish the true condition. In drunken stupor the face is not drawn to one side and the cheeks do not puff out in breathing as occur in apoplexy. Snoring ceases for the moment in drunkennness if effort be made to arouse; in apoplexy it does not. In drunken stupor, there is no one-sided paralysis as in apoplexy. The pupils of the eyes are of equal size and when the ball of the eye is touched the eyes close quickly; they do not in apoplexy. In apoplexy the pulse is slow, full and hard; in drunken stupor it is feeble and soft and increased in frequency. As a rule, the patient can be roused to speak in the manner peculiar to a drunken man; in apoplexy he cannot. If the least doubt exists as to whether a person is intoxicated or has had an apoplectic attack, he should invariably be treated as if it were the latter. It is to be borne in mind also that death may result from an overdose of alcohol.

Treatment.—If the case is one of intoxication, give an emetic of a tablespoonful of mustard in a tumbler of warm water. If there are indications of shock—that is, cold, clammy skin and feeble pulse, the patient must be treated as for *Shock,* eliminating, however, the doses of alcoholic stimulants and substituting therefor hot broths and the like. Yet, as the stupor wears off, it may be necessary to administer small doses of liquor for a time, because if a man who has been accustomed to drinking heavily be suddenly completely deprived of liquor, there is the possibility of the onset of *delirium tremens.* The procedure as to giving or not giving a certain amount of alcoholic stimulant must therefore be governed by the circumstances of each individual case. An article on *Delirium Tremens* will be found by reference to general index.

Ivy Poisoning.—This is a condition caused commonly by the poison oak or poison-ivy. It is characterized by redness, burning, itching and generally by swelling with a vesicular eruption.

Valuable applications are those of cloths wet with lead-water and laudanum, black wash or phenol-sodique one part, water eight parts. Mild ointments give relief, especially oxide of zinc ointment containing ten grains of carbolic acid to the ounce.

Jaw, Dislocation of.—See Dislocation of Jaw.

Jaw, Fracture of.—See Fracture of Jaw.

Lightning Stroke.—Place the victim in a current of fresh air, dash cold water on face and chest; if body be cold use lively friction with hands or flannel. Manipulate arms and use artificial respiration as in drowning cases. (See Drowning.) If revival ensue give stimulants—whiskey, spirits of ammonia, a teaspoonful of the former every few minutes, or twenty drops of the ammonia in a tablespoonful of water. An electric current from a home battery applied to spine and back part of the head is useful, before signs of life appear. Means for the recovery of one stricken with lightning should not be discontinued till at least an hour has elapsed after the visitation, as many supposedly fatal cases have been returned to life.

Lungs, Bleeding from.—See Hemorrhage of the Lungs.

Mining Accidents.—The Bureau of Mines at Washington, D. C., recommends a first aid organization in connection with all mines, such organization being composed of operatives and officials who shall study First Aid and carry on regular practice drills. The organization should be divided into squads or teams of six men each, including one captain, one patient and four stretcher bearers. Each squad should have the following equipment for use in practice drills and in cases of actual emergency: 12 triangular bandages, 12 medium size safety pins, 6 packages of gauze (plain or picric), 6 first aid outfits, 6 light wood or yucca splints 3½ inches wide by 18 inches long, 12 roller bandages, assorted sizes, 2 tourniquets, 2 rolls of cotton (plain or absorbent), 2 blankets, 1 stretcher, 6 wooden splints for legs and back fractures, 1 or 2 sets of first aid charts.

Moving of the Injured.—See Transportation of the Injured.

Poisons and their Antidotes.—See special alphabetically arranged article on this subject as per general index.

Pulse, the.—See "Sick Room Emergencies" (general index).

Powder Burns.—See Burns and Scalds.

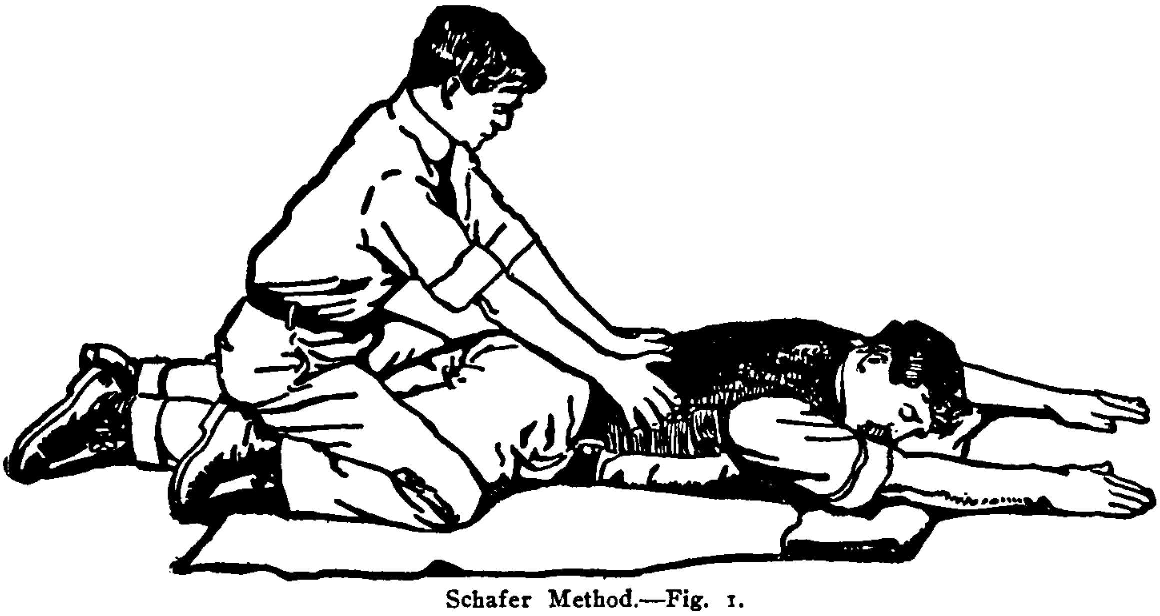
Rabid Animals, Bites of.—See Dog Bites.

Railroad Accidents.—See Wounds.

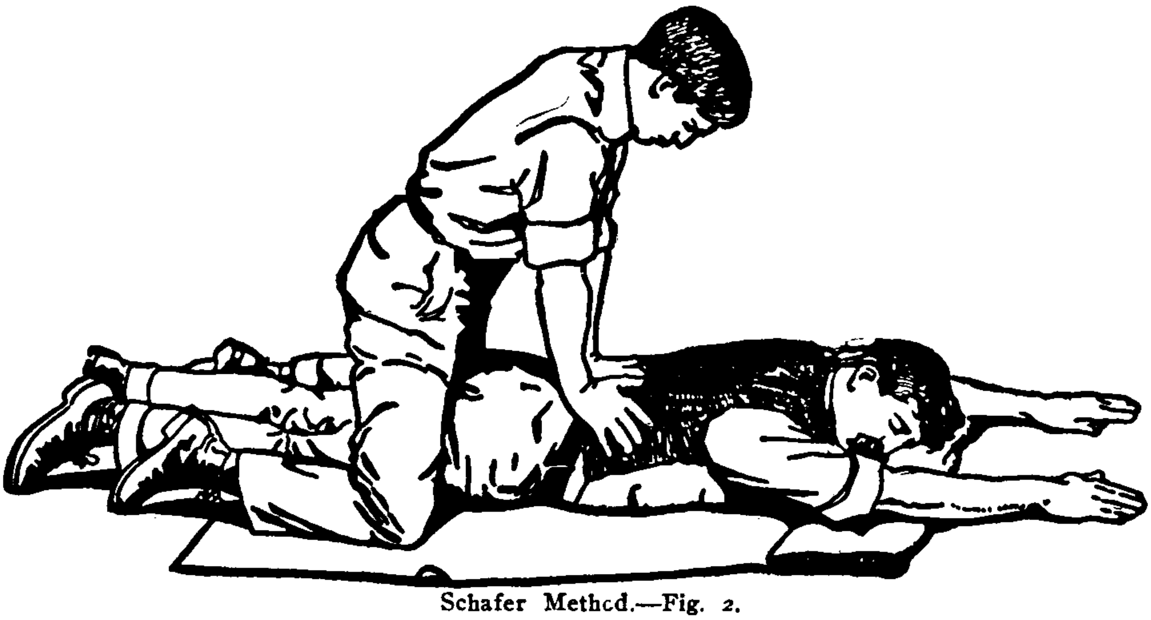
Respiration, Artificial.—See Rescue from Drowning.

Rescue from Drowning.—Death from drowning is the result of asphyxia, due to the stoppage of a supply of fresh air to the lungs. No time should be lost in going to assistance of a drowning person, but none should attempt to go into the water themselves to rescue others unless they are capable swimmers and have understanding of proper methods of rescue. Before diving, boots and heavy clothing should be discarded if possible, and when a leap must be made from a height into waters whose depth is unknown, it is safer to drop in feet first. Where weeds are about, there is always danger of entanglement and great care is requisite. When approaching a drowning man, there is always danger of being clutched, but a swimmer who knows the right way can avoid this. It is a subject with which all swimmers should become thoroughly informed. When the apparently drowned person has been rescued from the water, no time should be lost in the commencement of endeavor to bring back respiration.

Treatment.—We shall first consider what we may call manual treatment, as differentiated from that of mechanical device, and afterwards refer to the latter. There are various methods of manual treatment, most of them requiring two persons, but the method which has now been recognized by the great life-saving bodies of the world as not only the easiest but the most efficient is that known as the Schafer or prone system, being the outcome of exhaustive investigations made by Prof. E. A. Schafer, Chairman of a Committee appointed by the Royal Medical and Chirurgical Society of England, and finally adopted by that Society in 1904. Professor Schafer describes the method as follows: Lay the subject face downwards on the ground, then, without stopping to remove clothing, the operator should at once place himself in position astride or at one side of the subject, facing his head and kneeling on one or both knees. He then places his hands flat over the lower part of the back (on the lower ribs), one on each side (Fig. 1), and then gradually throws the weight of his body forward on to them so as to produce firm pressure (Eig. 2), which must not be violent nor upon the patient's chest. By this means the air and water, if any, are driven out of the patient's lungs. Immediately thereafter the operator raises his body slowly so as to remove the pressure, but the hands are left in position and the movement of body again repeated. This forward and backward movement is repeated every four or five seconds; in other words, the body of the operator is swayed slowly forward and backward upon the arms from twelve to fifteen times


Schafer Method.—Fig. 1.

a minute, and should be continued at least an hour, or until respirations are produced. Whilst one person is carrying on artificial respiration in this way, others may, if there be opportunity, busy themselves with applying hot flannels to the body and limbs, and hot bottles to the feet, but no attempt


Schafer Method.—Fig. 2.

should be made to remove the wet clothing or to give any restoratives by the mouth until natural breathing has recommenced.

It will be well to always bear in mind that an essential condition to the success of artificial respiration is the keeping of the windpipe open so as to afford free access to the lungs. In asphyxiated persons the windpipe is obstructed by the contracted and retracted tongue and by the epiglottis. It is therefore essential that the tongue should always be drawn forward in the proper manner, and this must be done even if the mouth be closed and it be necessary to force it open in order to draw out the tongue.

When natural respiration is once established, the operator should cease to imitate the movements of breathing, and proceed with treatment for the promotion of warmth and circulation. Friction over the surface of the body must be at once resorted to, using handkerchiefs, flannels, etc., so as to propel the blood along the veins toward the heart, while the operator attends to the mouth, nose and throat. The friction along the legs, arms and body should all be toward the heart and should be continued after the patient has been wrapped in blankets or put into dry clothing. As soon as possible, the patient should be removed to the nearest house and further efforts made to promote warmth and proper circulation by the application of hot flannels to the pit of the stomach and hot water bottles, heated bricks, etc., to the armpits, between the thighs and to the soles of the feet. If there be pain or difficulty in breathing, apply a hot linseed meal poultice to the chest. On restoration to life, a teaspoonful of warm water should be given, and then if the power of swallowing has returned, very small quantities of warm brandy and water, beef tea or coffee should be administered, the patient kept in bed, and a disposition to sleep encouraged. The patient should be carefully watched for some time to see that breathing does not fail, and should any signs of failure appear, artificial respiration should be resumed. While the patient is in the house, care should be taken to have air circulate freely through the room and all overcrowding must be avoided. In all cases of apparent drowning physician should be sent for at once, but do not wait his coming to commence restoration, for each moment may count. There are cases on record where respiration has only been re-established after several hours of continuous effort.

Mechanical Device.—Resuscitation must usually depend upon manual effort, and everyone therefore should become thoroughly conversant with the instructions contained in the foregoing paragraphs. Yet it is evident that the work of resuscitation is mechanical, being simply a movement of the patient's body in such manner as to cause expansion and contraction of the lungs or in other words produce artificial respiration. This being so it follows that if a mechanical device be truly adapted the requirements of the work will be done with greater regularity and more efficiency than is possible by manual effort. A machine of this nature has been devised. It is known as the Pulmotor and may be purchased from any dealer in surgical instruments. It is expensive and therefore cannot be an article of general household possession, but its value is so great when times of necessity come that every municipality should possess one and they should be found at all summer resorts, at all boathouses, and where financial conditions permit at all waterfront residences. Manual work, if properly done, is exhaustive and tiresome and there are very few who can continue it for any great length of time without cessation, yet the life of the patient depends upon the operation being carried on continuously and incessantly until natural breathing comes. The pulmotor is automatic and once started will keep up its work with continuity and may be superintended by a layman with as much capability as by a physician. It is simple of adjustment and automatically accommodates itself to the size and capacity of the patient's lungs, whether man, woman or child. Not only this, but the air administered is oxygenized some five per cent. above normal air, thus producing an especially vitalizing effect. In cases where limbs or ribs of the patient have been broken manual resuscitation is extremely difficult, sometimes impossible. With the pulmotor it may be carried on without danger to the patient. It may be used to advantage in all cases of asphyxiation, whether in the way of apparent drowning, electrical shock or gas, and may be used with infants who have not grasped the breath of life at birth yet who have animation within them. We have no brief for the manufacturers of the pulmotor nor for the surgical instrument dealers who sell them, but we consider it our duty to call the attention of the public to its undoubted worth that united action may ensue and one of the machines be secured for every municipality and kept on hand at all places where drowning accidents or asphyxiation from other causes are likely to occur.

Restoration of Circulation.—See Circulation, Restoration of.

Ribs, Fractures of.—See Fractures.

Scalds.—See Burns and Scalds.

Shock.—Accident, surgical operations, exposure to cold, sunstrokes, apoplectic attacks, asphyxia, poisoning and innumerable other ills are frequently followed by what is known as *Shock*. It is a more or less profound depression of the nervous system, and its onset is likely to be unnoticed unless looked for. Its detection and treatment are of great importance and the subject well comes under consideration in dealing with Emergencies.

The patient either becomes stupid, showing no interest in what is taking place about him, or partial, in some cases complete, unconsciousness occurs. The breathing is feeble, the face pale, pinched and anxious, the eyes are dull and the pupils dilated, the pulse feeble, usually rapid and sometimes absent at the wrist, the skin is cold and there may be shivering; sometimes the mind wanders. These symptoms may follow a slight injury like a crushed finger, while on the other hand they may be absent, or only present in a slight degree, after the severest accident. The severity of the shock does not depend so much upon the nature or gravity of the injury or condition as upon the character and vitality of the individual. Usually, reaction takes place in a few hours, but in some cases there is no reaction, and the patient dies of heart failure.

Treatment.—Much can be done to relieve a person suffering from shock. Should shock occur while there is severe bleeding, such bleeding must be stopped, and any wound or fracture may receive a quick dressing, but no attempt to do more than this to the injury should be made until after attending to the shock. When shock comes after asphyxia, poisoning, or the like, the treatment for the shock may be given at the same time as the treatment for the primary condition.

The patient should lie in a horizontal position with the head slightly lowered. Give from a teaspoonful to a tablespoonful of whiskey or other alcoholic liquor in a tablespoonful of hot water. Administer this every ten minutes until five or six doses have been taken.

Cloths wrung out in hot water should be laid on the bared chest and abdomen and the patient covered with a blanket to keep in the heat. Hot water bottles, bricks, or the like should be placed along both sides of the body and legs, inside the thighs and under the armpits. In doing this, care must be exercised not to burn the patient. This danger may be obviated by wrapping hot water bottles, etc., in cloth sufficiently to give just the heat required.

Rub the body and limbs vigorously with the hand, or with hot, dry cloths.

One-half pint of equal parts of water and whiskey, heated to 110° F., should be given in form of a rectal injection.

Concentration throughout should be upon warming and stimulating the patient in every possible way.

Transportation of the Injured.

Artificial Respiration.—The Pulmotor.

© E. J. S.

Snake Bites.—See Bites of Venomous Insects, Snakes, Reptiles, etc.

Splints.—See article on Fractures; also see general index.

Sprains.—Sprains are due to the violent twisting, stretching or partial tearing of the ligaments about a joint, and it sometimes happens, especially in sprains of the ankle, that there is at the same time a fracture of the ends of the bones. Unlike dislocations and fractures, sprains do not cause any deformity until swelling, which takes place very rapidly. There is always severe pain and any movement of the joint greatly increases the suffering. The most common sprain is that of the ankle, and its effects are so speedily manifested that in very few minutes, the patient may be unable to walk or even put his foot to the ground without great suffering.

TREATMENT.—Recovery from a sprain takes place slowly, and the serious mistake is often made of considering the injury trifling. Perfect rest is essential. The first thing is to reduce swelling and alleviate pain. The injured joint should be immediately placed in water as hot as can be borne, and this water should be kept continuously hot by constantly adding fresh hot water. Keep this up for an hour or longer. Or, instead of hot water, ice water cloths or an ice-bag may be held on the joint by a firm pressure bandage, which should be kept on for several hours. After the hot water or the ice treatment, cotton batting should be padded about the joint, and then bandaged with moderate firmness, using splints if desired. An affected ankle should be elevated above the hip. Cold applications of water, lead-water and laudanum, or of alcohol and water should be used for a day or two, after which hot fomentations and hot water bag afford more relief. When the pain and other acute symptoms have subsided, gentle motion and rubbing with liniments help to prevent stiffness. Time is lost by attempting to use the affected limb before it is sufficiently restored and great precaution should be taken in such regard.

Stings of Insects.—For the more common and less poisonous stings, such as those of the honey bee, wasp, etc., applications of washing or cooking soda, ammonia water, iodine or lead-water and laudanum, give relief. For stings of scorpions, large spiders and so forth, see Bites of Venomous Insects, Snakes, Reptiles, etc.

Stretchers for Carrying the Wounded or Injured.—See Transportation of the Injured.

Strains.—A strain is the wrenching or tearing of a muscle or tendon and is usually caused by violent exertion or sudden unexpected movements. A strain generally occurs in the muscles or tendons of the arms or legs. The symptom is sudden, sharp, excruciating pain.

TREATMENT.—Let the injured person rest; bandage the injured part tightly or apply adhesive plaster. It is sometimes necessary to prevent movement of the part by splinting.

Stomach, Bleeding from.—See Hemorrhage of the Stomach.

Strangulated Hernia.—An accident that may happen to anyone having a rupture in the abdominal wall forming a small pouch into which a little loop of intestine escapes. If this intestine loop becomes crowded into the pouch in such manner as to be tightly squeezed, the bowels cannot act, and there is danger of mortification. This is termed strangulated hernia and is a very dangerous condition. It is accompanied by fecal vomiting and great pain and prostration. No time should be lost in securing the best medical skill that can be obtained. If the hernia cannot be reduced an operation is imperative and is attended by small risk in hands of a skilful surgeon. Pending arrival of physician, the patient should be placed on his back with the foot of the bed elevated. The legs should be drawn up toward the abdomen and warm applications made to the rupture.

Stunning.—See Concussion of the Brain.

Suffocation.—See treatment in Rescue of the Drowning.

Sunstroke.—See Heatstroke.

Torn-off Limbs.—See Wounds.

Tourniquet.—See as to making and using with Hemorrhages.

Transportation of the Injured.—Never move a seriously injured person if avoidable. When necessary proceed in such manner as to cause least possible suffering and danger as to results. By unskilful handling sharp ends of a broken bone may be thrust through the flesh, or may cut into an artery, or bleeding of a wound may be started afresh. Every little bit of strength which the patient may lose through pain during transit, lessens the chance of recovery and may turn the scale on the side of death. The dangers to life from a broken leg, for example, when the skin is not cut through, are more than doubled, if, by ignorant handling, with the kindest intentions in the world, the affected limb is allowed to swing downward for a single instant so that some sharp splinter of bone penetrates the skin, and makes the injury a compound fracture. When moving is necessary, first examine for possible fractures and apply splints, etc. Then, if possible, place the injured person on a stretcher which may be improvised from boards, doors, shutters, etc., or if nothing of this kind at hand, may be made with two poles and a couple of coats. The sleeves of the coats are first turned inside out. The coats are then placed on the ground with their lower sides touching each other. The poles are passed through the sleeves on each side and the coats are buttoned up with the button sides down. A piece of carpet, a blanket, or sacking can be used in much the same way as the coats, rolling in a portion at each side and firmly fastening by cords or otherwise so that there can be no danger of giving away under the weight of the patient. In the woods, two poles about ten feet long, kept apart by forked sticks about a foot in length, tied in place with rope, twine or leather straps, or even some climbing plant, and covered with clothing, form a very good litter.

In placing an injured person on a stretcher the work can be most safely done by three persons. There are two modes of operation, one in respect of patients who have a broken limb and the other as to cases where there is internal or bodily injury. In either case place the stretcher at the patient's head on a line with the body, the foot of the stretcher being nearest the patient's head. When it is a case of broken limb, one bearer kneels on each side of the patient and the two join hands underneath his hips and shoulders, the third man attending to the wounded limb or looking after any bandages or splints that may have been applied. The bearers then rise to their feet, raising the patient in a horizontal position, and by a series of side steps bring the patient over the stretcher, when he is lowered gently and made as comfortable as possible. In cases where there is internal injury or the body is affected, the three bearers should stand in a row on the injured side of and facing the patient. Each bearer then kneels on the knee nearest the patient's feet, with the knee towards the patient's head raised so as to form a kind of bench. They now put their hands under the patient and at the command "Lift" gently raise him to their knees. At the command "Rise" they rise to their feet and gently turn the patient so as to face against their breasts. They may walk either by stepping forward or by sidestepping, the patient then being lowered upon the stretcher by bending again to the knee position just described. The tallest of the bearers places himself between the handles at the head of the patient and one of the others at the foot, the third member devoting himself to the patient by guarding any injured part. The bearer at the head starts out with the left foot and the other with the right —were they to keep step the stretcher would roll badly. The patient is carried feet first except in going upstairs or up a hill, when he is carried head first.

If there is plenty of assistance at hand, let the acting surgeon of the party take charge of the wounded limb, and devote himself, after giving the necessary instructions to an acting assistant surgeon chosen on the instant, to protecting that injured member in every way. Next, let four persons, under direction of the assistant surgeon, lift the sufferer by his hips and shoulders, two others supporting the head and feet, as may be necessary, and when raised to a sufficient height, let two others, still, slide the prepared litter under the patient as he is held up in the air by his seven bearers. He can then be gently deposited upon the litter, having undergone the least amount of disturbance possible under the circumstances.

If alone with an individual so severely wounded as to be helpless, the best way often is to make him as comfortable as possible, see that there is no danger of serious bleeding, leave him some weapon with which to defend himself, and hasten for the nearest assistance which can be procured.

Carrying the Litter.—The litter should be carried by two persons, whilst the acting surgeon walks by the side and keeps a constant watch over the patient. The following rules should be observed: First, the litter should be carried with the hands, or supported by straps passing over the bearers shoulders. The litter itself should never be placed upon the shoulders of the bearers, because the patient might then fall off, or even die from hemorrhage or other cause without his danger being observed. The patient is carried feet first except in going up stairs or up a hill, when he is carried head first.

Bearers not to keep step.—Second, the bearers should not keep step. If they keep pace, as in marching, the litter shakes from side to side, and the patient is apt to roll about, or even to be thrown to the ground. To prevent this, the bearers must walk in broken step—that is, not putting the right foot, for example, forward at the same moment—and then the litter remains nearly even as it is borne along.

Pace of the Bearers.—Third, the pace of the bearers should be short, not more than twenty inches, and the steps made without any spring on lifting the foot from the ground. All jolting, all hurried movements and lifting over fences, ditches, and so forth, are to be avoided. Send some one ahead, if practicable, to look out for gates, bridges, and similar advantages, which are very important in the transportation of the sick and wounded, and let him come back and guide the bearers in the easiest path to the place of destination.

Bearers of Same Height.—Fourth, if it can be done, choose bearers of the same height, and should it be impracticable to do this, arrange the shoulder-straps in such a way that the litter will hang as level as possible. Fifth, in ascending an inclination, such as hill or staircase, the patient's head must be in front, and in descending it should be behind. If, however, the invalid has a broken leg, this rule must be reversed; otherwise the weight of the body would press upon the injured part, and, perhaps, aggravate the trouble. Sixth, the patient should usually be removed from the litter in the same manner as he was placed upon it.

In Absence of a Litter.—Should neither a litter nor material out of which one can be made present itself on careful search, the wounded man must be supported in the arms, which of course can only be done as a general thing for short distances. If there is only one person at hand to help, and if the injured man can walk, though weak and faint from loss of blood, he must put one arm around the neck of the individual aiding him so that his hand hangs down over the further shoulder. The person assisting places his arm from behind around the waist of the wounded man, and with his other hand grasps that of the patient as it hangs over his shoulder. In this mode he can support him very efficiently, and if necessary even raise him from the ground for a few steps over difficult places, and so help him along. Should the patient, however, be unable to walk, the only resource is for the person helping him either to take him on his back, or, if not too heavy, to carry him in his arms like a child. In either case the wounded person should clasp his arms around the neck of the bearer.

Bed for Accident Patient.—The preparation of the bed for a patient who is the subject of a severe accident is a matter of no little importance. The couch intended for the reception of an accident case, wounded about the legs or hips, should be provided with a large sheet of water-proof material and an extra sheet folded and placed across the bed, so that it can be readily removed when soiled with blood or other discharges without disturbing the head and shoulders of the patient. If the mattress is likely to yield to any extent with the weight placed upon it, it should be supported with extra slats. In case of wounds about the head, the pillow ought to be protected by a piece of extra sheeting.

Undressing the Patient.—A patient who is not too much injured to endure the effort should always be undressed before being placed in the bed. All tight clothing about the neck should at once be loosened or altogether removed. Boots must be taken off with great care.

CASE OF BROKEN LEG.—If the leg is broken it is better to cut the boot down the side and nearly to the toe. Pantaloons need not be cut, unless the patient's leg or thigh is injured, in which case the outside seam ought to be ripped up, so as to get them off without causing suffering to the invalid. In taking off the coat and waistcoat always remove them from the sound side first, and then they come away from that which is injured with comparatively little difficulty.

UNLOADING THE LITTER.—When a patient who is unable to walk is brought in on a litter or stretcher of any kind, such as a window-shutter or door, the litter should be placed with its head at the foot of the bed which the invalid is to occupy, and lying in the same direction, this position being the most convenient one for transferring the sick man to his couch. To properly lift an adult patient four assistants are required, two standing on either side. One of these helpers should support the head and shoulders, and a second the hips on one side, whilst on the other side the third assistant lifts the back, and the fourth supports the legs. In some cases the size or arrangement of the room will not permit this.

PLACING THE PATIENT ABED.—The litter must then be laid alongside of the bed, and three assistants lifting the patient into the air, a fourth rapidly withdraws the litter to allow the bearers to approach the side of the bed and deposit the invalid upon it. All the assistants should commence to lift together, and set down the patient at a given signal, special attention being devoted to the injured limb. The bed-clothes should be folded back for the whole length of the bed on one side, leaving one-half of the bed laterally uncovered for the reception of the patient. By this little maneuver they are easily replaced over a frame of wire, or of two half hoops tied together in their centres, in such a way as to protect the wounded limb from the weight of the bed covering.

There are a number of other ways of carrying an injured person. Where the patient is in condition to permit, the "chair" method may be adopted. Two persons join hands thus: Each of the two grasps his own right wrist with his left hand, back uppermost. Then each grasps his companion's left wrist with his right hand. This forms a chair. The patient sits on this support, at the same time putting his arms around the necks of the bearers to steady himself. When the patient is unable to sit in such a chair, one bearer standing behind the patient passes his arms under the patient's arms and clasps hands over his chest. The other bearer stands between the legs, his back turned toward the patient and passes his arms beneath the knees from the outside. The patient may now be lifted and carried. It is sometimes necessary for one person to carry another without aid, as from a burning building, etc. The method recommended by the Boy Scouts of America is to turn the one to be carried on his face, step astride his body, facing toward the patient's head, and with hands under his armpits lift him to his knees; then clasping hands over the abdomen lift him to his feet, then with the left hand seize the patient by the left wrist and draw his left arm around your neck and hold it against your left chest, the patient's left side resting against your body and support him with your right arm about his waist. Then with your left hand seize the right wrist of the patient and draw the arm over your head and down upon your shoulder, then shifting yourself in front stoop and clasp the right thigh with your right arm passed between the patient's legs, your right hand seizing the patient's right wrist; lastly with your left hand grasp the patient's left hand and steady it against your side while you rise, and the patient will lie over your shoulder like a sack and so may be carried.

A simpler way if there is a chair at hand is to hold the patient in the chair while you place your shoulder against his abdomen; then throw the arm belonging to that shoulder around him and rise to your feet with his body hanging over your shoulder like a meal sack, his head and shoulders hanging down behind while his legs are in front. Only one hand is used and the other is therefore free for use in descending a ladder or for any other purpose. This latter method is recommended by the New York City Society for First Aid to the Injured.

For other methods see general index.

Unconsciousness.—Insensibility or unconsciousness may result from so many different causes that even the most skilled physicians often find it difficult to determine its origin. The following general procedure is recommended.

1. Send for medical assistance.

2. Lay patient on his back. Loosen all tight clothing about neck, chest and waist which might interfere with flow of blood to and from the head. If face is then red or flushed raise head and shoulders. Lay cloths dipped in cold water on the head. *Never give stimulants when the face is flushed.* If the face is pale do not raise the head but see that it is on level with the body. In all cases the head should be turned a little to one side to prevent tongue falling back, vomit matter being drawn into lungs. etc., and to insure free breathing.

3. Get all the information possible. The person may have had a fall

or a blow, may be wounded, suffocated, drunk, have had heatstroke, be suffering from uræmic coma or any one of many ills. Enquire as to whether patient fell suddenly, had convulsions, complained of illness, had been under conditions to cause heatstroke and make other pertinent queries.

4. Compare the two sides of the body for evidence of paralysis or fracture. Open eyes and observe whether pupils contract when exposed to light and whether they are of same size, large or small. Count pulse, note respiration, whether slow, irregular, quiet or snoring. Notice the odor of the breath and whether the skin is hot or cold to the touch.

Information such as outlined may help you to decide as to what the unconsciousness is due and enable you to act if the coming of physician be delayed. In any event it will be valuable to the doctor when he arrives, as symptoms may have changed in the meantime, and it may be important to him to know what the earlier symptoms were. (See Hysterical Unconsciousness and Uræmic Coma.

Unconsciousness, Hysterical.—See Hysterical Unconsciousness.

Uræmic Coma and Convulsions.—Unconsciousness may be due to presence of impurity in the blood resulting from disordered action of the kidneys. In such cases there is usually a strong smell of urine about the person affected, and if there be convulsions and there are signs of dropsical swellings about the legs and eyes, this condition should be had well in mind. Treatment should be left to the physician. In his absence give a cathartic, as castor oil or epsom salts if the patient can swallow—a hot water and soap enema if he cannot swallow—and surround him with hot blankets and bottles to induce sweating, being careful not to burn him.

Varicose Veins.—See Hemorrhage of Varicose Veins.

Vapors, Apparent Death from.—See Gas Poisoning.

Wounds.—It is of first importance in dealing with wounds to have a clear idea of the principle of *Asepsis.*

Asepsis means the absence of living germs. Germs are bodies so small that of some kinds it would take 1,500 to stretch across the head of a pin. They procreate with marvelous rapidity. There are innumerable varieties. They are present on the surfaces of everything, even on those that appear cleanest and brightest, though more abundant where there is dirt. They are always present on the skin of the body, in the mouth, throat, stomach and intestines, in water, and are carried in the dust in the air. Most of these germs are harmless to man, in fact they are necessary to his existence. Comparatively few germs are what are known as disease germs, such as those of diphtheria, tuberculosis, etc., and these are not present everywhere but only in the bodies of and discharges from persons or animals suffering from such diseases. The germs of decomposition, however, are almost everywhere present. Without them the earth would be covered with dead animal and vegetable matter, for it is these germs of decay which transform dead matter into substances which plant life uses in its growth. Ordinarily we are protected against these germs of decomposition by the unbroken skin, through which they cannot pass, but when they get into a wound they begin at once to multiply and exercise their power of producing decomposition. Irritation of the wound, inflammation, pus and delay in healing are natural consequences. Not only this, but other varieties of germs may find their way into wounds and set up blood poisoning. In a person with healthy body, and if but a small number of germs enter the wound, the healthy cells and fluids of the blood and tissues may destroy the intruders before they accomplish harm, yet the danger exists with even the most healthy. Germs in an open wound, where they may be washed away by discharges, are less dangerous than those in a closed wound where discharge is prevented. Thus a small wound contaminated with germs and then dried up or covered with sticking plaster may prove much more dangerous than quite a large wound which remains open.

As asepsis means the absence of germs, so a wound is said to be aseptic when there are no living germs in it. An aseptic wound, if properly closed, will quickly heal without inflammation or pus. The wonderful development and success of modern surgery is due to this knowledge of asepsis and the power to make wounds aseptic. Formerly inflammation and pus were invariable accompaniments of large wounds, because the principle of asepsis was unknown. To-day a wound with inflammation and pus is said to be infected or septic, which is the opposite of aseptic.

When things are aseptic they are said to be surgically clean, which is therefore different from ordinary cleanliness. The usual way of making things surgically clean is to thoroughly boil them in water. An article that has been well boiled and then kept from exposure is surgically clean and will not cause disease or blood poisoning. You may pick up a dirty knife off the street and, after boiling it for half an hour, use it immediately with safety in an operation, while if you took a knife from your kitchen and used it without boiling or otherwise making aseptic, the wound would be sure to be infected by germs. Things treated in this way by boiling are said to be sterilized. This knowledge is of paramount importance in first aid work, because it enables anyone to use whatever material be at hand with almost perfect safety, by sterilizing it. It will be evident that a fresh wound should not be touched by the hands or any unsterilized object or instrument when this can be avoided. Fresh towels, handkerchiefs and sheets that have been boiled in the washing are usually surgically clean, and this also is true of running water. However, it is always safer in connection with wounds to use dressings that have been properly sterilized and water that has been boiled.

Wounds may be operative—that is, made by a surgeon in operation —or they may be accidental. In operative wounds aseptic principles are religiously adhered to, instruments and dressings are made absolutely aseptic, the surgeon wears aseptic apron and in spite of the most scrupulous care as to the cleanliness of his hands, he usually wears rubber gloves which have been specially sterilized for the operation. In the case of accidental wounds, however, there is almost always more or less contamination and therefore it rarely happens that an accidental wound is surgically clean. It is with accidental wounds that we have here to deal.

At one time it was believed that wounds should be thoroughly washed and cleaned at once, but it has been learned in different ways, and especially in modern warfare, that as a rule accidental wounds do best if simply immediately covered with a sterile dressing and kept at rest without handling or washing until the patient can be handed over to the care of the surgeon. Many of the germs that may have entered the wound are washed out by bleeding and the few that are left may be destroyed by the healing powers of the tissues themselves. Any attempt of an unskilled person to wash and clean a fresh wound may result in introducing more germs than are removed.

It sometimes happens, however, that a wound is so grossly contaminated by earth or other matter as to demand cleansing before it reaches surgeon's hands. In such cases water should be sterilized by boiling and poured into the wound from a little height. Or peroxide of hydrogen may be used freely in such a wound. Such antiseptics as carbolic acid and bichloride of mercury are usually unsafe except in skilled hands. Before touching any wound or instruments or materials to be used about the wound, thoroughly wash the hands with soap and cleanse the nails with brush and piece of clean wood, rinse in hot water and dry on fresh towel, after which touch nothing with the hands excepting the wound, when necessary, and dressings, etc., for it. An exception, of course, is that of severe hemorrhage where the first necessity is to stop the flow of blood. The following general emergency rules, then, may be adopted in respect of the immediate treatment of accidental wounds:

1. If wound is bleeding severely, treat as described under Hemorrhage.

2. If wound is not bleeding severely, take a piece of sterilized gauze or cotton of the cleanest material obtainable, and simply wipe away any blood or loose clots on the surface. If the wound gapes open, draw the edges together as well as possible, using pieces of the same material to do this, and avoid touching the wound with the fingers. Then place over the wound a good-sized pad of the same material and bandage it firmly with a handkerchief or other convenient bandage. Where no surgical help is obtainable this dressing may remain on the wound until it heals, unless it discharges or becomes painful, in which case the dressings should be changed every day or oftener and the wound washed by pouring sterilized water over it or freely using peroxide of hydrogen.

Sterilized dressings and emergency necessities should be kept in every home, house, shop, factory or camp and carried by those who travel. They can be bought very cheaply at any drug store and take up little room.

Extraction of poison by sucking is highly commendable when possible. "Cupping" also may sometimes be employed to advantage (see Cupping).

Wounds, Healing of.—Wounds may heal by what is known as *first intention* or *primary union*—that is, when asepsis or freedom from germs has been obtained and preserved, resulting in that the wound quickly heals and leaves but little scar. But if a wound does not heal by first intention, then it comes under the slow process of *second intention*—that is, with formation of granulations—and finally leaves a large scar. Second intention is in evidence when the skin has been destroyed over such area that the edges cannot be brought together, when the wound is disturbed, when blood collects in it, forcing it apart, or when the wound is dirty—that is, when asepsis has not been preserved. Contused and lacerated wounds generally heal by second intention.

Wounds, Contused and Lacerated.—These are wounds which have ragged edges and the skin and soft parts are torn and bruised. These occur in accidents where instead of a clean cut there is a tearing or crushing of the tissues. Railway, machinery and such like accidents are frequently of this character. Treat as for general Wounds, but it is to be borne in mind that such wounds are frequently followed by Shock, and this should be looked for.

Wounds, Poisoned.—Dissection wound is a term applied not only to wounds received by medical students and surgeons in their dissections, but to wounds sometimes received by butchers, cooks and fish-dealers, who handle putrefying animal matter. Such wounds are particularly virulent. A wound of this character should be thoroughly washed, and the blood squeezed out of it. If a puncture, it should be freely opened and swabbed with pure carbolic acid, then washed with bichloride of mercury solution, and wet antiseptic dressing applied. Bites by animals should be so treated, the human bite being one of the worst.

Wounds, Punctured.—Wounds made by sharp instruments (such as a dagger, a splinter, a fork prong, and so forth) have especial dangers, and require radical treatment. Foreign bodies are frequently left at the depth of such a narrow wound; the opening is small and readily closes, locking up infective material; underlying organs of the abdomen, head or chest are liable to injury. Such wounds generally demand the attention of the skilled surgeon. He will usually probe for a foreign body and will generally open the wound to its depth, often incising it freely, in order to disinfect it properly and to allow for drainage. He will determine whether underlying organs are injured and any treatment needed for such.

Wounds, Gun-shot.—The special dangers to be combated in gun-shot wounds are shock, hemorrhage and infection. Injury of vital organs is liable. In many cases it is better not to probe for a bullet. The ball should be searched for when it has surely carried in with it foreign bodies; when it is in a vital organ, as the brain; and when its presence interferes with healing.

Wounds, Crushed Feet, Hands, etc.—Displaced tissue should be put back and the injured member made to assume as nearly as possible its original shape by carefully moulding it with the hands, using as little force as possible and endeavoring not to cause excess of pain. Then wrap in warm sterilized gauze or cloth and cover the whole warmly with cotton, wool or a blanket. If a long bone is fractured in a crushed wound, a splint should be applied over the dressing before moving the patient.

Wounds, Torn-off Limbs.—If a foot, hand or finger is torn off, the stump should be considered as a lacerated wound and so treated.

Wounds with Protrusion of Internal Organs.—In cases of chest and abdomen wounds where internal organs are protruding, for instance, the bowels, it is generally unwise for anyone but a surgeon to attempt to replace them. They should be covered with a warm, moist, sterilized cloth until the surgeon arrives. If, however, no doctor can be obtained, the protruding part may be gently cleansed with warm, sterilized water and replaced, a sterilized compress being bandaged over the external wound. Be on lookout for symptoms of shock. If symptoms of shock are present they require as careful attention as the wound itself.

Wounds, Infected.—Contaminated wounds may become red, swollen and very painful and give rise to fever. This is proof of the presence of germs and all dressings must be removed, the wound opened if necessary, thoroughly washed out with peroxide of hydrogen or sterilized water, and dressed every few hours with wet, sterilized compresses. Such cases should always be under a physician's care and those who are unskilled should not attempt to treat excepting in cases where it is impossible to secure medical assistance.

Wounds, Incised.—See Cuts.

PART II OF BOOK V

Describes the different kinds of bandages and the manner in which they are applied.

ILLUSTRATIONS

ACCIDENTS AND EMERGENCIES

PART II.

BANDAGING.

While this article on bandaging is primarily intended to give knowledge especially applicable in cases of accident, and the illustrations are chiefly in respect of emergencies, and therefore do not show that decision of arrangement which would naturally be followed in the operating-room, yet both the article and its illustrations will be found applicable in the sick room.

Bandages may be made of gauze, cotton, flannel, rubber, muslin, etc. They are used to hold splints or other dressings in place, to give support, to make compressions, and to correct deformity. When desirable to have a part absolutely rigid, starch, silicate of sodium, plaster-of-paris or like material may be incorporated in the bandage.

There are many different kinds of bandages. They are named from their shape, use, mode of application, from a fancied resemblance to something, or from the name of their inventors. It is not intended to here give details in respect of every class of bandage. It would only be confusing. It is purposed, however, to give such particulars and illustrations as will enable the layman to apply bandages in all cases requiring such treatment.

A stock of bandages and cloths for emergencies should be kept always on hand in every home. Bandages and all dressings for wounds should be absorbent to admit of ready impregnation with medicines and to allow of the absorption of discharges. They should be thoroughly sterilized and kept in clean paper and not removed until required for use.

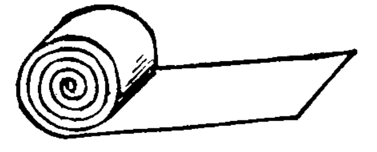


Figure No. 1.

The Roller Bandage (Fig. 1) is usually made of gauze or unbleached muslin which has been washed in soda solution to remove the sizing and then torn into strips varying from one to five inches in width and from three to ten yards long, according to the part to be bandaged. Roller bandages may be purchased in any drug store in sizes of all lengths and widths. When the bandage is made at home care should be taken that the edges be kept true, the loose threads picked off and the end of the bandage secured by a pin.

The T Bandage is made by sewing one piece of bandage at right angles to another, is used to retain dressing between the thighs. One part of the bandage is tied around the waist, the stem of the T passing between the legs, then being brought up and tied to the first part.

The Many-tailed Bandage is used principally after abdominal operations. On applying it the central portion is placed over the spine, and beginning at the top, the first tail on one side, then the first tail on the opposite side is brought across the abdomen, so alternating and overlapping until all the tails are used.

The Recurrent Bandage is applied to various parts. To adjust it to the head make several turns around the head, then pass the bandage backward and forward over the scalp until the parts are covered. Secure the turns with pins or strips of adhesive plaster.

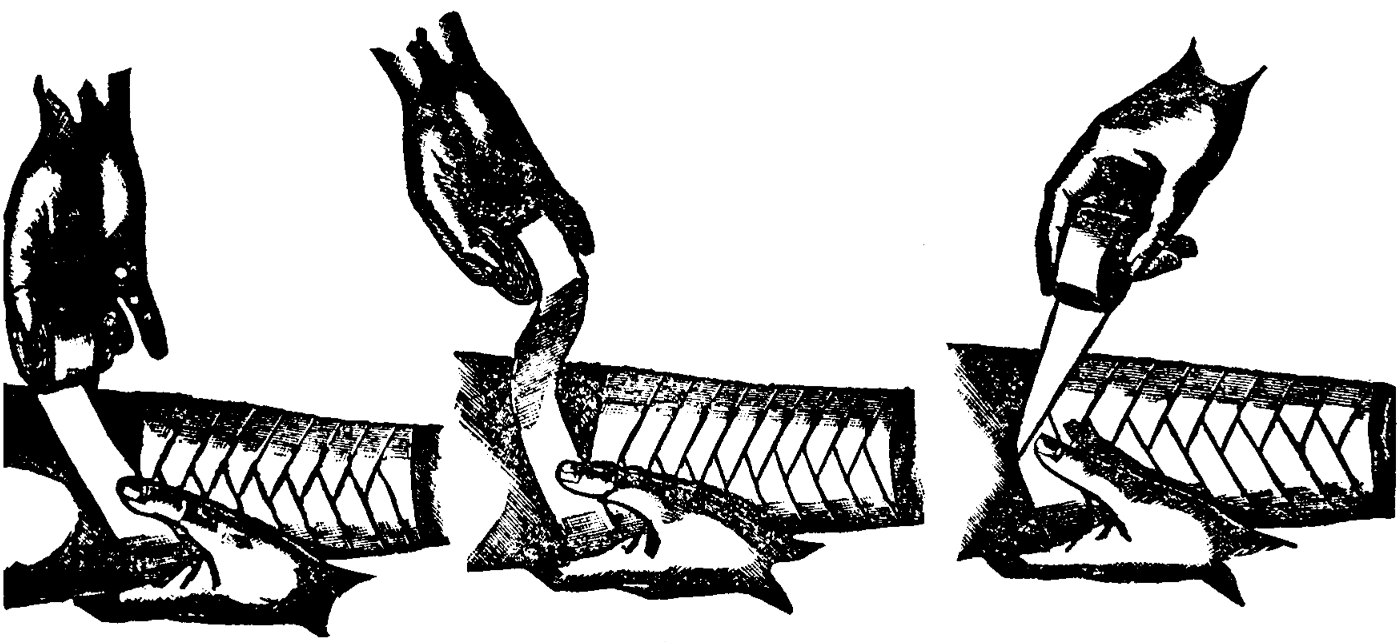


Fig. 2.

The Oblique Bandage is begun by several circular turns and is then carried up the limbs like the red band on a barber pole. It is rarely used.

The Spiral Bandage is applied to parts which do not vary in circumference. It is applied like the oblique except that the turns overlap each other. Figure 4 demonstrates the application of the spiral bandage to the hand and wrist.

The Spiral Reversed Bandage (Figs. 2 and 10) is applied to parts which are conical. It is begun like the spiral, but as the legs begin to thicken it will be found that the lower edge of the bandage does not lie snugly against the limb. In order to obviate this reverse each turn of the bandage, *i. e.,* the upper edge of the bandage becomes the lower edge. Overlap each preceding turn of the bandage at least one-half.

To confine the bandage the end should be folded on itself, the corners again folded under and a pin should be passed in the direction from which the end of the bandage has come.

The Figure of Eight Bandage is applied to the knee, elbow, chest, axilla and occiput. Make several circular turns around the limb to fasten, pass obliquely downward over the flexor side of the joint to the opposite side, make a circular turn below the joint, and pass obliquely up again. The figure of eight is repeated, overlapping the turns until the part is covered.

Figure 11 shows an excellent method of binding up the hand and wrist by means of a folded handkerchief in times of emergency. Care shoudld be taken not to allow any tight constriction around the wrist for a prolonged period, as death of the fingers may result.

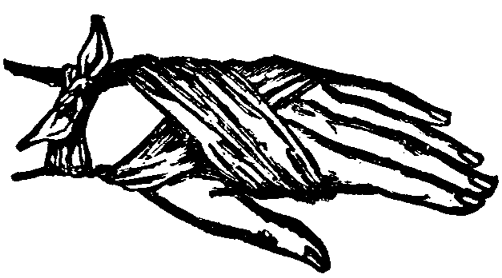


Figure No. 11.

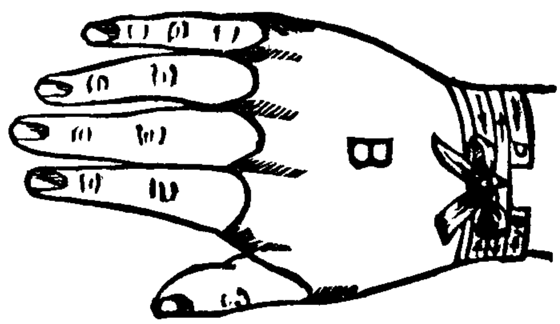


Figure No. 12.

Bandages on the hand may be kept in place by use of a glove with the fingers cut off as shown in Fig. No. 12 and such a glove may also be used in keeping wounds clean and in other advantageous ways.

The Spica Bandage is a figure of eight bandage, each turn overlapping the previous one so as to resemble a spike of barley. When the turns overlap each other from below upward the bandage is called an ascending spica; when from above downward, a descending spica. When the turns cross in front it is termed an anterior spica; in back, a posterior spica; and on the side, a lateral spica; when two corresponding parts like the groin are covered, the bandage is known as a double spica.

The Four-tailed Bandage is made by taking a square or oblong piece of flannel or muslin, and tearing toward the centre from opposite sides, so as to make four tails. The size depends on the size of the part to be covered.

For the instep make the bandage about twenty inches long and about five inches wide. Double it and tear down the centre, leaving a square portion untorn. Apply it by placing the central square portion across the instep; bring the two upper ends up around the leg and tie them; the lower ends are to be brought about the lower part of the foot and tied in a similar manner. This bandage is very effective in confining dressings to the instep and lower part of the leg. It may also be applied to the heel.

Figure No. 13.

Figure No. 14.

For the knee take a strip of muslin eight inches wide and about thirty inches long; tear each end down the middle to within six inches of the centre. Apply the central portion over the patella, bring the upper ends of the bandage around behind the knee, passing obliquely downward, and tie on the front of the leg below the knee-pan; the lower ends should be crossed behind in a similar manner, and tied on the front of the thigh above the knee-pan.

Figure 13 shows the four-tailed bandage applied to the chin.

The Triangular Bandage by skillful manipulation has been made to perform many and varied offices.

Figure 14 shows the ordinary triangular bandage applied to the scalp in a manner somewhat like that adopted by women to protect the hair from dust when sweeping.

Figure 23 shows the triangular sling applied in the usual way, the weight being supported by both shoulders.

In Figure 22 the same bandage is depicted, except that the weight of the forearm falls on the left shoulder.

In applying the triangular bandage to the knee take a triangle of muslin, the base being about two feet long and the apex about ten inches from the base. Place the centre of the base across the front of the knee just above the knee-pan; bring the ends around as many times as possible and tie them. Dressings are easily held on by this method, and much support is given in cases of fracture of the knee-pan.

The Fillet or Head Band.—Take a piece of flannel twenty-five to thirty inches long and about ten inches wide. At the centre of the bandage, one-half inch from the lower edge, cut a triangular hole large enough for the nose. Stand behind the patient and place the bandage over the face, the nose projecting through the hole, the remainder of the upper part of the face being covered. The ends are brought together behind and pinned. This is an admirable dressing for retaining dressings on the face and eyes, especially in burns of the face.

Figure No. 22.

Figure No. 23.

Bandage for the Chin.—This bandage should be one and a half inches wide and about nine yards long. Standing at the back of the patient the end of the bandage is placed just over the left eyebrow, and fastened by one horizontal turn around the head, then passing around to and below the right ear, underneath the chin, and upward over the left side of the face, just covering the left ear. Two more turns are to be made over the top of the head and underneath the chin, each turn including a little more of the anterior part of the chin. The bandage is now to be continued around behind the neck, and, in a slanting direction, over the head and around the forehead, as before, and then again below the right ear and across the front of the chin and around the neck, drawing this part quite snug, and repeating; then passing under the chin and up on the left side of the face, bring the bandage to the top of the head and confine by several turns. It is used for fracture of the lower jaw, and for holding poultices to the side of the face, and so forth. If any turns be made about the neck care should be taken that they are not drawn tight enough to interfere with the circulation.

T-Bandage for the Temple.—Take two pieces of muslin, one two to four inches wide and three feet long; ten to twelve inches from one end, at right angles to it, another bandage should be fastened, two inches wide

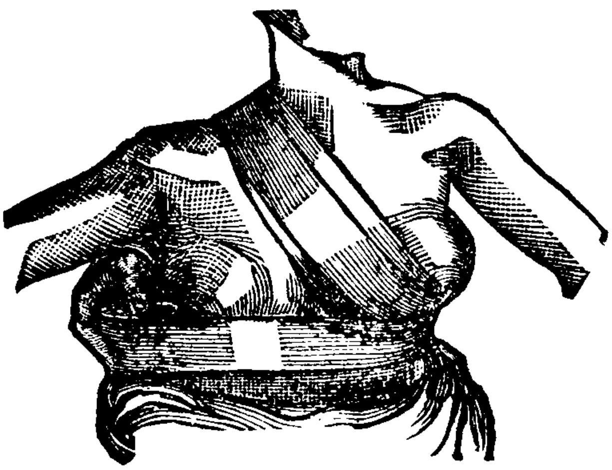


Figure No. 24.

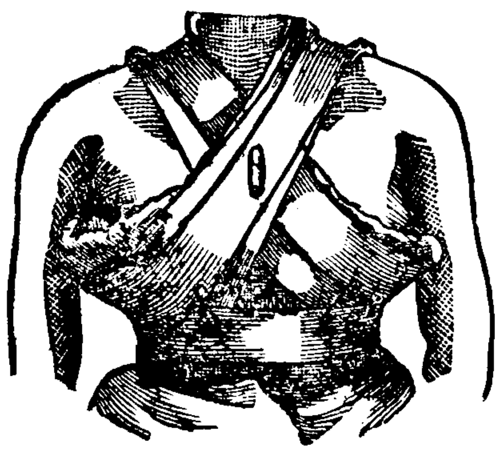


Figure No. 25.

and seven to eight feet long, one end only extending fifteen to eighteen inches beyond the point of junction.

Place the point of junction of the bandage over the injured temple in such a manner that the wide part of the bandage is perpendicular as regards the head; the short end is to be brought to the top of the head and the long end around under the chin and fastened to the opposite end. The narrow part of the bandage is now carried around the head horizontally, the short end being confined by the horizontal turns.

Double T-Bandage for the Nose.—Take a muslin bandage seven to eight feet long and one inch wide. At the centre of this, about one inch from each other, and at right angles to the first, stitch two other strips each two and one-half feet long by three-quarters of an inch wide.

Place the centre of the main bandage beneath the nose (the two shorter pieces passing up on each side, crossing at its base and resting on the top of the head), carry the ends around to the back of the head where they cross and are again brought around to the forehead, where they may be confined after taking several circular turns about the head. The ends passing over the top of the head may pass down behind and be pinned to the main bandage. This bandage is of use in keeping dressings about the nose in position.

Bandages for the Breast.—We will assume the left breast is to be supported. It is first covered with a layer of cotton; then applying the end of the bandage about the centre of the back, holding it in place with one hand and with the other bringing the roller under the arm and breast, then across the chest and over the right shoulder, then under the arm and breast again until it is covered; the bandage should now pass across the chest at the level of the lower end of the breast-bone, below the opposite breast, and around behind, where it may be confined. (See Figure 24.)

When both breasts are to be supported the bandage should pass across the left shoulder also and below the right breast in the same manner. (See Figure 25.)

Fig. 3.—Simple Spiral Bandage applied over splint.

Fig. 4.—Simple Spiral Bandage.

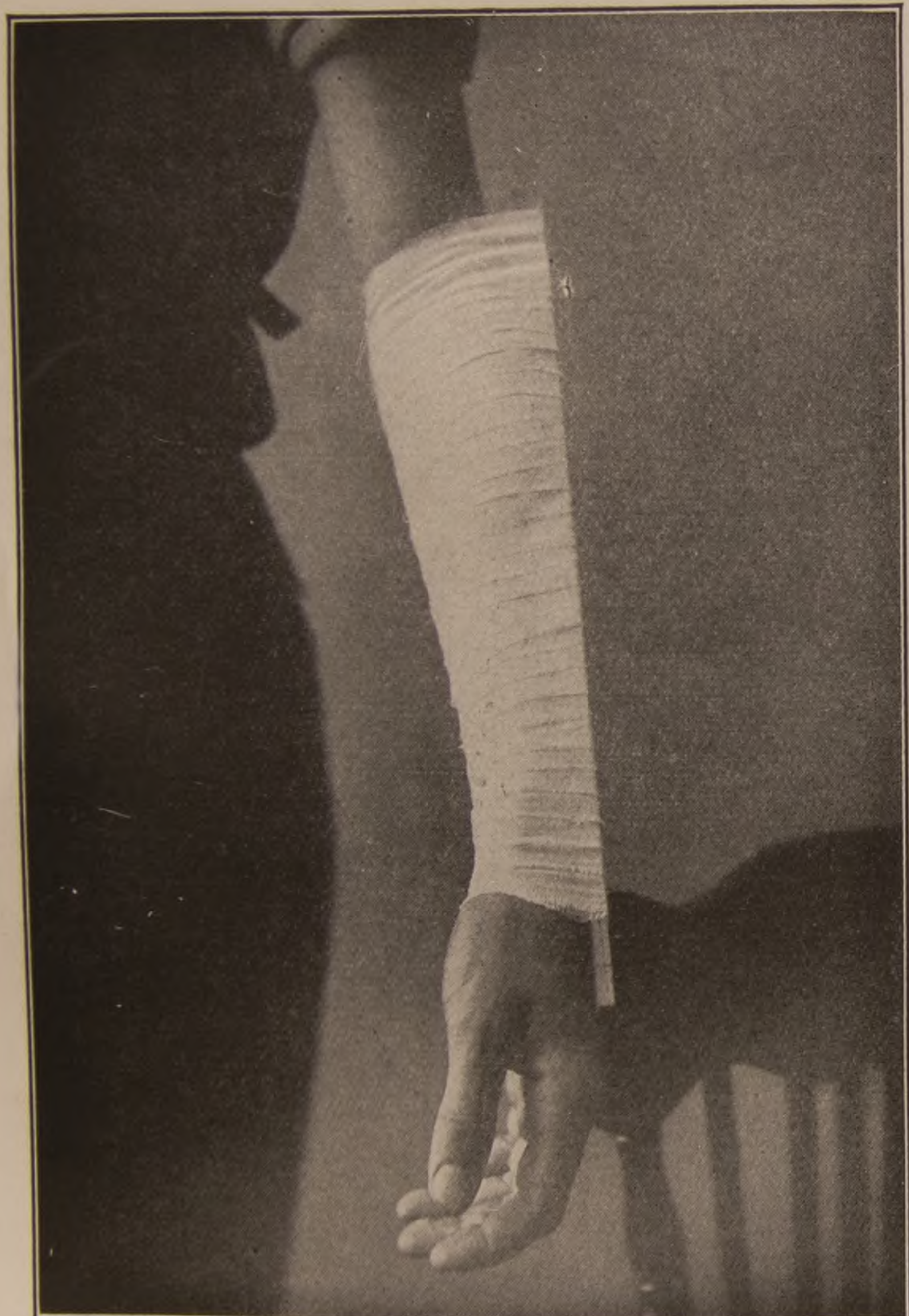


Fig. 5.—Posterior Splint for fracture of the forearm.

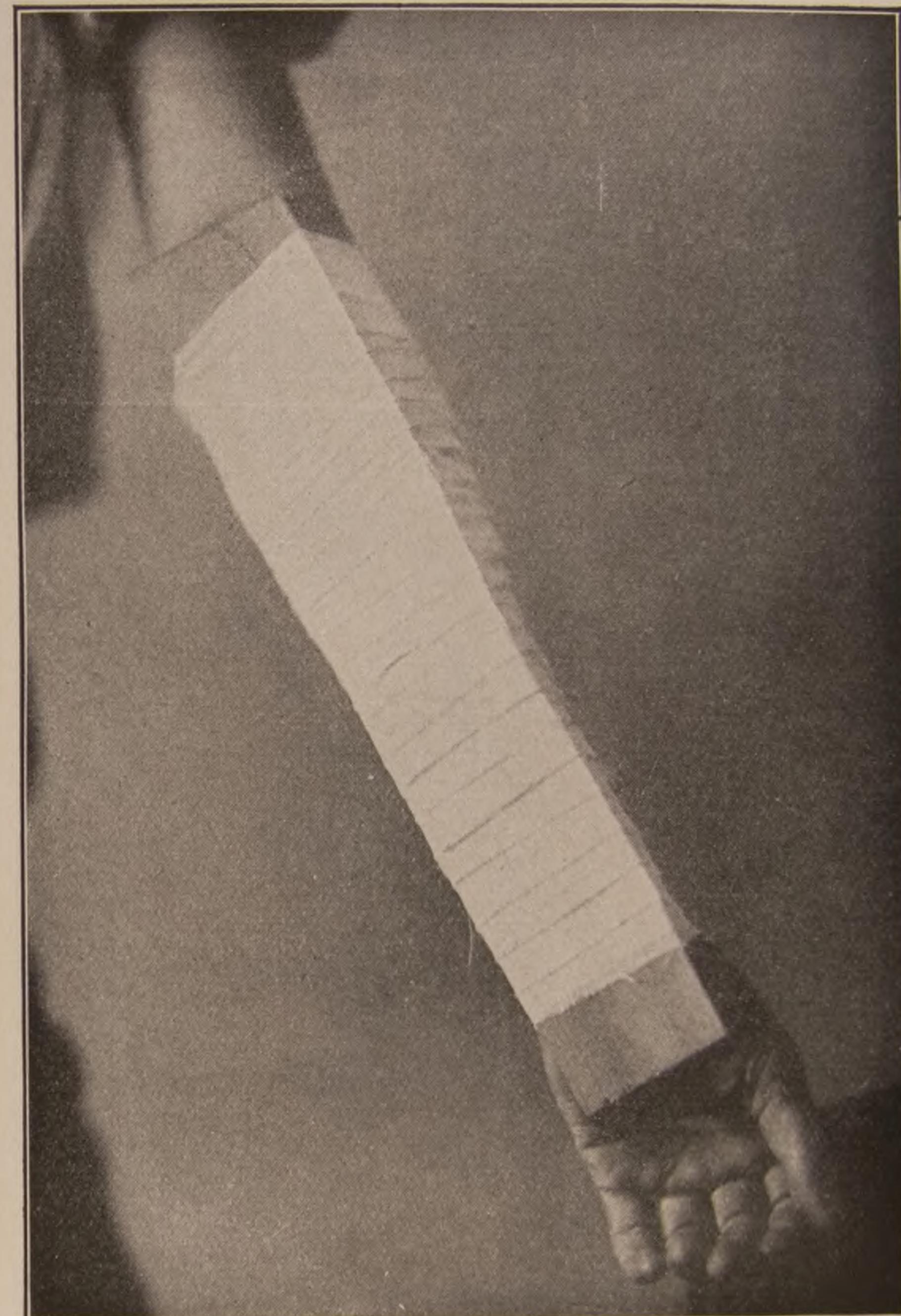


Fig. 6.—Anterior Splint for fracture of the forearm.

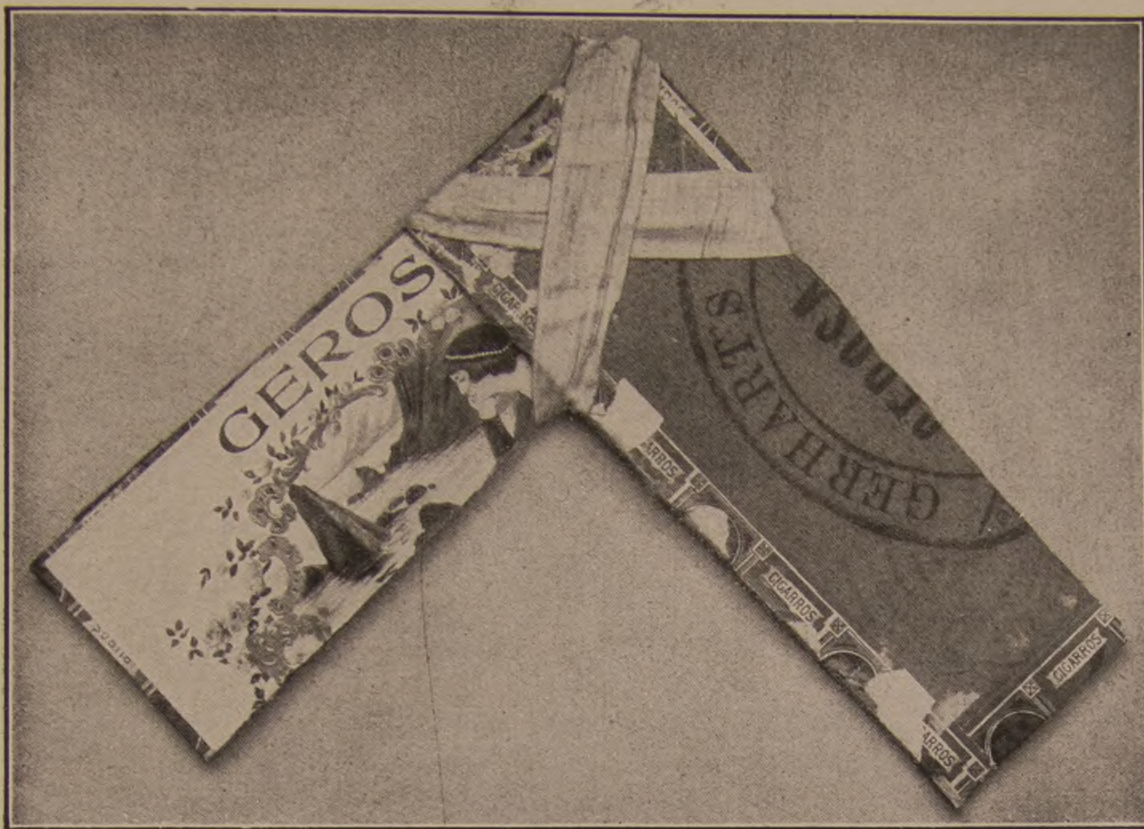


Fig. 7.—Emergency Splint made from cigar-box lid for fracture of ankle.

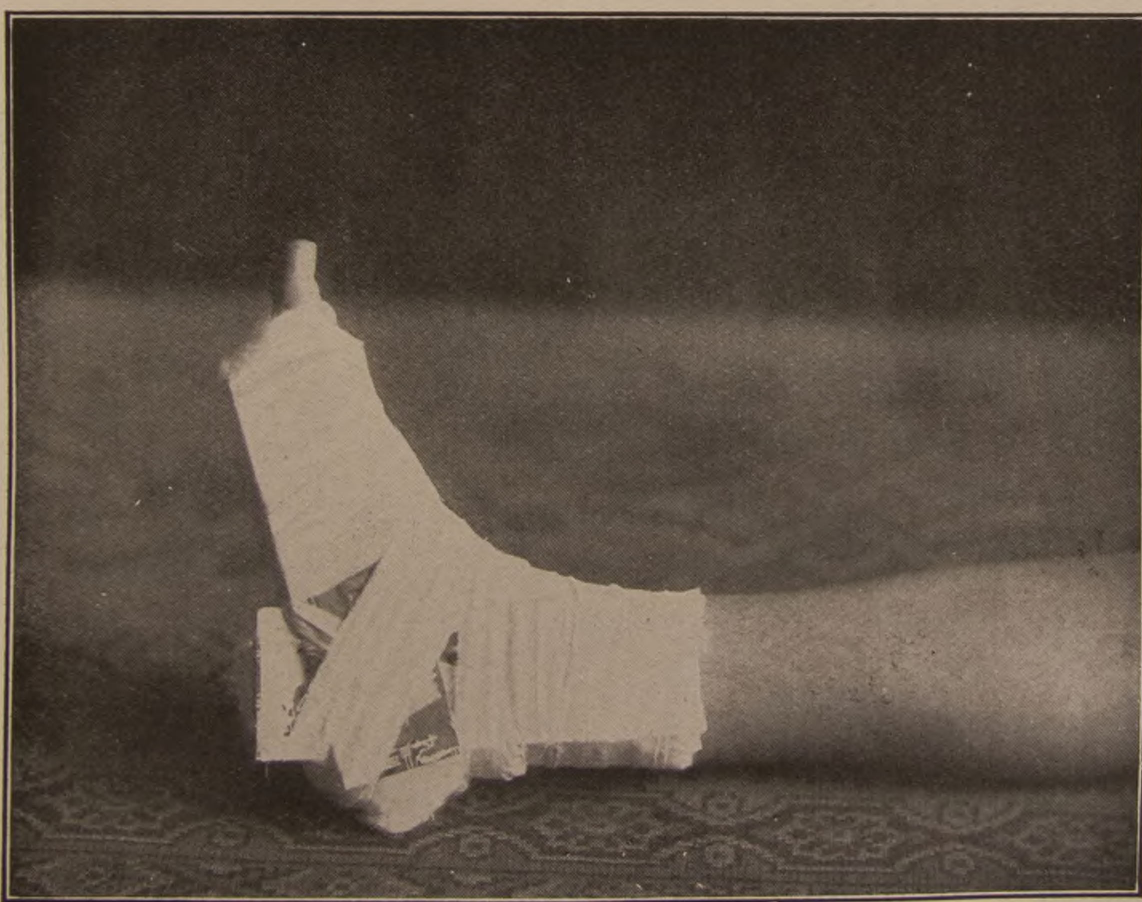


Fig. 8.—Cigar-box Splint applied to fracture of ankle.

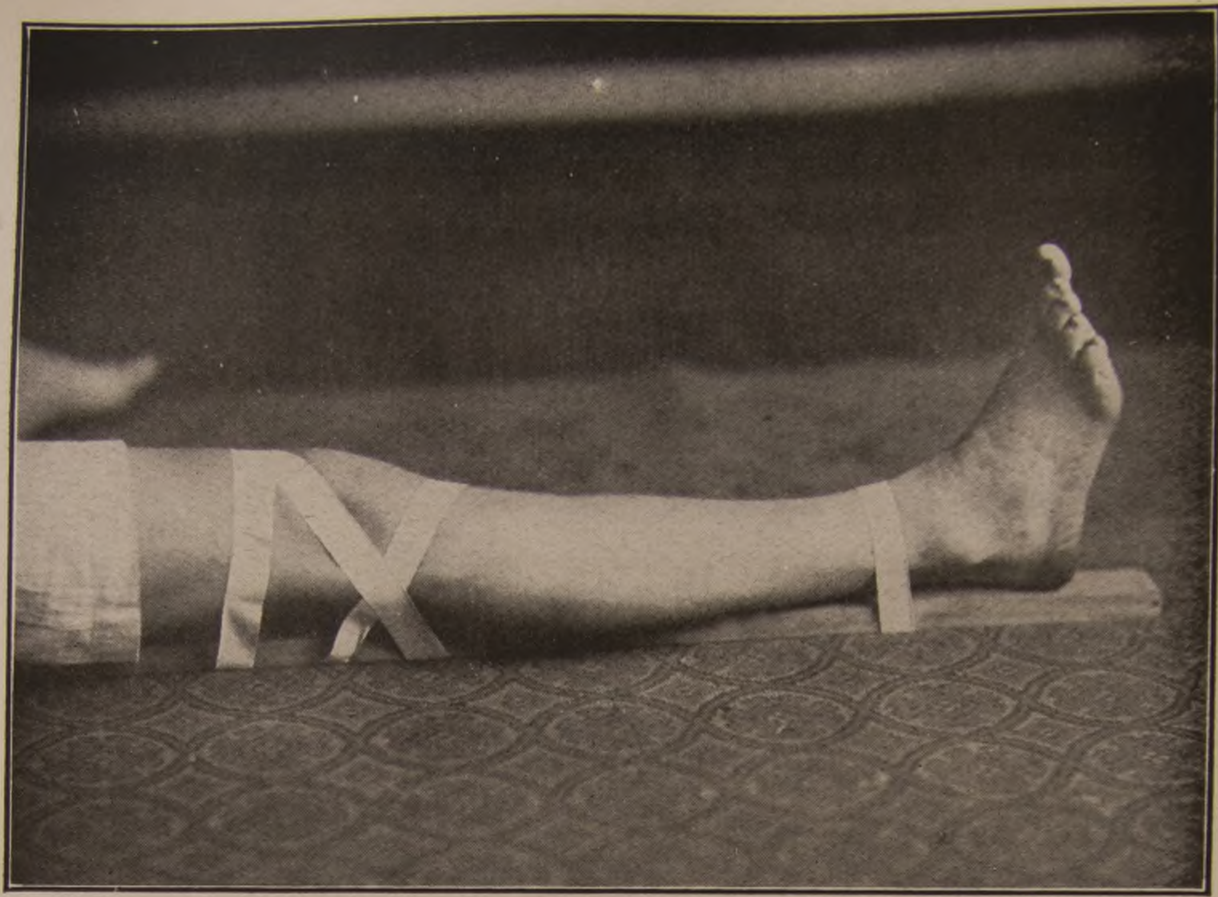


Fig. 9.—Fracture of knee-cap held in place with adhesive plaster and a board.

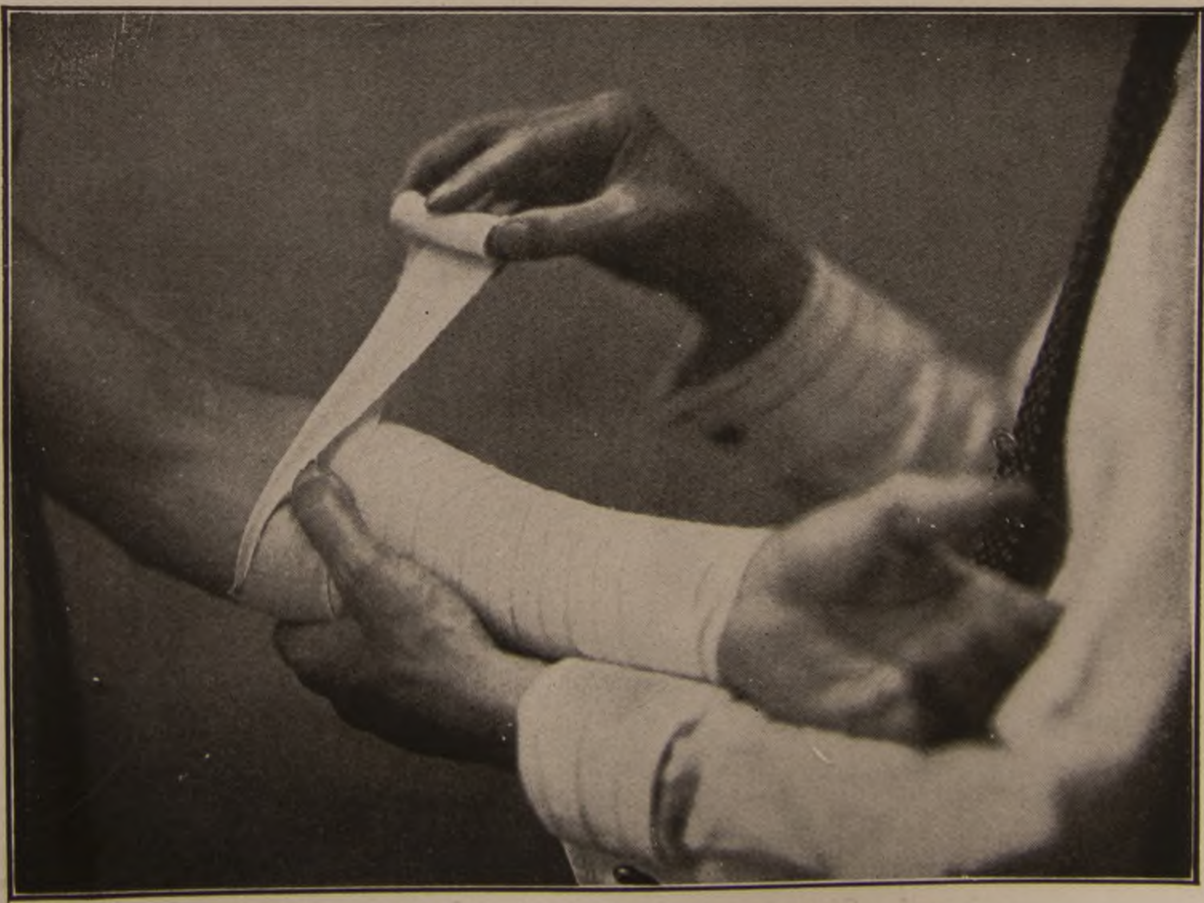


Fig. 10.—Spiral Reverse Bandage for the arm.

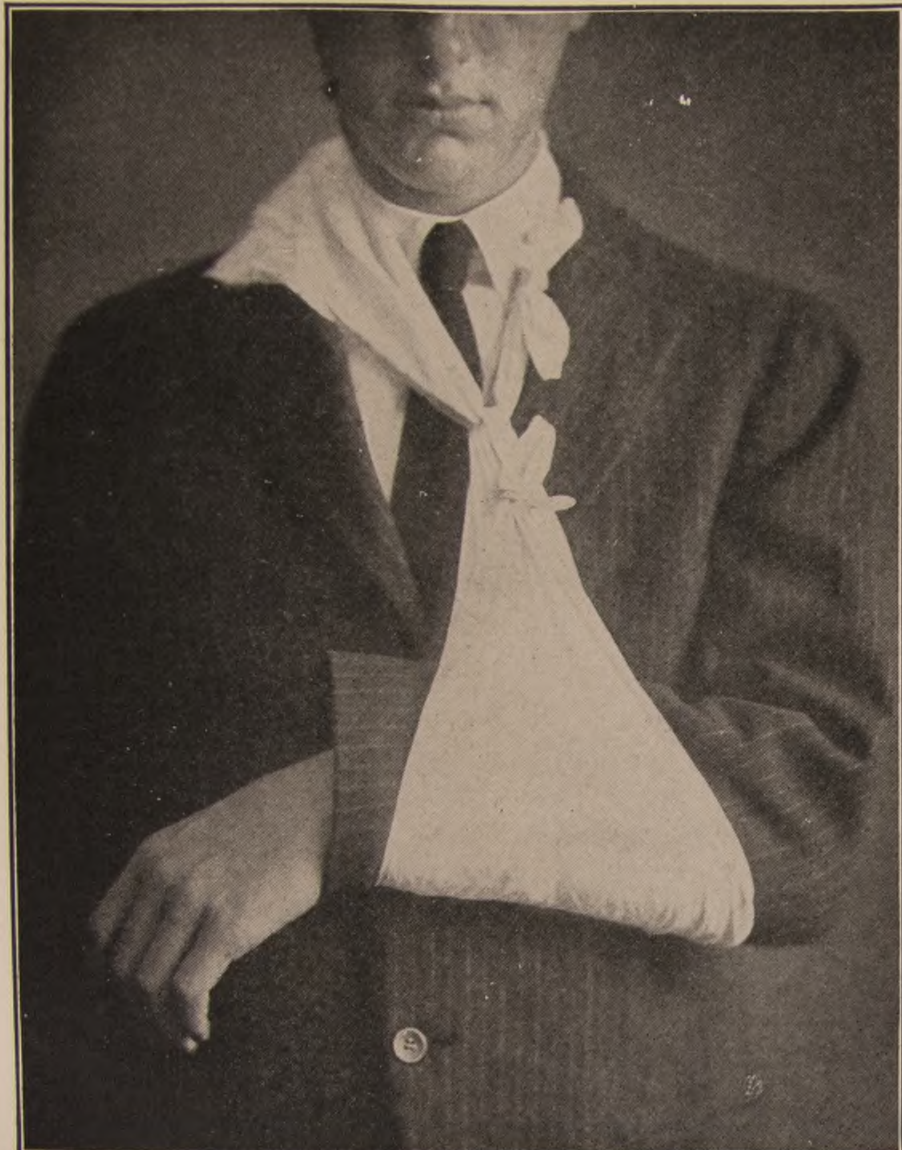


Fig. 15.—Double Handkerchief Sling.

Fig. 16.—Coat Sleeve Sling.

Fig. 17.—First stage of applying Head Bandage.

Fig. 18.—Second stage of applying Head Bandage.

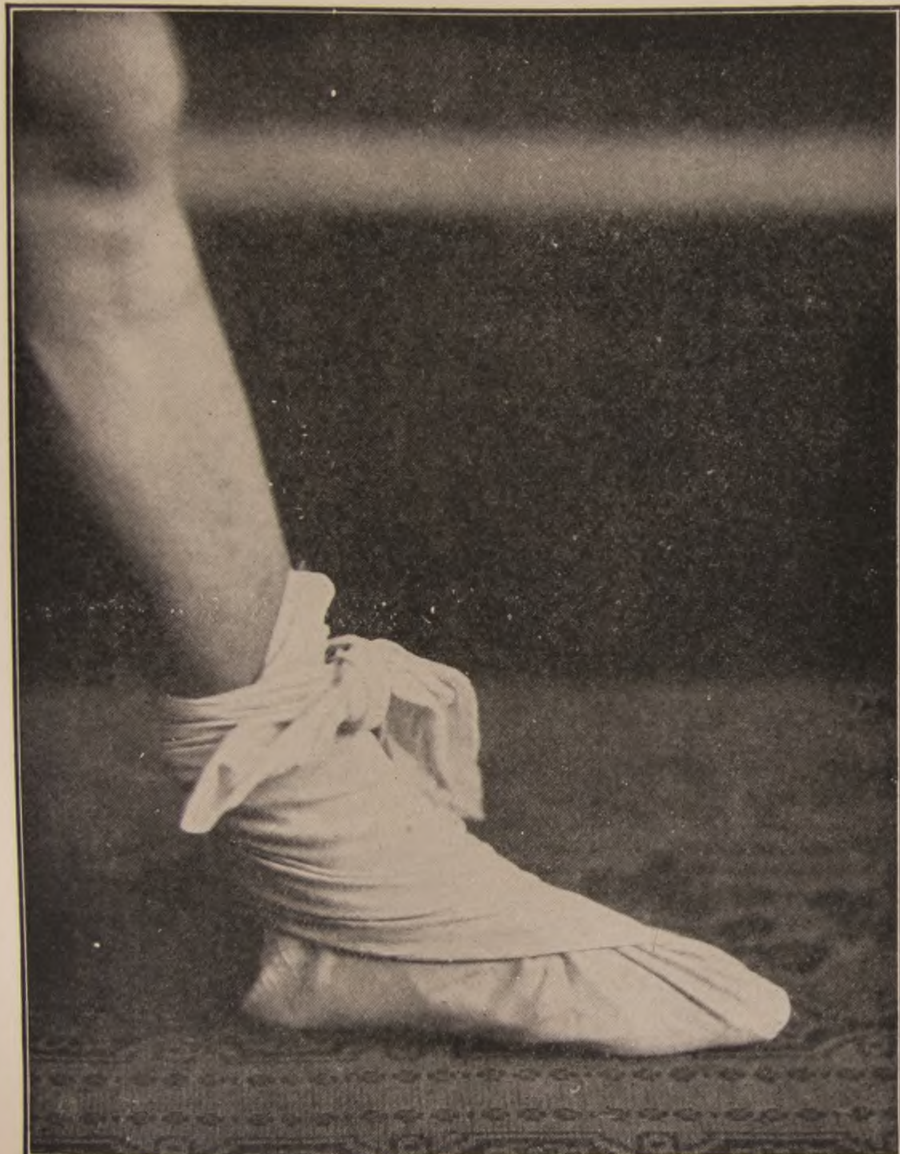


Fig. 19.—Triangular Bandage applied to foot.

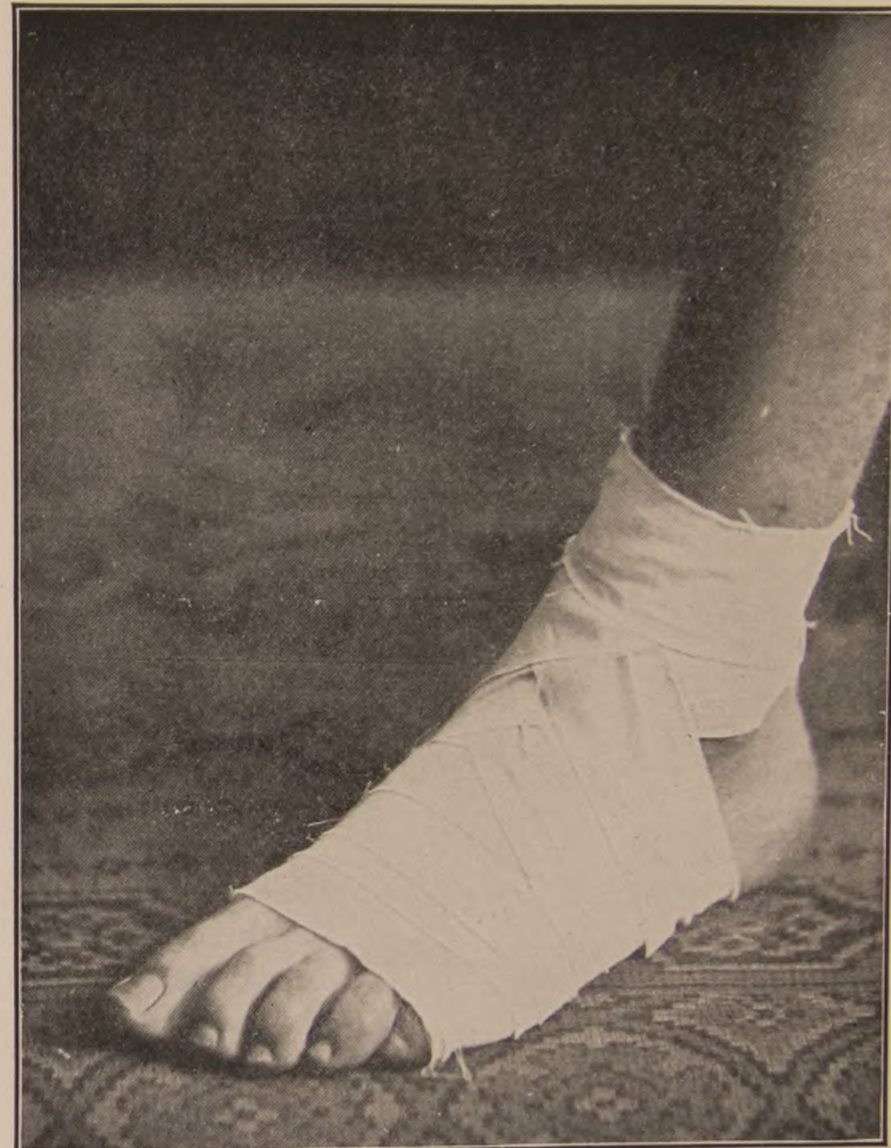


Fig. 20.—Simple bandage for foot and ankle.

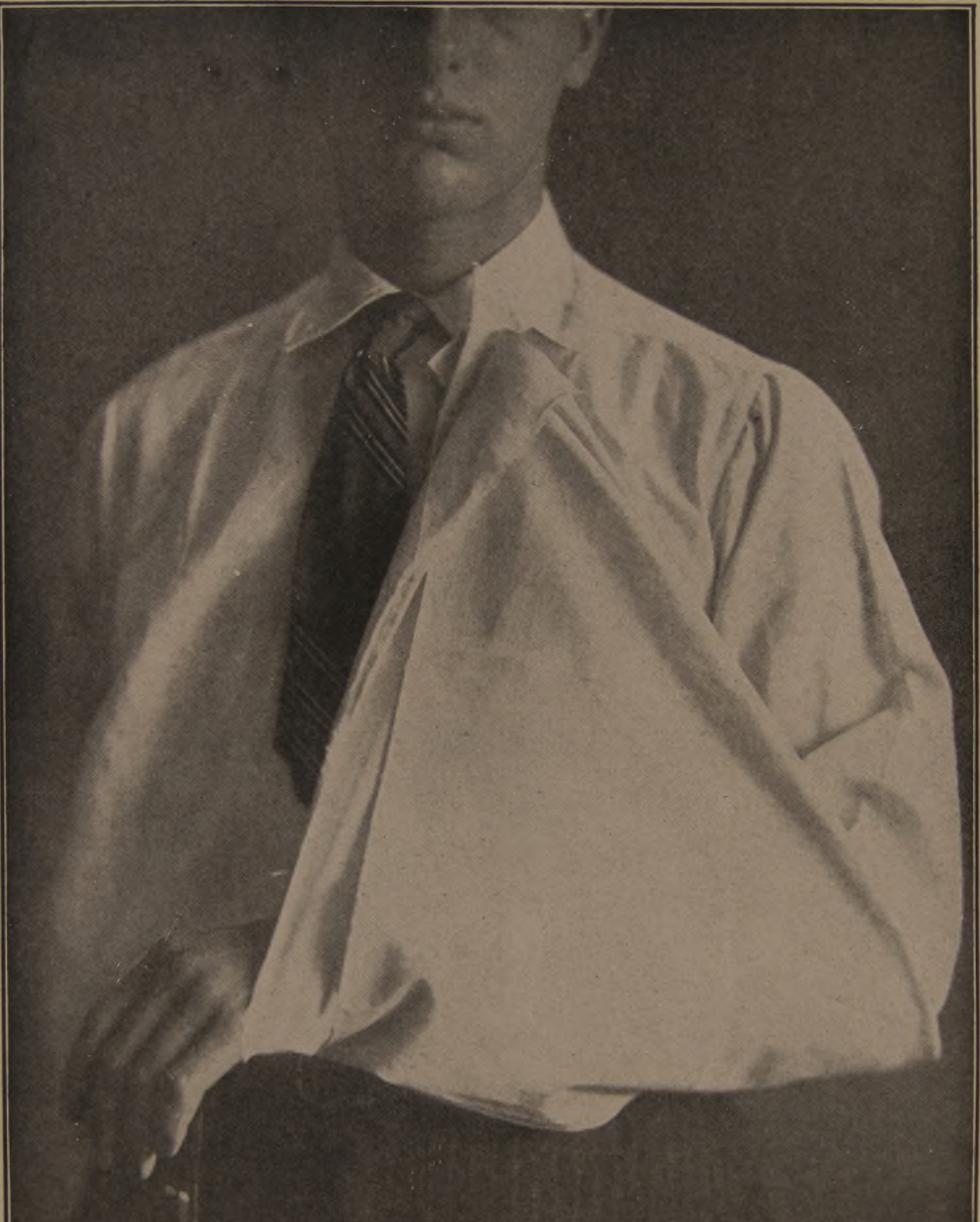


Fig. 21.—Triangular Bandage as a Sling.

Fig. 26.—Bandage used in case of a burn on front part of hand, wrist or forearm.

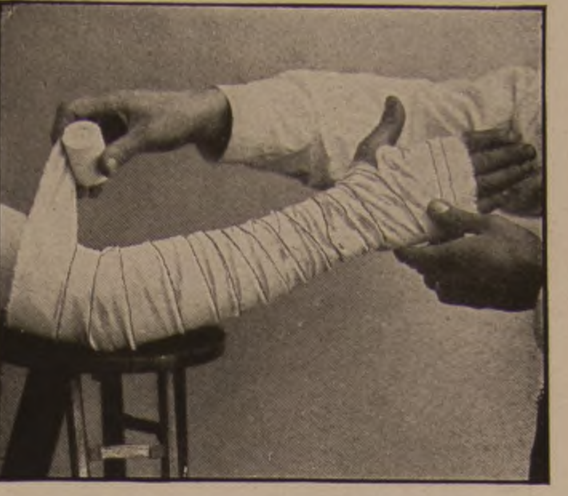


Fig. 27.—Bandage used in case of a burn on back of hand, wrist or forearm.

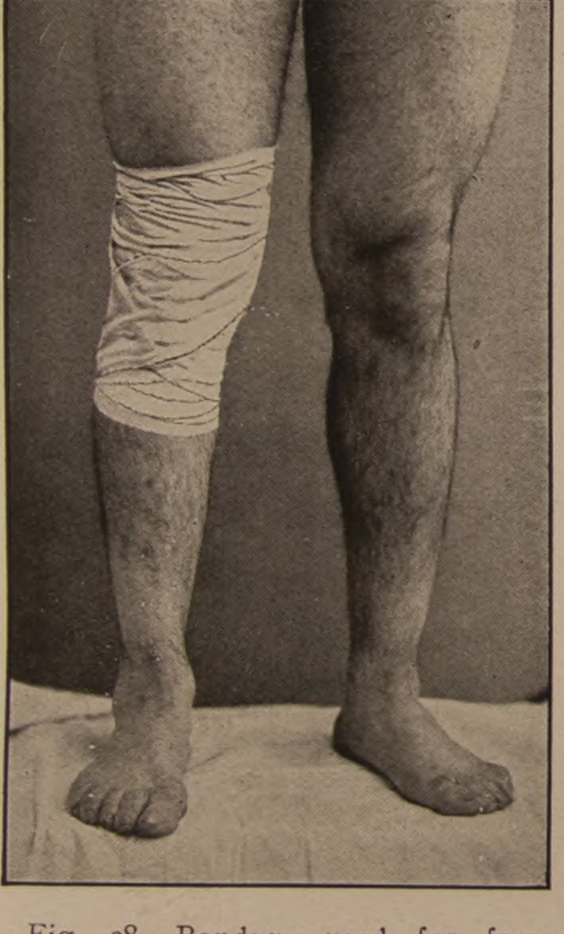


Fig. 28.—Bandage used for fractured kneecap and steadying joint motion.

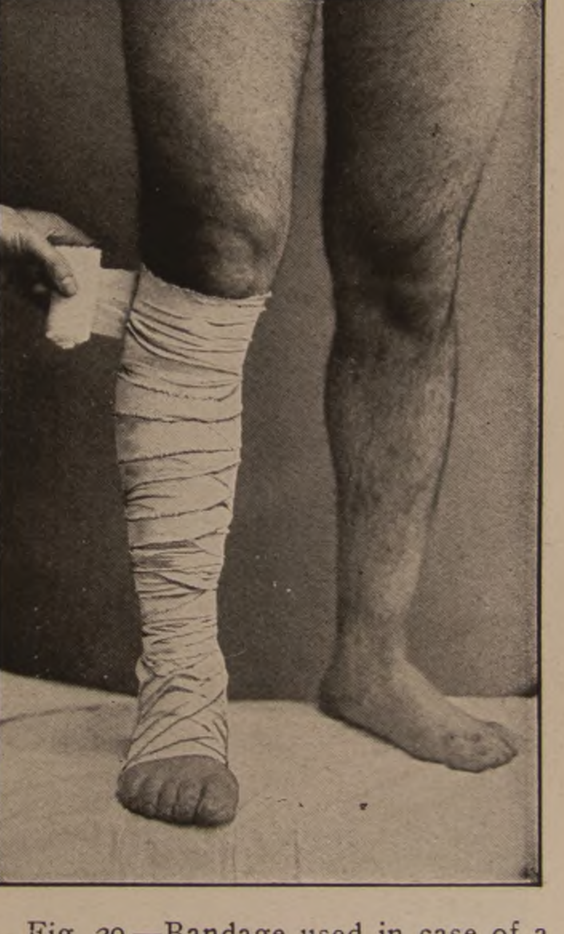


Fig. 29.—Bandage used in case of a serious wound on lower part of the leg.

Fig. 30.—Bandage used to fix the shoulders back in case of a burn on breast, or roken collar bone.

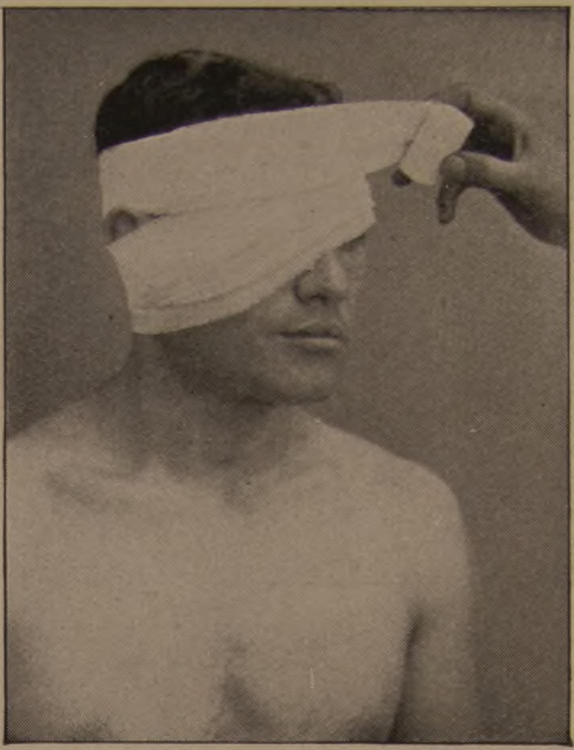


Fig. 31.—Bandage for serious injury to the eye, to retain dressing and exclude light.

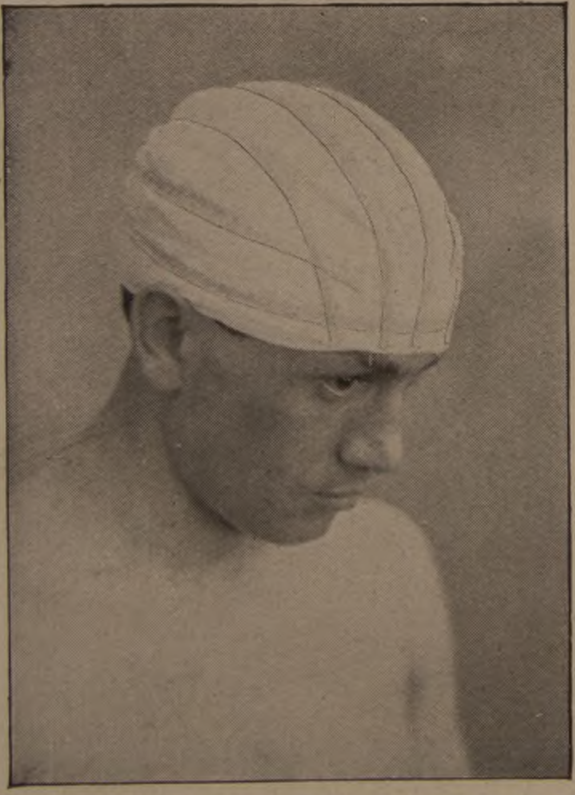


Fig. 32.—Simple and effective bandage for dressing wounds of the scalp, or any injury of the top or sides of the head.

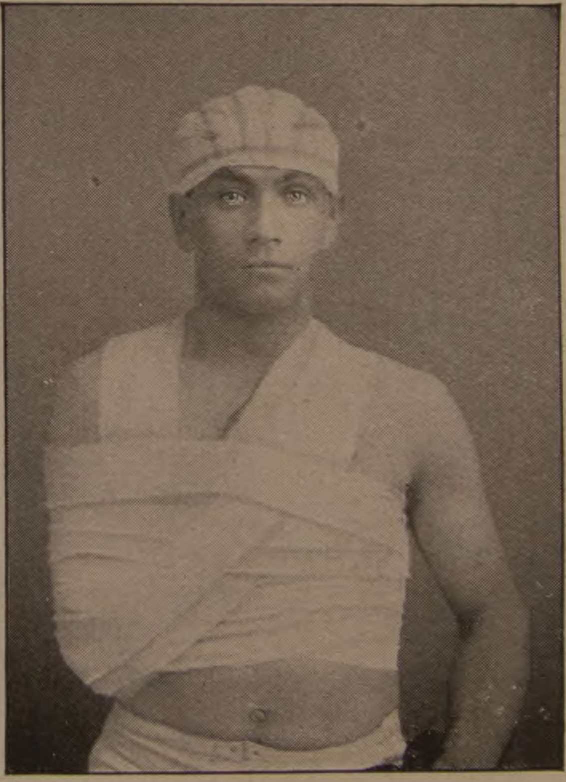


Fig. 33.—Bandage for fractured collar bone, so applied that it cannot be removed by a restless patient.

Fig. 34.—Board used as Emergency Splint for fracture below the knee.

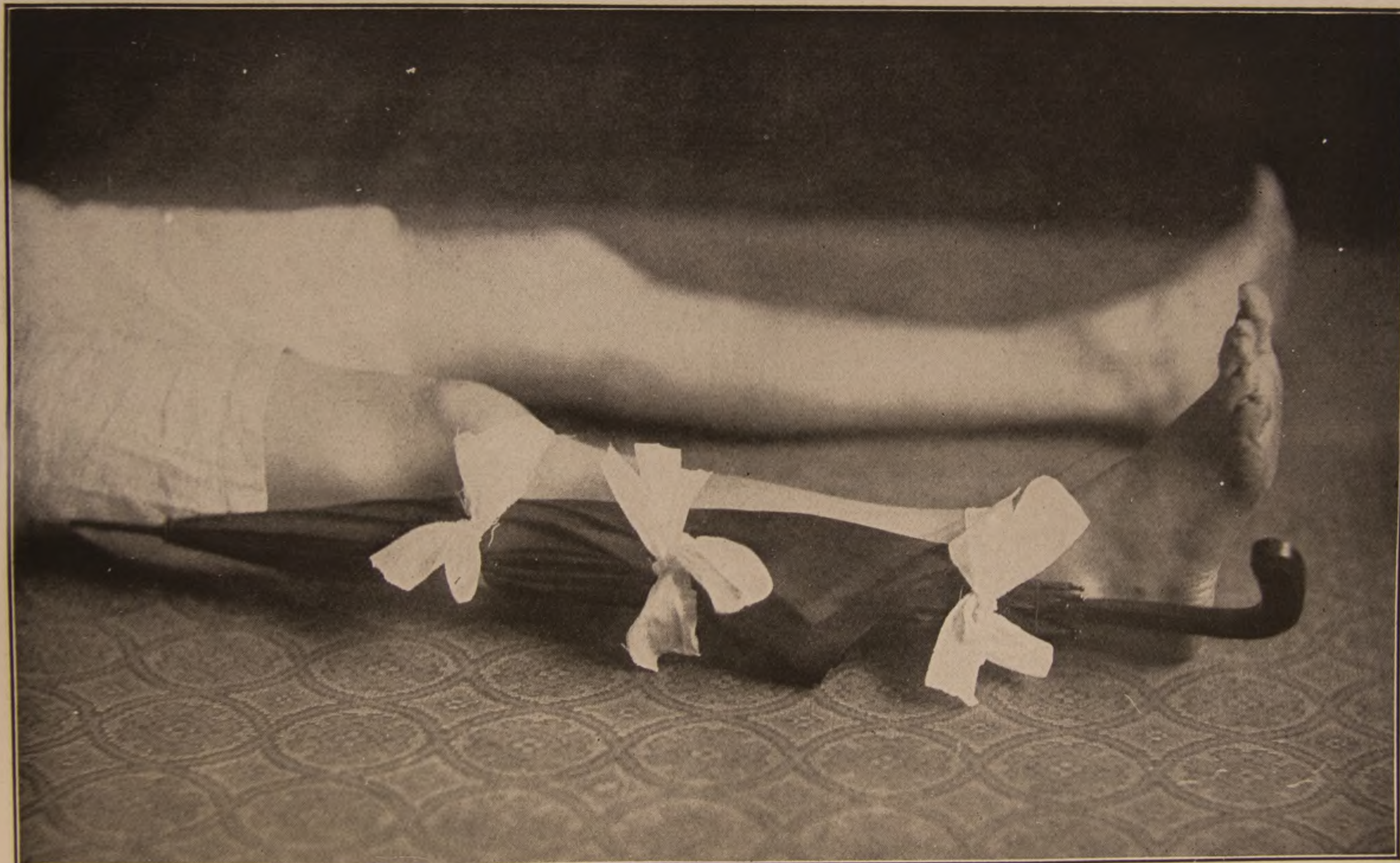


Fig. 35.—Umbrella used as Emergency Splint for fracture below knee.

PART III OF BOOK V

Treats of the poisons and their antidotes, giving a list of poisons and antidotes for quick reference.