The household medical adviser. A complete, popular-scientific work of reference ... compiled from the most recent recognised system of prevention and cure ... with over 320 illustrations, coloured plates and unfolding anatomical models / by H.Muller. M.D.

Contributors

Müller, H.
Royal College of Physicians of London

Publication/Creation

London : Werner Co., 1900.

Persistent URL

https://wellcomecollection.org/works/hwmpzzr7

Provider

Royal College of Physicians

License and attribution

This material has been provided by This material has been provided by Royal College of Physicians, London. The original may be consulted at Royal College of Physicians, London. where the originals may be consulted. Conditions of use: it is possible this item is protected by copyright and/or related rights. You are free to use this item in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s).

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

The Household Medical Adviser

SL
615.89

THE

HOUSEHOLD MEDICAL ADVISER

A COMPLETE, POPULAR-SCIENTIFIC WORK OF REFERENCE

HOW TO AVOID ILLNESS, AND HOW TO PRESCRIBE FOR AND TREAT ALL CLASSES OF AILMENTS & DISEASES

COMPILED FROM THE MOST RECENT RECOGNISED SYSTEM OF PREVENTION AND CURE

BY

H. MULLER, M.D.

WITH OVER 320 ILLUSTRATIONS, COLOURED PLATES AND UNFOLDING ANATOMICAL MODELS

London
THE WERNER COMPANY
3 BROADWAY, LUDGATE HILL, E.C.

SL

ROYAL COLLEGE OF PHYSICIANS
LIBRARY

CLASS 615.89
ACCN. 35466
SOURCE Lady Hamilton Fairley. Gift
DATE 19 Dec. 1968

COPYRIGHT
THE WERNER COMPANY, LONDON, E.C.
PRINTED AND BOUND IN LEIPZIG.
ENTERED AT STATIONERS' HALL.

PREFACE.

No apology, it is hoped, is necessary for the appearance of a work offering in a popular form useful information not hitherto placed within the reach of the general public. In one respect, this work resembles many others that have been previously published—it is a book containing counsels on the preservation of health and cure of disease, and so may appear superfluous. But in another respect, it differs from previous works—in the manner in which its subject matter is treated; and the author trusts that, for this reason, it will be found more useful than others. Many works, and some of them excellent ones so far as they go, have been published with the aim of supplying such information as may enable people to treat, in the right manner, a number of common simple maladies; maladies that may be safely dealt with at home, without professional medical assistance, by the aid of ordinary remedies, or innoxious drugs procurable from the pharmaceutical chemist. Many others contain valuable advice on the preservation of health. But none of them are exactly on the same lines as the one here offered the public. A step in advance of anything that has been previously attempted is here taken. An effort is made to enable the public to form some more exact and more scientific notion of the true conditions of health, and of the nature of the various maladies that may disturb it, and so to give some idea of the reason why disorders should be treated in the manner described.

It is in this respect that the book differs distinctly from those that have previously appeared. The reader who consults its pages will find first of all an elementary explanation of the structure and functions of the human organism, and of its different parts. From this he will be able to form some idea of how the various organs, when in a healthy condition, work in that harmony which constitutes life. It is

not until this has been made clear that a further step is taken, and the various maladies, to which the different organs are exposed, are discussed. A brief sketch of the ordinary course of the maladies is then offered, and after that the treatment most likely to combat them successfully is described. It will be seen from this that the work aims at giving its readers some insight into the causes of health and sickness, and therewith the opportunity of understanding why particular remedies are recommended in preference to others, and why those remedies should effect the desired cure.

The hope that this kind of information may be found really helpful seems reasonable. When a piece of machinery, even of some very simple kind, is out of gear, any one who knows something about its structure (though his knowledge is only of a general and elementary sort) is by far more likely to be able again to put it into working order than one who is entirely ignorant of its mechanism. The human body is not only a piece of mechanism of a very complex nature, but absolutely the most highly complex and delicately organised thing on the face of the earth; and to proceed to deal with it without any knowledge of how it performs its elaborate functions, cannot be so safe as to be guided by some notion of their nature.

Here it may be urged that the organism is so fine and delicate that all attempts to do anything with it are to be strongly deprecated, unless the treatment is in entirely competent hands, that is to say, conducted under the supervision of a professionally educated medical man. This is a sound objection, and deserving of due consideration. In the present work it is by no means disregarded. The writer has no wish to encourage the public in the gross imprudence of "attempting to doctor themselves" in cases where the advice of a medical man is necessary, or even probably desirable. Everywhere a sharp line is drawn between the simple maladies that will yield to prudent regulations of life and diet, to elementary treatment and to homely drugs, and those disorders (often only aggravated cases of the same maladies) which render medical advice expedient. And the line has been always drawn "on the safe side," so that the patient who attempts, without consulting a medical man, no more than is here recommended, may feel assured that he is not guilty of imprudence. In this way the work is so far from encouraging the patient to dispense with a medical man when his assistance is desirable, that it carefully describes those symptoms which indicate that the malady is assuming a serious form, and that professional advice should be taken. Here it is hoped that the explanations of the structure and functions of the different parts of the body which are given, and of the manner in

which the various maladies affect them, will assist the reader to distinguish between simple and grave complications, and to recognise when the need of professional advice is real. Care has been taken to assist the reader also to understand the difference between disorders and mere symptoms—an important point often very obscure to the public; and this information alone would suffice often to show the patient whether advice should be sought or not.

From all this it will be plainly seen that one of the aims of the work is to enable the reader to distinguish between the cases in which his malady is one which he may treat for himself and one that he ought to place in the hands of his medical adviser. It is a certain fact that in the case of maladies of minor importance (and indeed of some that are not of minor importance) the public will and do take the treatment into their own hands—when they are not guilty of the imprudence of letting matters take their course without doing anything. Under these circumstances it is plain that no harm, but rather good, must result from giving the patient such information as may enable him to get a little scientific insight into what is amiss with him.

It is the very want of this information, the ignorance of the public at large of the structure and nature of the human organism, and the consequent ignorance of the elementary rules of health and of the treatment of disease—and particularly ignorance of how to proceed at the beginning of a malady, that occasion, on the one hand, the neglect of incipient disease, that might be easily checked in the bud, until it assumes the form of grave complications, and, on the other hand, belief in the abilities of quacks to cure complaints of all kinds with their nostrums.

It will be understood that, though due attention has been paid to the latest discoveries of science, this work contains nothing new in the shape of remedies or methods of treatment. Only what has been proved, and found by experience to be really useful is recommended. And it will be almost unnecessary to add that no pretence is here made of giving an epitome of all that is known about the human organism and the maladies from which it suffers. All that is known could not be contained in many volumes of the size of this book. But an effort has been made to include all such elementary information, in a popular scientific form, as may be useful to the general public. That any one who consults the book will generally find what he wants is hoped. That it will not be always found is certain. No book of this size could contain a complete discussion of all human maladies. But in the case of the reader's finding that the book gives

him no information about a malady, he may be certain that the disorder is one about which a medical man should be immediately consulted.

That those who follow the rules for the preservation of sound health given in the following pages will seldom have occasion to consult them for remedies may be asserted without hesitation. But that they will be found really helpful also in sickness is the hope of the author, who concludes these few words with wishing his readers long health, and, when sickness comes, a rapid recovery.

THE AUTHOR.

CONTENTS.

Chap. Page.

Preface . . . . . V—VIII

I.—The New-born Infant and Congenital Imperfections. 1—12

Harelip, 3.—Wolf-Jaw, 5.—Hydrocephalus, 5.—Congenital Cephalhæmatoma, 7.—Hermaphrodism, 8.—Displacement of the Testicles, 8.—Hydrocele, 9.—Congenital Hernia, 9.—Congenital Dislocation of the Hip-joint, 9.

II.—Diseases of the New-Born Infant. . . . 13—20

Infantile Jaundice, 13.—Umbilical Diseases of the New-born, 13.—Umbilical Hernia, Omphalocele, 16.—Blister Eruption. Pemphigus, 17.—Inflammation of the Eyes of the Recently Born, 18.—Lock-jaw. Tetanus of the Recently Born, 19.—Congenital Swelling of the Mammary Glands, 20.

III.—The Nursing and Nourishment of the Suckling. . 22—39

Nursing of the Suckling, 22.—Bringing up by Hand, 26.—Weaning, 32.—First Teething, 33.—Care and Bringing Up of the Suckling, 34.—Weight and Growth of the Suckling, 35.—The Suckling's Baths, 37.—The Dress and Bed of the Suckling, 37.—First attempts to Stand and Walk, 38.

IV.—The Diseases of the Suckling. . . . 40—62

General Weakness of the Constitution and its Consequences, 40.—Phthisis, or Tabes of the Intestines, 41.—Thrush, 44.—Diseases of the Digestive Canal of the Suckling, 46.—Dyspepsia of the Suckling, 47.—Acute Intestinal Catarrh of the Suckling, 49.—Cholera Nostras. Summer Cholera, 53.—Chronic Intestinal Catarrh of the Suckling, 57.—Chronic Constipation of the Suckling, 58.—Difficulty in Teething, 60.

Chap Page.

V.—**The Disorders of Childhood.** . . . . 63—121

The Child's Sick Chamber, 63.—Infectious Disorders with Special Reference to Childhood. Measles, 68.—Scarlet Fever, 74.—Diphtheria, or Membranous Croup, and Diphtheritic Laryngitis, 82.—Small Pox, 91.—Chicken Pox, 97.—Asiatic Cholera, 97.—Whooping Cough, 98.—Erysipelas, 102.—Typhoid or Enteric Fever, 105.—Influenza, 113.—Rheumatism of the Joints, 115.—Mumps, 120.

VI.—**Structure and Functions of the Digestive Canal.** . 122—148

The Oral Cavity and the Pharynx, 123.—The Teeth, 123.—The Tongue, 125.—The Soft Palate, 136.—The Salivary Glands of the Oral Cavity, 136.—The Œsophagus, and Stomach, 128.—The Intestines, 130.—The Large Intestine, 131.—Food and Drink, 137.—Digestion, 146.

VII.—**Disorders of the Organs of Digestion.** . . 149—186

Oral Cavity and Pharynx, 149.—Disorders of the Mucous Membrane, 150.—Disorders of the Teeth, 152.—Acute Catarrh of the Pharynx, 154.—Chronic Pharyngeal Catarrh, 154.—Inflammation of the Tonsils, 155.—Phlegmonous Purulent Inflammation of the Tonsils, 157.—Proliferation of the Tonsils and Pharynx, 158.—Disorders of the Œsophagus and Stomach, 158.—Acute Catarrh of the Stomach, 160.—Chronic Catarrh of the Stomach, 161.—Circular Gastric Ulcer, 164.—Spasm of the Stomach, 167.—Acute Catarrh of the Intestines, 168.—Colic, 170.—Flatulence, 171.—Catarrhal Jaundice, 172.—Gall Stones, and Gall Stone Colic, 173.—Chronic Catarrh of the Intestines, 174 —Chronic Constipation, 175.—Invagination of the Intestines, 177.—Inflammation of the Cœcum, 179.—Prolapse of the Rectum, 180.—Parasites, 181.

VIII.—**Diseases of the Organs of Respiration.** . . 187—237

Structure and Functions of the Organs of Respiration, 187.—Acute Nasal Catarrh, 129.—Chronic Nasal Catarrh, 192.—Bleeding of the Nose, 195.—Acute Catarrh of the Larynx, 195.—False Diphtheria of the

Chap. Page.

Larynx, 197.—Chronic Catarrh of the Larynx, 198.—Spasm of the Glottis, 200.—Acute Bronchial Catarrh, 201.—Inflammation of the Bronchi, 204.—Chronic Catarrh of the Bronchi, 206.—Diphtherial (Fibrinous) Inflammation of the Lungs, 209.—Bronchial Asthma, 213.—Dilatation of the Lungs. Emphysema, 214.—Congestive Œdema of the Lungs, 214.—Tuberculosis, 215.—Tuberculosis of the Lungs, 218.—Tuberculosis of the Skin (Lupus), 224.—Tuberculosis of the Bones, 225.—Tuberculosis of the Glands: Scrofula, 227.—Tuberculosis of the Organs of Digestion, 228.—Tuberculous Disease of the Urinary Organs, 229.—Tuberculous Inflammation of the Meninges, 230.—Tuberculosis of the Larynx, 231.—Pleurisy, 233.—Hydrothorax. Dropsy of the Chest, 237.

IX.—The Organs of Circulation. . . . . 238—262

Structure and Functions of the Organs of Circulation, 238.—Disorders of the Organs of Circulation, 249.—Acute Inflammation of the Lining of the Heart, 251.—Valvular Disease of the Heart, 251.—Independent Enlargement and Dilation of the Heart, 255.—Callus Degeneracy of the Muscles of the Heart, 256.—Nervous Disturbances of the Heart, 256.—Inflammation of the Pericardium, 258.—Hæmorrhoids or Piles, 259.

X.—Diseases of the Urinary Organs. . . . 263—276

Structure and Functions of the Urinary Organs, 263.—Diseases of the Kidneys, 265.—Kidney-stones and Renal Colic, 270.—Catarrh of the Bladder, 272.—Stone in the Bladder, 273.—Spasm of the Bladder, 275.—Incontinence of the Urine, and Passage of Urine in Drops, 275.—Stoppage of the Urine, 276.

XI.—Disorders of the Nervous System. . . . 277—333

Structure and Functions of the Nervous System, 277.—Paralysis and Convulsions, 290.—Acute and Chronic Inflammation of the Nerves, 292.—Paralysis of the Facial Nerves, 294.—Paralysis of the Radial Nerve, 295.—Tetanus. Lock-jaw, 296.—Facial Spasms, 296.—Writer's Cramp and Similar Professional Cramps, 297.

Chap. Page.

—Cramp in the Calves of the Legs, 298.—Neuralgia in the Face, 300.—Sciatica, 301.—Neuralgia of the Coccygeal Nerve, 302.—Nervous Headache, 303.—Inflammation of the Spinal Cord, 305.—Myelitis or Sclerosis, 306.—Spinal Paralysis of Children, 309.—Congestion and Anæmia of the Brain, 311.—Apoplexy, 313.—Migraine, 315.—Convulsions in Childhood, 317.—Epilepsy, 318.—Neurasthenia, 323.—Hysteria, 326.—Chorea. Saint Vitus' Dance, 329.—Basedow's or Grave's Disease, 331.

XII.—Diseases of the Eyes and Ears. . . . 334—357

Structure and Functions of the Organs of Sight, 334.—Short Sight and Long Sight, 339.—Squinting, 342.—Acute Catarrh of the Conjunctiva, 342.—Chronic Catarrh of the Conjunctiva, 343.—Egyptian Ophthalmia, 344.—Stye, 345.—Inflammation of the Cornea, 345.—Inflammation of the Iris, 346.—Glaucoma, 346.—Cataract, 347.—Structure and Functions of the Organs of Hearing, 348.—Hardening of the Ear-wax, 352.—Foreign Bodies in the Ear, 353.—Furuncles in the Auditory Canal, 353.—Inflammation of the Middle Ear, 354.—Inflammation and Injury of the Membrane of the Tympanum, 356.—Laceration of the Membrane of the Tympanum, 356.

XIII.—Constitutional Disorders. . . . . 358—380

Anæmia and Chlorosis, 358.—Leucæmia and Pernicious Anæmia, 361.—Diabetes Mellitus, 363.—Simple Diabetes, 367.—Rickets, 368.—Gout, 373.—Corpulence, 377.

XIV.—The External Skin, its Preservation and its Disorders 381—414

Structure and Functions of the Skin, 381.—Care of the Skin, 388.—Excessive Perspiration, 391.—Comedones, 391.—Corns, 392.—Warts, 393.—Freckles, Mother-spots, Liver-spots, 393.—Burns, Scalds, and Frost-bites, 394.—Acne, 398.—Eczema, 400.—Boils and Carbuncles, 403.—Inflammation of the Cellular Tissue and Abscess, 404.—Injuries of the Skin, 405.—Nettle Rash, 405.—Prurigo, 406.—Excessive Itching of the Skin, 408.—Fever Spots, 408.—Psoriasis,

Chap. Page.

409.—The Itch, 410.—Lice and Phthiriasis, 411.—Honey-comb or Favus, 412.—Ring-worm, 413.—Sycosis, 413.—Head-scurf, 413.—Falling off of the Hair, 414.

XV.—The Muscles and Bones. . . . . 415—466

The Muscles, 415.—Rheumatism of the Muscles, 418.—Abdominal Hernia, 420.—Wry Neck, 422.—Wounds and Cure of Wounds, 423.—The Skeleton, 429.—Bones of the Head, 431.—Bones of the Trunk, 431.—Bones of the Limbs, 433.—Diseases of the Bones and Joints, 439.—Inflammation of the Periosteum, 439.—Acute Purulent Inflammation of the Medulla of the Bones, 440.—Caries of the Bones, 441.—Softening of the Bones, 442.—Thecal Abscess, or Witlow, 443.—Curvature of the Spine, 444.—Fractures and Dislocations, 451.—Inflammations of the Joints, 461.—Rheumatism of the Joints in Adults, 462.—Chronic Rheumatism, 462.—Knock-knees, 464.—Flat Foot, 465.—Tuberculous Inflammation of the Joints, 465.

XVI.—First Help in Accidents. . . . . 467—477

Artificial Respiration, 468.—Drowning, 470.—Sunstroke, 471.—Suffocation, 471.—Hanging, 472.—Poisoning, 472.

XVII.—New Growths and Tumours. . . . . 478—487

General Remarks upon the Causes and Nature of New Growths, 478.—Sarcoma, 479.—Carcinoma, 480.

XVIII.—Female Disorders. . . . . . 482—515

General Remarks, 482.—The Female Organs, 483.—Catarrh of the Vagina, 485.—Catarrh of the Womb, 486.—Acute Inflammation of the Womb, 487.—Chronic Inflammation of the Womb, 488.—Prolapsis of Vagina, 488.—Prolapsis of Womb, 489.—Flexion of the Womb, 490.—The Menses, 491.—Pregnancy, its Course, and Disturbances, 494.—Calendar, 498.—Miscarriage, 511.—Parturition, 512.—Child-bed, 513.

Chap. Page.

XIX.—The Various Methods of Treatment and General Notes. . . . . . 516—626

Medicines with Especial Reference to Home Remedies, 517.—Aperients, 520.—Antiseptic Remedies, 522.—Remedies for Flatulence, 524.—Blood-making Remedies, 525.—Styptic Remedies, 527.—Emetics, 528.—Febrifuges, 529.—Diuretic Remedies, 530.—Cough Remedies, 531.—Stomachic Remedies, 533.—Nerve Remedies, 535.—Sudorific Remedies, 540.—Binding Medicines, 541.—Approved Ointments, 543.—Plasters, 544.—Embrocations, 545.—Mouth-waters and Gargles, 546.—Cosmetics, 547.—The Use of Water in the Art of Healing, 548.—General Remarks on Water Treatment and its Effects, 550.—Baths. Full Bath. Child's Bath. Half-bath. Partial Bath. Sitz-bath, 551.—Rubbing Down and Washing, 557.—Shower Baths and Douches, 558.—Compresses and Packs, 561.—The Use of Vapour Baths, 565.—Gymnastics and Massage, 569.—General Remarks on the History of Massage and Hygienic Gymnastics, 569.—Swedish Hygienic Gymnastics, 571.—Ordinary Hygienic Gymnastics, 573.—The Aim of Hygienic Gymnastics, 575.—Massage, 577.—Various Processes of Massage, 578.—The Effects of Massage, 580.—The Use of "Suggestion" and Hypnotism, 581.—Electricity and its Use in Therapeutics, 588.—Electric Baths, 599.—Light-cures, and the Röntgen Rays, 602.—Sun Baths, 603.—Electric Light Baths, 604.—The Use of Röntgen Rays in Therapeutics, 611.—General Notes, 619.

Index - - - - - - - - 627—639

INDEX OF COLOURED PLATES.

		Page.
1.	Measles. Scarlatina. Chicken-pox. Roseola.	80
2.	Child treated by Tracheotomy. Butterfly-Erysipelas.	96
3.	Table shewing the Nutritive Qualities of the Commonest Articles of Diet.	144
4.	Edible Fungi.	208
5.	Poisonous Fungi.	224
6.	Bacilli of Typhoid, Anthrax, Tuberculosis, Cholera, and Germs of Intermittent Fever in Human Blood	272
7.	Poisonous Plants. Deadly Night-shade. Foxglove. Common Thorn-apple.	304
8.	Disorders of the Eye.	320
9.	Poisonous Plants. Hemlock. Henbane. Meadow Saffron —Autumn Crocus. Monkshood.	336
10.	Poisonous Plants. Laburnum. Mezereon. Black Night-shade. Herb Paris.	368
11.	Fractures.	464
12.	Dislocations.	480
13.	Medicinal Plants. Juniper. Club-moss. Lavender. Castor-oil Plant.	496
14.	Medicinal Plants. Chamomile. Valerian. Sage. Marsh Mallow.	512
15.	Medicinal Plants. Wormwood. Arnica. Gentian. Peppermint.	528
16.	Massage of the Breast, Neck, Face, etc.	576

INDEX OF FULL PAGE HALF-TONE ILLUSTRATIONS.

I.—Parasites in Man, Tape Worms and Trichina - - 182

II.—View of the Organs in the Chest of a Child - - 186

III.—Anterior View of the Heart and the Great Vessels- - 240

	Page.
IV.—The Jugular Vein and its Ramifications on the Head -	250
V.—Varicose Veins in the Leg with and without Bandages -	258
VI.—Ramifications of the Nerves on the Neck and Face -	282
VII.—Congenital Absence of Colouring Matter (pigment) on the Hairy Scalp and on the Nape of the Neck. Marked Loss of Hair after Typhoid - - -	412
VIII.—The Outermost Stratum of the Muscles; Anterior View	416
IX.—The Outermost Stratum of the Muscles; Posterior View	419
X.—The Bony Skull; Interior View of the Upper Portion of the Skull - - - - - - - - -	432
XI.—The Bones of the Trunk, &c. - - - - -	440
XII.—Badly Set Fracture of the Lower Arm, with an Angular Deformity of the Elbow, as shown by Röntgen Rays -	554
XIII.—Automatic Cooling Apparatus for the Heart and Brain -	550
XIV.—Examples of Approved Modes of Bandaging the Head-	592
XV.—Massage of Lower Arm, Elbow, and Upper Arm - -	600
XVI.—Use of Zander's Apparatus - - - - -	624

CHAPTER I.

The New-born Infant and Congenital Imperfections.

A VIGOROUS crying informs us that the painful hour of labour is ended, and that the long expected little citizen of the world has made his appearance.

Whether the child be boy or girl, the parents have every reason to be thankful if the new comer lies before them whole and healthy. If they are sensible their most earnest hope will be that the child may grow up sound in body and mind. If they secretly breathe in their hearts a wish for the future of the little creature, they will do well to wish it neither wealth and possessions, nor fame and honour, but good health and—again good health. Health is, and will ever remain, man's really highest good. But the following pages will show how many perils threaten the infant from the very day of its birth; and how many dangerous diseases may rob the parents of their precious possession.

It is certain that no child ever grows up without passing through some sickness. And the high average mortality of children during their first year proves how dangerous sickness is to the little life whose powers of resistance are still feeble. Now, in the battle of life, a prudent man labours to protect himself against every foe; and knows, too, that he may most reasonably hope to come off victorious, if he first learns thoroughly to understand against whom and what he is fighting, and arms himself accordingly. Our aim is this, to supply weapons against all the diseases which can attack the family and the home; and not only to explain to anxious parents how they should treat their children, and have them treated both in sickness and in health, but also to point out to them how they may in many cases make and keep both themselves and their children whole and sound by paying attention to advice that is often very simple.

We will now, however, turn to the little creature who is reminding us of his existence by vigorous cries. We shall see how the midwife proceeds to attend to him after that she has first taken care that the mother is warmly covered.

To commence she carefully places the new-born child in its first bath. In doing this she is attentive not to press the child's body, a thing always to be avoided with new-born children. The temperature of the bath must be carefully ascertained with a bath thermometer—an instrument which no house should be without. The temperature of the water should be from 94° to 95° Fahrenheit (34°—35° centigrade). For the delicate new-born infant higher temperatures are distinctly dangerous, and may produce blisters. Water below 94° Fahrenheit may, on the other hand, easily cause a chill. The first bath should not take longer than some three minutes. It is intended principally as a cleansing bath, and more particularly aims at the removal of the caseous matter which many new-born children have about them. After this the attentive midwife once more assures herself that the umbilical cord has been properly fastened off, and that no blood is escaping. Having swathed the body of the child with a band, which is best made of wool, so as to protect the remains of the umbilical cord, she clothes it in a little vest and gown, which have been slightly warmed, and places it in its cradle or basinette. The baby is there at liberty to cry at its ease. The midwife knows that it has been properly cared for. She can, without anxiety, again devote her attention to the mother, whose low moans announce the approach of the moment of the afterbirth, and the conclusion of the labour. As soon as a powerful contraction of the womb has expelled the afterbirth the midwife satisfies herself that this has completely come away, that nothing has remained behind, and that the labour is perfectly completed. The fatigued patient may now be warmly wrapped up, and recruit her exhausted strength by a sound sleep, of which she always has great need. How the mother has further to be treated during her lying-in will be explained in a subsequent chapter devoted to that subject. Only this much may be here added to ease the mind of a young mother: first, that the child, howsoever much it may cry, has no need at all of food before the mother goes to sleep; and, secondly, that this first crying, so far from being injurious to the child, is perfectly natural, and beneficial to the lungs of the infant, which commence their functions at the moment of birth.

Unfortunately, as the title of this chapter indicates, all new-born children are not perfectly and normally developed. It is by no means uncommon for the bodies of new-born children to present (from causes to a great extent obscure to us) divergencies from the normal form.

If the divergency from the normal form is very marked, the ugly word "monstrosity," which has become current, may seem to be justified. But we prefer to speak of "imperfect developments." And

this is what all abnormal forms actually are. We shall not, however, here enquire to what extent they are the results of inverted position in the womb, or whether the so-called "longings" of the mother during her pregnancy, or other causes may have co-operated to produce these "imperfect developments." Such questions will be discussed in a subsequent chapter, dealing specially with the treatment of the woman during pregnancy. Here we shall proceed directly to the commonest congenital imperfections, beginning with harelip.

Harelip.

Harelip (so called on account of its resemblance to the notched upper lip of the hare) is by no means an uncommon congenital imperfection. It always affects the upper lip, and is, in isolated cases, accompanied by a simultaneous horizontal or vertical cleavage of the cheek. We shall here deal only with the simple harelip, and call attention to the three usual forms as represented from nature below.

Harelips of the first, second, and third degree.

If the under lip presents a divergency from the normal form, which is extremely uncommon, this has no connection with true harelip. It is rather a case of fistula of the mucous membrane. The cleft of the harelip is never exactly in the middle of the upper lip, but either a little on the right or the left, and more often on the left. If the upper lip is cleft on both sides this is called double harelip.

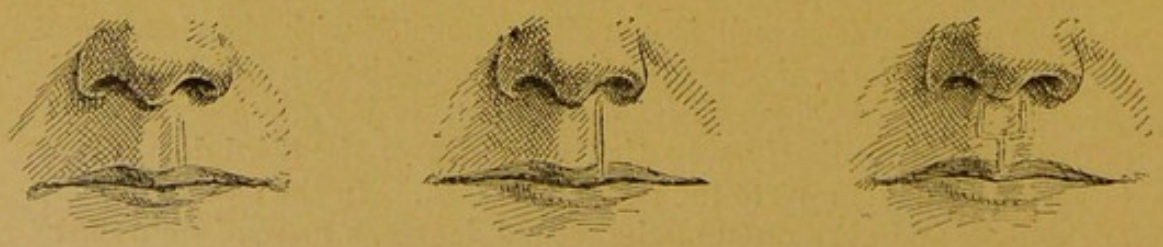
We distinguish harelips of the first, second, and third degree according to the extent of the cleft in the upper lip. In the first degree the lip appears to be only slightly notched. In harelip of the second degree the upper lip may be cleft to the base of the nostril. If the aperture of the nostril is actually connected with the cleavage of the lip this malformation is called a harelip of the third degree. It is always accompanied by a cleavage of the upper jaw.

It will be immediately seen that a harelip of the third degree may be seriously dangerous to the new-born child. In the case of harelip of the first, and even often of the second degree, a mere disfigurement is the only risk. And this, as we shall presently see, can be without

difficulty remedied by a very simple operation. But the sucking child that has a harelip of the third degree is from the very day of his birth placed at a great disadvantage, on account of the difficulty he has in obtaining nourishment. Generally such children are difficult to bring to the breast. They wheeze, and make an effort by fits and starts to lay hold of the nipple, but soon relinquish it and begin crying. Their lips are unable to embrace the nipple sufficiently tightly to draw the milk; and it soon becomes painfully evident that there is no hope of feeding them at the mother's breast. This, however, is not the only disadvantage of a harelip of the third degree. Experience has proved that such children must be carefully protected from draughts, and from the chills which they are liable to occasion. They are extremely liable to inflammation of the lungs. This can be easily understood when it is observed that cold air has a dangerously direct access to their lungs. It is not, as in the case of normal infants, first warmed by a passage through the nostrils.

There is, however, no reason why the mother should lose heart, or imagine that because the child has been born with a harelip of the third degree it must perish either by hunger or from inflammation of the lungs. Bringing up by hand (necessary in the case of so many children on account of the mother's wanting milk) can be successfully applied in these cases, but must, of course, be very carefully conducted. And when it has been realised that sudden changes of temperature, baths either too warm or too cold, and impure air and draughts, can easily produce injurious effects, it is necessary only to be more than ordinarily careful to guard against them.

To neglect to treat a harelip of the first degree, which may be regarded merely as a disfigurement, is not justifiable; but it must be understood that for harelips of the second and three degrees, especially for the latter, an operation is indispensable. At present any surgeon is competent to remedy this congenital defect permanently, either by freshening the edges of the wound and subsequent sewing up, or by what is called a plastic operation. It is better that the operation should not take place before the fifth month.



Harelips of different degrees after the operation.

The parents of children suffering from this imperfection should remember that they are responsible for the welfare and healthy development of their children, and should on no account allow themselves to be misled by neighbours and friends, who are very possibly opposed to any, even the simplest surgical operations, and falsely assert that "by and bye that will all come right of itself," which is often stated.

But the harelip will not grow into proper shape of itself. On the contrary, as the child grows older the evil consequences of having neglected a necessary operation become more and more plain. Healthy, normal children after the expiration of the first year begin to talk. Children with deeply-notched harelips during their earlier years exert themselves in vain to produce anything more than snuffling unintelligible sounds. Unless they are operated upon they never speak plainly, and consequently remain the intellectual inferiors of other children. They often have to endure in addition the entirely unmerited misfortune of being made objects of mockery on account of their snuffling speech.

In rare cases the cleavage of the upper jaw, which has been above mentioned as accompanying harelip of the third degree, is so marked that it appears as an actual wide cleavage both in the hard and soft palate. This is called "wolf's jaw" or fissured palate.

Wolf's Jaw.

The majority of children born with this imperfection die young. To nourish them is difficult; and they are particularly exposed to inflammation of the lungs induced by inhaling cold air. But if careful attention succeeds in bringing them safely through their first year they are not afterwards more exposed to disease than children of the same age. The wanting portions of the palate can then be subsequently supplied either by a plastic operation, or by a rubber plate, respecting which no further details need be added here.

Hydrocephalus.

Although the disease known as hydrocephalus may not be congenital, seeing that it often first attracts the notice of the mother some weeks after birth, in consequence of the unnatural enlargement of the child's head; yet the opinion is at present becoming more and more general that, even in cases which subsequently become apparent, the predisposition to this disease is formed in the foetus whilst still in the womb. Hydrocephalus is undoubtedly a frequent cause of difficulty

of parturition, only to be overcome by medical assistance. Whilst in these cases such children are generally born dead (to save the life of the mother), some children suffering from hydrocephalus are born alive, in cases when the pelvis of the mother is wide, and the child born is not excessively large.

Before proceeding farther we shall explain the term hydrocephalus (water on the head) in order to show what is to be understood by it. By hydrocephalus is meant a permanent enlargement of the head, appearing either at the time of birth or at a very early age, and occasioned by a gathering of water in the head, that produces a sundering of the bones of the skull.

If this unnatural water-gathering is situated in the interior of the brain chamber, this is called an "internal hydrocephalus." If, on the other hand, the situation of the water is more superficial, that is to say between the integuments of the brain and the bony cranium, this is called an "exterior hydrocephalus."

Internal hydrocephalus sooner or later terminates in death; and must produce imbecility on account of the severe pressure of the water upon the substance of the brain; so that death may be well regarded as a release both for the little patient and for his parents. In the case of exterior hydrocephalus the termination is often a more favourable one. But even here the most attentive care, and the most conscientious compliance with all directions are necessary if a good result is to ensue.

We have just asserted that internal hydrocephalus sooner or later results in death. But we shall, nevertheless, go a little more minutely into the exterior appearances and symptoms of this disease, in order to guard against its being confused with other less serious maladies, amongst which rickets must have the foremost place. It is not an uncommon thing to believe that a given case is certainly one of hydrocephalus, and afterwards to discover that the case is one of severe congenital rickets of the skull, which, in consequence of its widely separated fontanels and sutures, made it possible to mistake one disease for the other.

Measurement with a tape is the best method of arriving at a conclusion when a suspicion of hydrocephalus arises. If the circumference of the head increases continuously and so rapidly that it reaches in a few months to 19½, 21, or even 23 inches; if a simultaneous continuous wasting of the body is observable; if the child has a staring gaze, generally in a sidelong direction, the eyes seeming to protrude slightly; if it be perceived that the child's intelligence leaves a good deal to be desired, that he is always staring aimlessly, and seems neither to see nor hear what is going on around him, the assumption

is fully justified that this is a child suffering from internal hydrocephalus, which will sooner or later perish from general exhaustion, often accompanied by convulsions. A good thing for the poor little sufferer, and for his parents when his heart has ceased to beat. Permanent idiotcy would have been the unfortunate child's lot.

External hydrocephalus, in which, as we have already said, the water-gathering is of a more superficial kind, though dangerous enough is not so absolutely hopeless. In this case it is of primary importance that the motions of the little patient should be regular and easy. No straining should occur, as straining in every case produces increased and dangerous pressure on the head. An abundant generous diet should be provided; and, above all else, the directions followed which are given below under the title of rickets, the commonest concomitant of hydrocephalus. Many medical men have believed that they obtained good results from temporary bleeding in the region of the neck. A favourite treatment is the envelopment of the head, with the exception of the face, in warm moist packs, to favour an absorption of the watery matter. If properly applied they can at least do the child no harm. Gently rubbing the neck with common mercurial ointment (each evening a portion as large as a pea) may be also recommended.

I may here take the opportunity of mentioning another congenital enlargement of the head, which, if it is strongly developed, may also be mistaken for hydrocephalus. This is congenital bloody tumour of the head, or cephalhaematoma.

Congenital Cephalhaematoma.

This tumour, which is almost always situated on the right front of the skull, owes its origin to the severe pressure which this part of the head, especially in cases of protracted parturition, suffers from the bony pelvis of the mother. The curious particular is, that the tumour often first makes its appearance several days after birth. The only explanation of this is that the blood continues for days to ooze from the blood-vessels injured by the severe pressure, until it frequently presents the appearance of a distended bag. For the consolation of the parents it may be added at once that this kind of tumour almost always subsides in consequence of the gradual absorption of the blood. The tumour can exercise no pressure on the brain of the child, such as we have met with in the case of hydrocephalus, and no particular treatment is necessary to remove the tumour.

A direct warning against the use of the knife (the former practice) is here necessary, because in the first place the child looses no inconsiderable quantity of blood, and, in addition, the best operator cannot be certain that purulation will not ensue. Of course, the child's head should be protected from pressure. This can be best effected by swathing with cotton wool. Gentle stroking of the tumour from the centre towards the edges may accelerate the diminution of the tumour. Care should be taken that the child has daily baths, that its motions are regular, and that its diet is of the best.

Hermaphrodism.

Most stories of beings of double sex, so called hermaphrodites, belong to the domain of fable. They owe their origin either to intentional fraud, or to unintentional self-deception. But it would be wrong to omit to mention that in the case of newly-born children, we are occasionally unable to say with certainity, whether a boy or a girl is lying before us. We here have before us a case of arrested development of the child in the womb. Rigorous examination by a specialist almost invariably clears up the question of the sex of the so called hermaphrodite. To treat of all the shapes which the malformation of the external sexual organs present would far exceed the limits of this book. But the parents may be assured of this much, that for the moment nothing can be done, and that generally time will allow the tokens of masculine or feminine sex to appear clearly. It is, at any rate, completely wrong to assume that such children must be subsequently unfortunate, that they ought not to marry, or to pay attention to any other fables of this sort. But often it is not until a mother has become a grandmother that she is finally convinced of the groundlessness of anxieties which has haunted her for years.

Displacement of the Testicles.

The subject of the last paragraph has, in reality, a purely scientific interest, important only to students of evolution. Of greater general importance, is the fact that a newly born boy not rarely presents an "apparent" want of testicles. This alone, has caused many a mother anxious hours, without her having any suspicion of why her darling cried so incessantly and exhibited all the symptoms of being in great physical pain.

Here it is necessary to explain that the testicles, even normally, are not from the beginning situated below the male organ in the scrotum.

During the development of the child in the mother's womb, they are placed immediately below the kidneys. They are drawn down thence through the inguinal canal by the gubernaculum testis, which gradually contracts, until they reach their place in the scrotum. We now see why an "apparent" want of testicles was above mentioned. They are merely out of reach of the eye and the hand, and, in consequence of an imperfect descent are still in the inguinal canal.

No mother, whose baby boy has frequent sudden violent paroxyoms of screaming, should neglect to assure herself that the testicles are in their right position.

If they are not she may be certain that the testicles are still in the inguinal canal, and are causing the child pain in consequence of pressure. She should try to sooth the child by gently stroking his groin downwards. This can be best done with a little warm oil.

The disturbances occasioned by the testicles remaining in the inguinal canal are seldom so important as to amount to actual constrictions, which would make the immediate assistance of a specialist necessary. A complete descent of the testicles generally takes place after the lapse of a year, and all the previous troubles immediately cease. Besides this, irregularity of development seldom occurs on both sides. It generally exists on one side only, and is much commoner than many medical men appear to suppose.

I am unable to agree in general with the advice which many practitioners give, that a truss should be early used. The truss is very likely to press upon the testicle remaining in the inguinal canal, and may thus directly hinder its descent. Only when an inguinal hernia also exists should the early use of a well-fitting truss be recommended.

Congenital Hydrocele.

An attentive mother will often remark that the scrotum of her baby boy sometimes appears relaxed, and again at other times distended and shiny. Though during the earlier days she may believe that she is deceiving herself; she will soon see day by day more plainly that something is out of order, and that the scrotum becomes constantly harder and fuller. This is a case of congenital hydrocele. Is this dangerous? No, it is not. It is a fairly common indisposition of recently born boys. The best way of treating it is to take care that the scrotum may be kept high, and to envelope it in warm cotton wool. It will be found that after a couple of weeks the watery swelling diminishes. It is only in exceptional cases (when the gathering of

water is excessive, and, in consequence of pressure, causes the child great inconvenience) that medical aid must be summoned to draw off the water, which can be done without the least danger.

Congenital Hernia or Rupture.

In any case of a swelling around the testicle that comes and goes, or even if permanent, a doctor's advice should be obtained, as it may be a case of hernia of the bowel which demands medical assistance.

Congenital Dislocation of the Hip-joint.

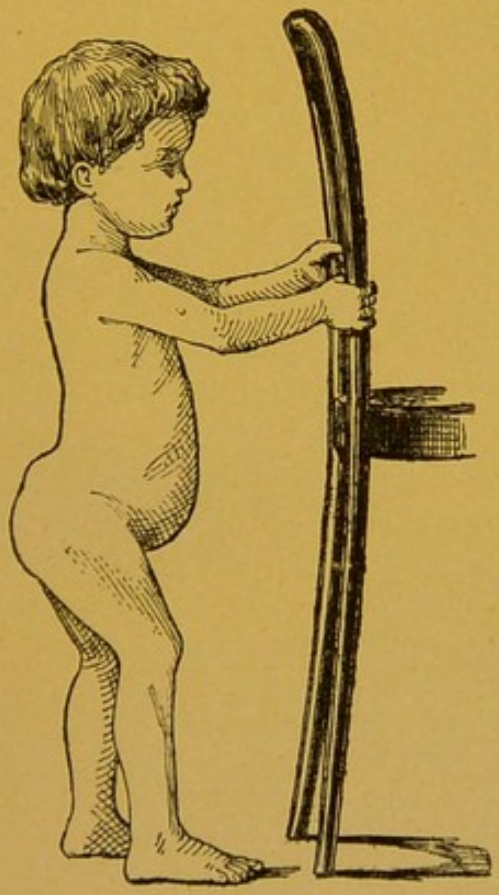
Congenital dislocation of the hip-joint is a pathological phenomenon much discussed by the most celebrated surgeons and orthopedists, and one still under investigation, more particularly since the discovery of the Röntgen Rays has given it a new interest. It may appear illogical to speak of a *dis*-location (in this case the removal of the head of a bone from its socket) when we have to deal with a congenital imperfection, and when no normal action of the hip-joint has ever existed. It would be more correct to speak of a congenital non-existence of the working of the hip in its socket. But the expression of congenital dislocation of the hip-joint is a familiar one, and we shall retain it.

To give an explanation of what this malformation (whether existing on one or the other side, or on both) is, we may say briefly that the round head of the thigh-bone is not in its proper socket but outside of it, so that there is no hip-*joint*. Generally the empty socket is quite flat and imperceptible, and the head of the upper thigh is but slightly developed.

Several theories exist concerning the cause of this unhappily common congenital defect. It is sometimes regarded as a result of hereditary phthisis, sometimes of marriage between near relatives, sometimes to the faulty position of the child in the womb. Sometimes the blame is laid upon the midwife or the medical man, it being supposed that the imperfection is artifically produced in drawing out the child in cases of inverted position. It must, however, be confessed, that hitherto we have arrived at nothing more than conjectures concerning the cause of this complaint. Probably we have here as real a case of imperfect development as in wolf's jaw and harelip.

In any case we shall be fully justified in treating of the whole complaint here. We are certainly dealing with a congenital defect, although its consequences may become apparent at some time after

birth when the first attempts to walk are made. The complaint is practically entirely concealed, even from the most attentive mother, so long as her baby lies in the cradle. It may appear to the mother that the baby moves its legs forwards unwillingly and with difficulty, and that it does not play so much with its feet as other infants, who may be frequently seen to draw their feet to their mouths; but it is only when the first attempts to stand (that is to say when the child is from ten to twelve months' old) are accompanied by screams, and the child refuses to repeat them, that the parents become convinced that some pain must be causing this reluctance to stand and walk. The case is most serious when the dislocation exists on both sides. At an age when other children can cross the room with the support of the mother's hand, the little patient (girls are by far more subject to this malady than boys) with difficulty, attains a standing posture with the assistance of a chair. She would, perhaps, willingly go to the next chair, on which a red-cheeked apple has been temptingly placed; but after some hesitating movements, she allows herself to drop on the floor, crawls on all fours to the other chair, and then raises herself again, laughing at having got over her difficulty and having gained her apple.



Child with Congenital Dislocation of the Hip-joint.

Let us again look at the little patient after she has reached her second year. On entering the room she can now cross the floor to take the hand offered her. But her uncertain walk immediately attracts attention; at each step she swings herself from one side to the other, and at the same time advances alternately the right and left hip by a quarter turn of her body. The walk of such children has been compared to the waddling of a duck, and not altogether without reason.

In the course of the disorder, which is always chronic, certain recurring symptoms also invariably present themselves. These serve to complete the symptoms of the disease. We shall observe an imperfect growth in height. Children suffering from this

disorder are always poorly developed; they sever themselves from other children, and amuse themselves alone. We may further indicate another peculiarity, one that is evidently a result of the complaint. We shall find that the little patients in walking protrude their stomachs, and try to hold their shoulders back. This will be seen to be quite natural when we reflect that the children are thus labouring to bring the centre of gravity of their bodies between their legs in such a manner that the upper part of the thigh may support the body, although the hip is not fixed in the hip socket.

What means are at our disposal to obviate this evil, after its existence has become certain, and has been probably also confirmed by an examination with Röntgen Rays. Can any medicinal remedy avail? No. Nothing but intelligent orthopedic treatment which must extend over a long period, and will make great demands on the patience of the parents, can here effect if not complete cure, at least some amelioration. It is most important that, after the disease has been discovered, the child should never be compelled to walk more than he chooses. Any kind of excessive fatigue should be avoided. The diet should be generous; fresh air, and frequent salt-water baths (see the paragraphs about *Baths*) are important. The little patient should never walk quickly, but always take his time, so that his walk may gradually become sure and regular. Particular attention should be paid to the spine. The spines of children suffering from congenital dislocation of the hip are prone to curvature, resulting either like the dislocation from congenital causes, or from subsequent inflammation. The little patient is also very liable to be attacked with rickets, the commonest of all infantine disorders, since, as has been already said, children suffering from congenital dislocation of the hip are generally of weakly constitution, and feebly developed. The paragraphs below on curvature of the spine and rickets should be carefully read, and the advice there given followed.

It is right to add in conclusion that in recent years the first orthopedic authorities, particularly Hoffa in Würtzburg, and Lorenz in Vienna have attempted (partly surgically by operations, and partly without the use of surgery, by the continuous use of plaster dressings of the bones, reduced under anæsthetics) to produce an artificial socket. These experiments have, however, hitherto proved mere experiments. So long as no better results are obtained, parents may reasonably hesitate long before resolving upon what they will attempt. It may be menitoned that both the operations and the necessary subsequent treatment, as well as the long continued bandaging necessitate a protracted treatment in the sick bed, such as is often impossible in small houses.

CHAPTER II.

Diseases of the New-born Infant.

We now proceed to speak of the diseases of the recently born child. It will be understood that these are those to which the child is liable in its earliest days; but they are not congenital disorders, they are diseases contracted after birth. The commonest of these is infantile jaundice.

Infantile Jaundice.

Almost eighty per cent. of all children born exhibit from three to four days after birth, whilst their health remains apparently undisturbed, a more or less plainly developed yellowish hue of the whole skin, the hands and feet alone appearing to be less affected. Ordinarily, this jaundice of the recently born infant presents no occasion for anxiety. If the nourishment and digestion continue undisturbed, the normal colour reappears after about ten days. This jaundice of recently born children has nothing in common with the jaundice of grown up people, nor with diseases of the liver, but is connected with the ligation of the navel, and the consequent change in the circulation, which causes the colouring matter of the bile to pass into the blood, with which it is carried into the smallest vessels of the skin.

This jaundice is seldom aggravated by supervening disease. Only in the case of very delicate children (for example those prematurely born, who have less natural warmth) redoubled attention should be paid to guarding particularly against chills. Whenever it is possible such children should be fed on the mother's milk.

Umbilical Diseases of the Recently Born

It has been already mentioned in the opening lines of our book that, as soon as the child is born, the midwife binds up the umbilical cord with a prescribed thread, or with an indiarubber band, and thus intercepts the connection between the child and the mother. It is at this moment that the new inhabitant of the world commences to

exist independently. Hitherto the mother has performed for him all the natural operations of nutrition and breathing. Now he begins his own battle in the world. His little lungs fill with air, and a shrill crying informs us that he has begun to work for himself.

Some two or three inches of the umbilical cord remain. They are wrapped in dry cotton wool, turned upwards and enclosed within a swathing band. After five or six days it is found that this remainder of the umbilical cord (which has meanwhile become withered and dry) tends more and more to detach itself, and that only a small wound remains on the infant's navel, which after a few days begins to heal.

The course of events is not, however, always thus favourable. Different disturbances can occur, and these demand our attention. In particular, it occasionally happens that a midwife has to deal with a navel-wound (which is healing quite normally), but bestows upon this very important process too little attention, and afterwards is surprised to find the child committed to her charge suddenly showing symptoms of fever and of general disturbance of health. Almost always want of cleanliness is the cause, when healthy navel-wounds exhibit symptoms of inflammation. In these cases we find the infant, which at first was developing a most regular appetite suddenly refusing the milk. It begins to sleep badly, and gives, by the character of its crying, evidence of physical pain. The whole body, and particularly the abdomen feels hot, and a careful measurement of the temperature in the anus shows 102° Fahrenheit (39° Centigrade) or even more. If we examine the navel itself, a redness all around it strikes us. In addition to this redness we may generally observe a swelling, and in the navel-wound itself, a dull, greasy layer or a watery, flocky discharge.

If the inflammation remains local, that is to say is limited to the neighbourhood of the navel, compliance with the directions given below will in a few days effect a substantial amelioration. But if the inflammation (which has very probably existed for several days before it was discovered) extends further, affects the surface of the belly, and penetrates inwards; the form of the disease has become distinctly serious. It must never be forgotten that the infant is an infinitely delicate creature, whose life can be seriously endangered by the least disturbance, and in this case by an acute fever, and by diminution of its ability to take nutrition. But, to proceed to remedies, and the sooner the better. The first thing necessary is a very gentle, but thorough cleansing of the navel-wound. For this purpose should be used a luke-warm pale-rose-coloured solution of

permanganate of potash, wetting the navel-wound with it for one or two minutes. This can be best done in the bath, one hand being meanwhile placed under the back of the child to support it. The navel itself, and the regions around it should, after the bath, be once or twice wetted with the lotion, and compresses, only slightly wrung out, be placed in layers upon it. Two or three such should be put one over the other, and the child should then be lightly wrapped up and placed in the cradle. The compresses on the navel dry very rapidly. During the day they should be renewed every half-hour, and during the night every hour.

A daily bath is necessary; a mere washing of the child is not sufficient. In this malady the complete bath is particularly strengthening, and has a beneficial effect upon the organism. I generally have made a decoction of a handful of thyme or camomile in a quart of water, and pour the decoction into the bath water through a clean cloth. Regular and nourishing diet (the mother's milk is best) is of course necessary. If on the second or at least third day of this treatment a general improvement is perceptible, if the sleep is less disturbed, and the appetite better, a cure may be reasonably anticipated, if the same measures are continued until the navel is completely healed.

Inflammations of the navel assume a very much graver aspect, if they become widely diffused. In these cases there is danger of a purulent peritonitis, which means very great danger on account of the age of the patient. An attempt should be made to draw out the pus which has been already formed. This can be best done by luke-warm compresses. A piece of guttapercha tissue should be laid over them, as high fever generally accompanies this form of inflammation, producing constipation of the bowels. It seems certainly expedient to give the patient twice a day a half tea-spoonfull of pure castor oil, or twice a day, and best early in the morning and again in the evening, a luke-warm injection.

A further, not uncommon, but perfectly innocuous irregularity in the healing of the navel-wound is the so called fleshy navel. This generally arises when the midwife does not wait until the navel falls off of itself. Thus, for instance, the midwife, who generally attends poor people only until "the navel is all right," pulls off with a sharp tug the remains of the umbilical cord which is retained only by a few tissues, and thus favours the development of a fleshy navel. This fleshy navel is in shape like a small fungus with a stem. It is best not to interfere with it too soon but to wait until the stem has attained a certain length. After having washed the hands thoroughly,

a clean, white thread, that has been boiled, is carefully fastened around the stem of the navel and drawn into a tight noose which arrests the further nutrition of the fleshy navel and causes it to perish. It must be clearly understood that the thread is not to cut the stem of the navel, but only to constrict it. The whole falls off in a few days; the navel may, for precaution, be covered with a clean cotton wad. Instead of constriction, cauterisation with lun causticar may be resorted to. But constriction is certainly preferable. Cauterisation gives the child unnecessary pain. Constriction is perfectly painless.

Umbilical Hernia (Omphalocele).

In adding here, whilst we are engaged with other diseases of the navel, a few words about umbilical hernia (omphalocele), its origin, and the simplest cure, I am departing somewhat from my principles, as this chapter should treat only of the diseases of the recently born, and, strictly speaking, umbilical hernia is not one of these. However, I depart here a little from my rule for the convenience of my readers, so that all diseases of the infant navel may be grouped together; a plan which may be the most convenient for reference.

The umbilical hernia is the commonest hernia; happily it is also the least dangerous. The danger of constriction in all other abdominal hernia makes the disorder invariably critical, and cure is impossible without surgical operation. But in the case of umbilical hernia of children we are able permanently to check the disorder.

How does umbilical hernia originate? The mother herself not infrequently assists to produce it. Frequent violent pressure on account of constipation, continuous crying in consequence of hunger, or lying in wet clothes (all which things might have been avoided) are the commonest causes of infantine umbilical hernia. There are, no doubt, other causes, for example—general weakness, or previous inflammation of the navel. But it will be more useful to explain how the disease must be treated than to dwell upon them. First of all then, do not employ a so-called umbilical-hernia-truss. It is a strange thing that in the present days all kinds of bandages and mechanical contrivances are employed in the simplest cases, when the real remedy is of some much more unsophisticated kind.

Every infantine umbilical hernia can be permanently cured in a short time by a sticking plaster dressing, and any father or mother is perfectly competent to apply this dressing. A penny—or a counter of the same size will serve equally well—is wrapped up in a little cotton wool,

and then in good fast-holding sticking plaster. The child is undressed, and laid upon its back upon a table, with a long strip of previously prepared sticking plaster (3 inches wide, and about ¾ of a yard long) underneath him, in such a position that when the two free ends of the plaster are brought together over the abdomen, they may conveniently cover the navel, lapping over about 4 inches. The contents of the umbilical hernia are now to be quickly pressed back into the abdominal cavity with the first finger of the left hand. As soon as only the ring of the navel can be felt all round the finger, the penny wrapped up is placed with the right hand exactly over the middle of the navel, and the free ends of the sticking plaster brought together, so that they lie close upon the skin, and overlap each other well. For security a band may be laid over them, whose ends should fasten at the back. But this is not necessary if the sticking plaster has been applied as above directed. It is a good plan to renew the whole after the lapse of ten days. On removing the bandage the hernia will be found to have diminished considerably. After the removal of a second dressing, which may remain for fourteen days, a completely normal navel will be found. It may take considerably longer.

Blister Eruption (Pemphigus).

If a recently born babe, which at its birth presented a perfectly pure skin, some four days after birth exhibits blisters on the neck, abdomen, back, or indeed over the whole body *with the exception of the palms of the hands and the soles of the feet*, we may be perfectly certain that this is a case of infantine pemphigus (pemphigus neonatorum). The circumstance that generally several recently born children in the same neighbourhood, or such as have been nursed by the same midwife are often thus affected at the same time, supports the presumption that we here have to do with an infectious disease of the skin, and with a contagion due to the hands or clothes of the midwife.

The appearance of the afflicted child, covered completely with blisters, is most alarming; but the course of this particular skin disease is correspondingly reassuring if the right and very simple remedies are employed. Every blister that appears should be unhesitatingly pricked on the head with a clean needle, so as to allow the egress of the turbid watery contents. If this is not done the blisters merely grow larger until they burst of themselves. It is best to powder each blister that is opened, either with rice-powder or zinc-powder.

Baths twice daily of the temperature of 95° Fahrenheit (35°

Centigrade) are necessary. It is prudent to place in the bath water a tea-spoonfull of powdered alum (which can be purchased at any chemists), or a little morsel of permanganate of potash. The latter will dye the water a bright red.

I have never been able to see any particular advantage resulting from the often recommended addition of decoctions of oak bark. But they are not to be rejected, as it must be admitted that the tannic acid contained in this substance would be favourable to the affected parts of the skin.

It is most important to be perfectly certain that the palms of the hands and the soles of the feet are unaffected by the blisters. If these also, particularly from the first day, appear covered with blisters, the disease assumes an entirely different aspect; as we have before us, in that case, a symptom of a very grave disorder, demanding the immediate assistance of a medical man.

Inflammation of the Eyes of the Recently Born.

It is the duty of every midwife to call the attention of the mother to the fact as soon as she perceives that a child is afflicted with the alarming disease of inflammation of the eyes, and to advise her to call in competent advice. Seventy per cent. of the blind have been robbed of the light of day in consequence of neglect of inflammation of the eyes in early infancy. How much unspeakable misery prompt and efficient action might here have been averted! Certain cure is almost always possible when the malady is properly dealt with at the right time, that is to say, at its very commencement.

The disease of the inner eyelids (for this is what it at first really is) generally appears on the third day. But may not be until the fourth or fifth day that a redness and swelling of either one or both of the eyes shows that the child is ill. If an affected eye, which is very sensitive to light, be examined, and the eyelids carefully drawn apart, an abundant quantity of thick yellow pus wells up from the parting of the eyelids. The mucous membrane of the affected eyelid is also strongly inflamed, and also swollen. Immediate medical assistance is necessary. The eyes of the little patient can still be opened to free them from the pus. But after a few days they often become so hard and stiff and swollen that only the practised hand of a specialist is able to part them.

Experience proves that either the leucorrhœa of the mother or other impure discharges of hers are the occasion of this disease at the moment when the head of the child during labour passes through the

vagina of the mother. For this reason the midwife should wash the eyes of all children whose mothers suffer from leucorrhœa, cleansing them with water that has been boiled, and using a piece of clean linen. This simple precaution will almost always prevent the appearance of this dangerous complaint. If the malady has, however, established itself, if one eye alone is affected, the healthy eye should be protected by a light protecting bandage secured with sticking plaster. After this attention should be given to the diseased eye. The best plan is to give the diseased eye a twofold washing with a weak solution of lunar caustic. The lunar caustic should not be more than two per cent. For this purpose either a clean piece of linen or a camel's hair-brush should be used. Afterwards the eye should be bathed with some lukewarm water. The camel's hair-brush should after use always be placed in water. Whilst the child sleeps a rag which has been damped with a weak solution of acetate of alumina, prepared according to prescription, should be placed over the diseased eye. As soon as the child awakes the pus must be allowed an exit and wiped off, the eyelids having been carefully parted. If this treatment is conscientiously pursued day and night for several days hopes of a good result may be entertained. Any carelessness in carrying out the directions may on the contrary not only delay the cure, but, in consequence of the inflammation spreading to the interior of the eye, result in total blindness.

Before quitting the subject of the diseases of the recently-born babe, we will here further mention two other diseases, which may indeed appear at a later age of the suckling, or of the weaned child, but which generally occur at a very early age. These are lockjaw of the recently born, and the periodical recurrence of swelling of the mammary gland during the first days after birth.

Lockjaw (Tetanus) of the Recently Born.

Lockjaw of the recently-born child appears to be, at least as regards its origin, completely analogous to traumatic tetanus of the adult. It can be almost always referred to infection of the navel wound, unless indeed the child's body has suffered some other damage during a difficult labour. This lockjaw almost invariably appears at the end of the first week. A sudden incapacity of a previously healthy babe to take the breast or the feeding-bottle is the almost invariable evidence of the presence of this disease. Successive efforts to feed the child prove equally ineffectual; and we perceive that the whole muscular structure of the cheeks and mouth is tightly contracted, that this

condition becomes from hour to hour more marked, and that the previously healthy child presents the appearance of grave physical collapse. If the symptoms, which may often subside distinctly for hours, go no further, some hopes of saving the young life may be entertained. Unfortunately the symptoms of spasms in the face are frequently soon followed by others affecting the upper and lower limbs, and subsequently the whole body. The temperature of the little patient rises to 104° Fahrenheit (40° centigrade), and even higher. Death, which may be regarded as a real release for all concerned, not excepting the little patient, soon supervenes in a state of general cramp, which is, however, accompanied by complete unconsciousness and consequent freedom from pain—a consolation for the parents.

But cases of cure of traumatic tetanus have certainly occurred; particularly when, as it was fair to conclude, the malady had been induced not by infection of a wound, but in consequence of over-heating or chilling the external skin. The cure in these cases was gradual and slow, and the greatest precautions should be taken, and every attention bestowed upon the infant, so that no other disorder may supervene.

Congenital Swelling of the Mammary Gland.

When a babe is suffering from swelling of the mammary gland the prospect is by far more hopeful than in the case of the disorder last treated of. In the dark middle ages short work was made of the poor little creature. Deluded fanatics felt no hesitation about accusing such children of being possessed and guilty of witchcraft. In these days, we who have become more humane, and have learned to look more into the real nature of things, know that we have in this case to deal with a engorgement, similar to that of a pimple produced by the retention of the secretions of the sebaceous glands.—The symptom of this disease of the infant mammary gland, is a marked and often painful swelling. Careful feeling enables us to discover a hard node in the interior of the breast, and a slight pressure upon the breast often occasions the appearance at the tip of the nipple of a thickish cream-like drop of fluid, called in popular language "witch's milk." Treatment almost always leads to satisfactory results. The swelling soon disappears if wet lukewarm rags are laid upon the breast during the day, and at night replaced by a plaster which should consist of pure white vaseline. But it sometimes happens that the redness and swelling increase, and that pus develops in the interior. Even, however, in these cases also a cure is almost always effected, particularly

if the general nutrition remains normal, and a bath, not too warm, is given daily. In these exceptional cases of the presence of pus, lukewarm water-poultices should be applied. They are best covered with guttapercha wrapping. It will be found that the pus comes to the surface, and the moment that it has been expelled almost all pain ceases, and the child advances without interruption towards recovery.

CHAPTER III.

The Nursing and Nourishment of the Suckling.

If the midwife, as usual, discontinues her regular visits on the ninth day after birth, and the mother is not disposed, or is not in a position to engage a nurse, she must now take on herself the attendance upon and nourishment of her baby.

Here the first and most important question is, what are the mother's intentions respecting nursing her child? Is she one of the great number of mothers, who with an absolutely unnatural blindness to their first duty, for a thousand imaginary reasons are indisposed to bring their babies to their own breasts? Such women do all in their power to persuade themselves, and their husbands, that they must be dispensed from the "nuisance" of nursing the baby. These mothers are exhibiting a most perverse ingratitude for the gifts of Nature, and placing themselves in a position inferior to that of the dumb creation, which at any price offers the hungry young the nourishing mother's breast.

The mother should reflect that for the baby absolutely no nourishment exists that can be compared with the mother's milk, this priceless gift for every new-born child, which contains everything that is necessary for the sustenance and development of the little body. Do not let it be pleaded that this or that friend did not nurse her baby, and that it has nevertheless got on very well. Let no such excuse be put forward, as that the obligations of household or social duties make nursing impossible, or that very likely the attempt to nurse may not prove successful, the mother's milk may fail. The mother's first duty, her maternal duty is *to try*. After a very few days, when she sees how the little babe prospers at her breast, how it has hardly patience to await the moment that shall bring its little seeking head to her bosom, she will rejoice in being the nurse of her child: and she will have a right to be proud of herself when compared with other women who have to bustle about with a bottle to satisfy their children. It is impossible to appeal too strongly to the mother to nurse her child whenever she can possibly do so. Unfortunately social and industrial circumstances often make the husband's earnings insufficient

to provide for his family, so that the wife, often soon after rising from child-bed, must go out to earn a few shillings a week. In such cases for the mother to nurse her baby is absolutely impossible: the natural supply of milk soon fails when it is not regularly used. In addition to this it must be admitted with regret that in the present day a great number of mothers are not capable of nursing their children on account of their lack of milk. This lack does not result only from the general bad effect of the corset, too early marriages, and other causes, but arises principally from the fact that too many women are unable during their pregnancy to spare themselves exertion, and to prepare themselves for their office of nurses. This is particularly true of women of the labouring classes. In the opinion of the author of this book the enactments for the protection of women engaged in industries and working in factories require to be largely extended in the direction of care for pregnant women. The State itself has the greatest interest in the raising of a healthy population, and no woman should be allowed to engage in work away from home after the seventh month of her pregnancy. Similarly for two months after childbirth she should be forbidden to withdraw herself from her household and maternal duties. The author is convinced that by the introduction of some far-reaching enactment to this effect, not only would the death-rate among children be diminished, but also there would be a still more marked diminution in female disorders. Amongst our working classes these have attained alarming dimensions chiefly in consequence of too great physical exertions shortly after childbirth.

What happens in the case of children whose mothers are compelled soon after childbirth to resume remunerative labour? Well, in the most fortunate cases there are elder brothers or sisters (who are not yet compelled to attend school) in the house. They, though themselves scarcely able to walk, bring the baby in its cradle a bottle containing a dubious mixture and put it to his mouth. It is no great wonder that seventy per cent. of all children who die young die of various forms of indigestion.

I may be accused of exaggeration. But I am speaking from experience, and describing what I have actually seen hundreds of times. And if there be no brothers or sisters at home to look after the baby? In that case there is nothing else possible but to entrust the child to some good neighbour, who for two or three shillings a week undertakes the duties of a foster-mother. It is evident that only numbers can make this pay, and consequently we often see three or more little creatures in a single small room under the care of a single foster-mother. It will be better to draw a veil over what has

often happened in such places, and can still happen, even under the eye of the law, and notwithstanding all the enactments affecting persons taking charge of infants. These are painful assertions, but unfortunately true: and it is much to be hoped that as the national prosperity increases the higher wages of the father of the family may make it possible for the mother to devote herself more and more to her household duties, and enable her herself to undertake the care and nursing of her children.

But is the mother's milk really a nourishment so magnificent, and so impossible to replace, that all this stress is to be laid upon it? The only possible answer is an emphatic "yes." If anyone interested in the question will follow me for a moment into Nature's great economy I will make the superiority of the mother's milk quite evident to him.

As is known—or if it is not known, here it is in a few words, man for the construction and maintenance of his organism requires a certain combination of albumen, fat, and hydrocarbon. These three substances can to a certain extent supply the place of one another. For example, a man who takes too little albumen can make up for it by taking more fat.

Milk contains, besides certain nutritive salts and water, the three substances above named. Thus there are in a hundred ounces:

	Albumen.	Fat.	Sugar.
Human milk	1·0	3·8	7·0
Cow's milk	3·4	3·6	4·8
Goat's milk	3·5	3·9	4·4
Ass's milk	2·4	1·6	6·0

The first glance at this table shows us that human milk contains by far the smallest quantity of albumen, and by far the largest quantity of sugar.*

That this small percentage of albumen is by far the best for the sucking child is proved by experience. It is certainly possible so to dilute cow's milk with water that the albumen may be reduced to

* Here the sugar takes the place of the hydrocarbon, and is in effect a starchless form of them. Leguminous fruit, bread, potatoes, and all preparations of meal for children, are starch, containing hydrocarbons, and are absolutely unfitted for new-born children and sucklings, whose digestive canal, quite peculiarly constituted, cannot digest starch.

1 per cent. But then, in the first place the milk becomes too poor in fat, and the albumen of the human milk has a quality that renders it superior to that of the cow's milk. In the child's stomach it curdles into very fine and easily digested flakes. The albumen of cow's milk is precipitated in heavy thick balls.

In addition to this, and before everything else, we must not forget how great a guarantee of purity the mother's milk presents in comparison with any other milk. Anyone who knows through how long and complicated a channel the cow's milk has to pass before it reaches the mouth of the suckling, knows also how many dangers of adulteration and pollution it encounters on its way.

In spite, however, of all the advantages appertaining to the mother's milk, and even in cases when it is abundant, it may happen that reasons exist for abstaining from using it. Especially nursing by mothers who may be suspected of consumptive tendencies is to be discountenanced. Mothers descended from consumptive families, even if they believe themselves to be completely without taint, had better not nurse their children. The development of a galloping consumption not infrequently follows an easy confinement; a phenomenon that suggest that hereditary latent elements of consumption existing in the mother's body have been made active by pregnancy and the changes which it induces, and have then become rapidly disseminated throughout the organism weakened by a confinement.—A general marked anaemia, and also nervous disorders, render a mother unfitted for nursing. All maladies, however, do not render a mother unfit to nurse her child. It is possible, in certain cases, for the child to have already contracted the disorder from which the mother is suffering, so that it cannot be any further infected by her; and it may have need of the very best nourishment, that is to say the mother's milk, if it is to overcome the malady. But the advice of a medical man should be always taken.

If a mother, who cannot nurse her child, or for one of the reasons above enumerated does not dare to nurse it, desires to give her child the advantage of being fed upon human milk, one course alone is open to her, to take a wet nurse into her house.

It is said, and with truth, that the best evidence of the healthiness of the wet nurse is the healthiness of her child. Certainly a wet nurse never deserves to be recommended except when the blooming condition of her offspring offers a probable proof of her own good health. But in choosing a wet nurse it is right to be far from satisfied with this alone. She should first of all prove that the child which she has at her breast is her child, and not a borrowed one put

in its place, so that her employer may not be the victim of a swindle that has often had serious consequences. Where a choice is offered, a wet nurse who has already had one or two children, and has suckled them successfully, should be preferred to one who is nursing a first child. Sexual disorders, and any suspicion of consumption, sores, and especially any kind of skin disease, or personal want of cleanliness, should be ample reason for refusing any wet nurse who offers herself, even though she has the most luxurious breasts, and apparently plentiful and rich milk. It is better to bring up the child by hand, in the manner which we shall now proceed to describe, than to expose it to direct dangers.

Bringing up by Hand.

The most convenient, cheapest, and surest substitute for the mother's milk is undoubtedly cow's milk. It may be here mentioned that in some districts goat's milk is much used as food for sucklings. But goat's milk is liable to be very fat, and must in any case be much diluted, if catarrh resulting from an excess of fat is to be avoided.

Ass's milk is also a good substitute for the mother's milk, and, in its good qualities approaches it more nearly than cow's milk. But it is much more difficult to procure, and is much more expensive. Good cow's milk can be everywhere procured both in town and country, and at a reasonable price.

It is best to stall the cow, from which the milk for the child is to be taken, apart; and to feed her on dry fodder. This is not always possible in the country, and sudden frequent intestinal disturbances of the child mark plainly the season when the cow begins to be fed upon green fodder. In the great cities, where there is a better sale, enterprising tradesmen have for some time past conducted with great success, under the direction of veterinary surgeons, permanent cow stalls with dry fodder, whence milk very suitable for the food of sucking children can be procured for the price of about fourpence a quart.

In order to free the cow's milk from all the impurities which may affect it on its way from the udder of the cow to the vessel from which the child is fed, the milk intended for the child's food should be boiled fairly soon in a special vessel kept for this purpose alone, and best in an earthen pot. It is not enough however to warm the milk until it bubbles up, it must be kept for a quarter of an hour by the clock permanently boiling, and then, carefully covered, be set aside to cool.

But now seeing that the cow's milk (as has been shewn in the comparative table, p. 24) contains three times as much albumen as human milk; it will not in its undiluted form agree with the suckling. It must be diluted with pure water that has been boiled. Continued experiments in childrens' hospitals, foundling hospitals, and creeches have demonstrated that the proportions of dilution are best varied according to the child's age.

It is best to give:—

In the first month	1	of milk and	3	of water.	
In the second	,,	1	,,	2	,,
From 3 to 6	,,	1	,,	1	,,
From 6 to 9	,,	2	,,	1	,,

After the ninth month pure milk.

Small variations of the proportions one way or another naturally involve no danger, particularly in the case of strong children. But it is best to keep to some fixed rule; and that above is based upon a a very long series of experiments.

The comparative table of p. 24 also shows that the cow's milk, even before it is diluted is much poorer in sugar than human milk. After the water has been added, the proportion of milk contained will be still smaller. For this reason the addition of sugar to the suckling's milk is necessary. For this we shall use not common household sugar, but clarified milk-sugar, which can be obtained of any chemist. This milk-sugar is far from sweetening so effectively as common sugar. But it is more nourishing, and it has the further great advantage that it makes the cow's milk resemble human milk in its peculiarity of curdling into fine flakes; (see p. 25). A heaped teaspoonful of milk-sugar should be added to 4 ozs. of the diluted cow's milk. This should not be done immediately before the child is fed, but sooner, so that the sugar may not remain at the bottom of the vessel, but have time to become equally distributed throughout the milk.

I may here add the advice that the necessary quantity of the mixed milk should be prepared once a day in the morning. Anyone who has once become accustomed to this plan, will find the advice excellent, and will never cease to follow it. The quantity of milk necessary can be easily calculated from the age of the child, and the information given in the following pages which will furnish particulars concerning the number of meals, and the quantity of nourishment to be given at each of them. Having as directed boiled the milk for a quarter of an hour, add the necessary amount of boiled water, and then the corresponding allowance of milk-sugar. Directly

the mixture has cooled, pour it into carefully cleansed feeding-bottles, provided with measuring marks. The bottles are best kept in a cool cellar, whence a bottle should be fetched whenever one is wanted.

It must not be considered surprising that I insist upon such small details. It is exactly in the accurate following out of all these small hints that the secret of a good result lies, and every morsel of advice is worthy of serious attention if the baby can be brought safely over the alarming period of cholera nostras, and especially over the infant complaints which are all of them results of faulty bringing up by hand.

And yet something else, as this book is not written for the middle and upper classes, but will rather be read by many a mother who has to think of every penny. I do not want such mothers to say, "It is all very fine for the author to write about a cool cellar, and a number of feeding-bottles; I have no cellar, and I cannot afford to purchase a number of bottles that will be afterwards standing about in the way."—Very good, poverty is, thank God, no shame. But I can suggest to this mother another plan, only it must be carried out scrupulously. She may every morning prepare the necessary quantity of food in an earthen pot, mixing the proper proportions of water and sugar, and have only two feeding-bottles, which must always lie in cold water. Let the earthen pot stand well covered in a cool corner, and each time that the child wants to be fed, let her take a feeding-bottle out of the clean water, and fill it with as much milk as is necessary for a meal.

But anyone who can afford the expense, should have at least a dozen similar glass bottles, provided with measuring marks, and containing four ounces each, and fill them in the morning. Naturally, during the first weeks of the baby's life, the bottles will not require to be filled above the fourth or fifth mark.* Every bottle that has been emptied should be placed in clean water, and should be thoroughly cleaned (best with a small bottle-brush) before it is refilled.

The opening of the indiarubber nipple is of importance. If it be too small the child has to exert itself too much, and, becoming irritated, ceases to feed when it is only half satiated. If, however, the milk flows too freely, in consequence of the opening in the rubber nipple being too large, the child cannot swallow the milk quickly enough, the usual result of which is a vomiting of the

* Unfinished milk remaining in the bottle after the child has had a meal, should never be used for the next meal. That is false economy. Anything that remains over from a meal must be poured away.

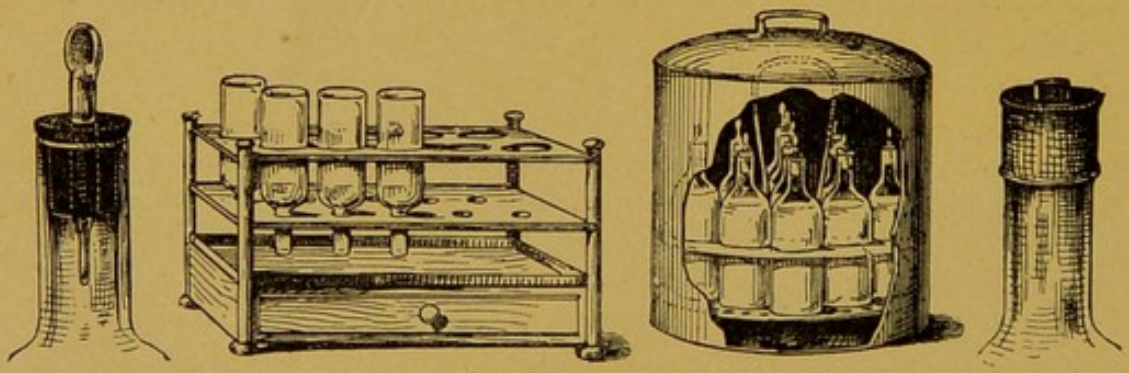
nourishment that has been too hastily swallowed. The opening in the nipple should be about the size of the thickness of a middle sized knitting needle.

How often, and how much should a child fed by hand drink? That evidently depends upon various circumstances. The simplest reply would be, "The child should be fed as often as he is hungry; and should each time take as much as is requisite to satisfy him." To follow this simple advice is by no means so difficult as it may possibly appear. The observant mother soon knows how to distinguish from the tone of the baby's cry whether actual hunger, or some other reason, such as being wet, or in an uncomfortable position, or what not else, is the occasion of the child's crying. It is a complete mistake to rush to the child with the feeding-bottle every time that he cries. A sucking child may very reasonably sometimes make himself heard in his cradle, especially when it is known that he is in perfect health. But if the little rascal discovers that his mother comes with the bottle every time he cries, he will cry for the sake of amusing himself, and for the pleasure of seeing his mother's face. It is possible to begin quite early to educate the youngest children, and to accustom them to behave. The popular saying that the tree must be bent when it is young, is perfectly applicable to the training of the very youngest children.

It is a good plan to give the child the bottle at fixed hours during the earliest days of its life, from the second day to the tenth. All children have great need of sleep; and it is a subject of thankfulness if their inclination to sleep presents itself also at night. If, however, it does not, and the child that sleeps by day is restless and cries during the night, it is the better to wake it up several times in the day, and to make it take food, it will then sleep in the night. After the tenth day, the bottle should be given the child every two hours; but it is better from the beginning to accustom the child not to require food by night. Most mothers allow themselves at the outset to be drawn into giving the breast or the bottle to the child that cries at night; mostly for the father's sake that his rest may be disturbed as little as possible. To give either breast or bottle is a mistake. The breast has need of time for gathering and forming the new supply of milk; and the infant that has once become accustomed to a nightly meal will wake with the punctuality of clock-work and cry until the weary mother rises, cross and sighing, to feed the little screamer.

The older the suckling becomes the less frequently will he need to be fed. After the third week it will be amply sufficient to give the

child the bottle every three hours during the day, especially as the quantity slowly increases with the child's age, as we shall presently see. This brings us to the second question, how much the suckling child should take at each meal. Generally—and here we have again the experience of the great hospitals for children—a normal meal for the child from the first until the tenth day is every two hours, five to seven table-spoonfuls, or from a pint and a-half to a pint and three-quarters daily. Feeding bottles can be purchased with the table-spoonfuls marked upon them. From the tenth to the twentieth day a daily quantity of from a pint and three-quarters to two and a-half pints. After the third week no measures of this exact sort can be given. Many children eagerly drink up to the eighth and tenth mark on the bottle, and even more, whilst others can be only slowly accustomed to take larger meals; which, however, is not at all a bad symptom. It is a mistake to give the suckling too much at a very tender age. A state of repletion is then liable to appear suddenly, and may bring the patient very low. A daily amount approaching a quart should be enough to daily satisfy a stout child up to the end of the sixth month.



Soxleth apparatus, with bottle-case, and two bottle-stoppers.

A very important point in bringing up by hand is the necessary warming of the milk. Many mistakes are made about this. The milk when offered the child is often too warm, and often too cold. The best plan is to place the bottle already containing the milk in an open vessel filled with warm water, and to allow it to stand for four minutes. The bottle, after being removed from the water, should be slowly turned in every direction so as to secure a uniform warmth of its contents. If the glass when placed against the cheek gives a sensation of agreeable warmth the milk is suitable for the child to drink. The habit of testing the warmth of the milk by tasting it with the tongue is not to be cultivated. The exact temperature, if

anyone desires to know it, should be 95° Fahrenheit (35° centigrade).

It is only right here to say that a number of eminent men have devoted their attention to the subject of the bringing up of children by hand, and have made very important experiments. Some have laboured to render cow's milk resemble human milk in its chemical constitution, others have studied how to preserve cow's milk so as to keep it perfectly free from infection. The best known form of preserved cow's milk is Swiss milk. This is sold in air-tight cases. It may be used when fresh milk cannot be procured. But it does not agree with all children. The author has himself had experience of this. To parents who do not mind the expense, I can recommend the Soxleth apparatus for keeping milk fresh and free from infection.

I have already said that this work is not written for the use of parents who possess ample incomes, and can easily procure for their children any sort of food they like. I am writing for people whose modest weekly wages place but small sums at their disposal; and my aim is that with the assistance of my book they may find themselves able to bring up their children whole and healthy. A mother may perhaps find that after she has bought for her baby all the milk that it requires, and has also purchased the milk-sugar, she has expended as much as she can well afford, even when the baby at first requires little milk, and a good deal of water is added to it. But at first she is able to follow the advice I have given. Only afterwards when the baby is ten or twelve weeks old, and requires more milk, this is a difficulty for her purse. She then thinks of doing like her neighbour, who has had two or three children, and has always mixed a little sodden bread or biscuit with their milk. But no mother should do this. The explanations which I am now about to give will show how dangerous it is to feed children too soon with any preparations made of meal.

If it were possible to believe all the "certificates" signed by professional analysts, and all the "testimonials" and letters furnished by grateful parents, which as a rule accompany all kinds of artificial foods, the problem of how to feed young children would be immediately solved. But too often these artificial productions are like the "infallible" remedies that are boldly advertised by quacks; and merely dear and useless. Most so-called "foods" are good only for the people who make money by selling them, and distinctly injurious to children (if given them when they are very young), because before they are six months old they have not sufficiently strong digestions to be able to digest foods containing starch.

Besides, milk is already so rich in sugar, which makes othe

hydrocarbons superfluous. It is true that adult man uses freely for the nurture and support of his body hydrocarbons, which are very rich in starch—as we shall explain in another place—for example in potatoes, in grain, and in leguminous fruit. But then his power of digestion is much greater than that of a child. The very small amount of saliva of the babe is not sufficient, as is that of the adult, to convert the starch into sugar. And similarly the glands of the stomach and bowels which produce digestive juices are only after six months sufficiently developed to deal with food of this kind. In a word the suckling cannot assimilate food of this sort. It lies like a weight in his little body, and even gives him pain when it finally quits his bowels in hard lumps.

However, the case is quite different when the child has passed in good health through his sixth month. Then the appearance of the first tooth itself gives us a hint that now the mother, whose means are small, may be more easy about the nourishment given her child, and may diminish the expense by adding to the expensive milk diet meal broth and children's biscuits.

Preparations like Nestle's Swiss milk, and artificial food for infants, which are free from the starch which is so hard to digest, and contain in its place sugary stuffs free from water (dextrine), are now available. All these preparations, of which I purposely abstain from recommending one more than another, are accompanied by full directions for their use. And with this I shall conclude my remarks on the bringing up of children by hand. They will show any mother how she should proceed in order to secure her child from the dangers which beset it whilst it is a suckling.

Weaning.

The transition from a pure milk diet to partial feeding with children's biscuits and preparations of meal coincides befittingly with the time of weaning.

It may be advisable to allow a child that is reared at the breast the advantages of the mother's milk for more than six months in cases when suckling the child agrees with the mother, and if the time of ordinary weaning should happen to fall in the hot months of July and August, a change of the diet in the hot weather might bring on intestinal catarrh; and under these circumstances it is well to advise the mother to wean the child in September. That will give a better prospect of an easy transition from one kind of food to another. In any case the weaning may be safely begun about the seventh month. I purposely use the word "begun" because the child must not be

suddenly, on a given day, taken from the mother's breast. This can lead to disagreeable consequences for the mother herself, and occasion the formation of hard and painful lumps in the breast. The transition from the mother's milk to other food should be a gradual one. In that way it can be accomplished without disadvantages either to the mother or the child.

The best way to begin is to give the child, before giving it the breast (which it is taking equally gladly and regularly), about half a raw egg, stirred up with a little salt and sugar, or a small spoonful of boiled cow's milk diluted with a little water. After this the child should be put to the breast. This should be repeated at first once and then twice a day, the amount of food other than the mother's milk being constantly increased. The more the babe is thus satisfied before being put to the breast the less milk he will take. And, on the other hand, the mother's breast, as less milk is taken from it, will produce less; so that in this way the weaning of the babe, and the diminution of the mother's milk will be simultaneously effected.

In passing it may be well to mention that at the time of weaning the mother should daily wash her breasts with lukewarm water, should rub them at night with white vaseline, and should during the night bind them up high with crossed bands over the shoulders. This will prevent the formation of abscess in the breast.

The child being thus weaned from the mother's breast should still be fed as before principally upon milk, that is to say, boiled cow's milk. After this a beginning may be made of giving it gradually oatmeal, children's biscuits, and now and then half a soft-boiled egg. It is, however, not necessary to do this before the end of the first year. But it is distinctly injurious to the child to give it meat, coffee, beer, or wine. There are, it is true, parents who think it fine to boast that their babies can already eat anything. But a re-action suddenly follows, and a violent diarrhœa, that often becomes permanent, proves how foolishly they have behaved.

The First Teething.

Weaning and teething are, to a certain extent, connected together. The appearance of the first tooth shows us that the time has come when the babe may be weaned. It is interesting to observe how the baby's teeth are gradually developed. At the time of the child's birth the milk-teeth are already formed in the teeth-cavities of the jaws. But projecting teeth would be injurious to the highly sensitive nipples of the mother, and nature provides that they shall not make

their appearance until a time when they will be useful, when the increasing saliva of the child, about the end of six months, makes it capable of beginning to digest solid food. Exactly at the time when the mother begins to seek daily for the first tooth all of a sudden a small pale seam makes its appearance. Generally, only the sharp sound produced by touching the spot with the handle of a spoon convinces the father that the baby has a tooth. Which tooth is it? The middle lower incisor generally first makes its appearance. A few days later its neighbour comes to sight. After this, there is an interval of a few weeks; and then, probably before they are noticed, the two upper incisors appear. After a second interval of about a month, the two outer upper incisors penetrate the gums, and then the two outer lower ones; thus, at the end of the year, the eight incisors have been cut. After a longer or shorter time the four inner back teeth appear, then the four canine teeth, and lastly, about the end of the twentieth or twenty-fourth month, the outer back teeth; so by the end of the second year the milk-teeth are perfect. Naturally, the teeth are not always so promptly cut, and we shall have something to say about the difficulties of teething, when speaking of the maladies of the suckling. But it seems that in some cases perfectly healthy children do not cut a single tooth before the ninth or tenth month, or even still later. But there is, in such cases, always some reason for a suspicion that the child has a proclivity to rickets, and what is below said about this common infantile complaint should be read.

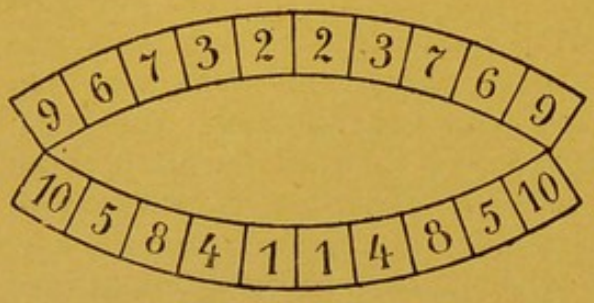


Illustration showing the order in which the milk teeth appear.

Care and Bringing up of the Suckling.

We have thus seen our little baby, either at its mother's breast, or thanks to the careful rearing by hand which we have described, safely reach the end of its first year. But we must now once more return to the child's earliest days, as proper nourishment *alone* will hardly provide everything that is necessary for the child's future satisfactory progress. There are, it is true, many parents who believe that everything is going on satisfactory, so long as the child merely takes a sufficient quantity of food and digests it. But we shall see that any one who wishes to bring up a child properly must think also of many other things besides food.

Weight and Growth of the Suckling.

The average weight of a new-born child is 114 ounces, or roughly about seven pounds; this is an average weight based upon that of 1000 children. Different causes may produce a considerably less or greater weight. The author of this book has assisted at difficult confinements of women who have brought into the world children weighing eleven pounds or even more. On the other hand many children are born weighing even less than four pounds. But these are exceptions about which we need not say any more here.

During the first four days almost all children without exception, lose weight at the rate of about 2½ ounces daily. On the fourth day they are consequently some ten or more ounces lighter than when they were born. This loss of weight is due partly to the evacuation of meconium, the child's first motions (generally black), partly to the altered conditions of life which the child encounters upon coming into the world (to which it needs a little time to accustom itself), and still more to the fact that many children during the first days of their life sleep almost continuously, and take hardly any food. By the tenth day the child recovers its original weight, and then for some months grows continuously heavier, gaining daily about an ounce. Towards the end of the fourth month the increase becomes more slow, and drops to an average of half-an-ounce daily. From the end of the fifth to the end of the twelfth month, the weight increases on the average by a quarter-of-an-ounce only daily. From these data it is easy to calculate how heavy a child ought to be at any particular age during the first year.* Small variations should not be considered important, as is possible to give only a general average. But it will be fairly correct to assume that at the end of its first year a child should be three times as heavy as on the day of its birth.

For determining the weight of the child it is advisable to have a properly shaped scale which can be placed on the ordinary balances used in the house.

---

* For example, if anyone wishes to know how much a child that weighed 114 ounces at birth ought to weigh when 9½ months old :—

Original weight	114 ozs.
+ 120 days, at 1 oz. per diem.	120 ,,
+ 120 days, at ½ oz. per diem.	60 ,,
+ 45 days, at ¼ oz. per diem.	11 ,,
	305
— 10 ozs. lost during first 10 days	10
	295

Or roughly about 18 lbs.

I should advise those parents who wish to observe the weight of the baby, each time to note down accurately the results of the weighing, so that they may have a record easy of reference. The weighing should not take place oftener than once a week, say every Sunday morning. The child should be weighed nude, directly after its bath, and before it receives any food. The weight of the cloth, in which the child should be wrapped to guard against a chill, should of course be subtracted.

Scales for weighing a child.

Next to say a few words about the height of the baby, and its increase during the first year. A new-born child is almost always 19½ inches long, and by the end of the first year has increased this length by one half, thus reaching 29¼ inches. During the second year the increase seldom exceeds 4 inches.

The Suckling's Baths.

The first bath of the new-born child has been already described in the opening chapter. This is a mere cleansing bath, intended to remove the coating with which many children are born. This bath should not last more than two or three minutes; but after the first few days the bath should last five minutes. During the first month a mother should be careful to bathe her child every day. The bath water should be absolutely clean, and its warmth should be ascertained with a bath-thermometer, of which an illustration is given. The right heat is 94° 95° Fahrenheit (34° 35° Centigrade). After six months the bath may be made a degree or two cooler, if the mother is particularly bent upon early strengthening the child's skin. But if coughing or cold ensue, the warning must be immediately taken, and the temperature raised to its former height. In many places it is an established custom to put strengthening herbs into the bath water. This is requisite only in the case of delicate children. Particular directions concerning baths are given at the end of this book, and for preparing children's baths with decoctions of herbs. The reader will there find all necessary instructions.

Bath-thermometer.

The Dress and Bed of the Suckling.

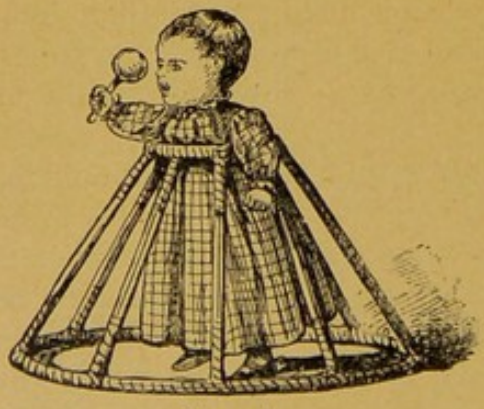
It will be hardly necessary to mention that the practice of wrapping children in swaddling clothes has completely disappeared. The child should be dressed during the earliest weeks in a little shirt and vest with a soft woollen belly-band, and the napkin folded into a triangular form. All the clothes should be slightly warmed, to protect the child from chill. It will be hardly necessary to say anything about the familiar long clothes, socks, and knitted shoes. In the case of very delicate babes, nursing upon a cushion may be necessary. The child should be secured with very broad bands.

During the night recently-born children and sucklings should be kept very warm in bed, but not so covered with bed-clothes as to seem completely hidden. This only weakens the child, and renders it extremely susceptible to chills. The cradle or basinette should be placed near the bed of the mother. The cradle should stand firmly and not be on rockers—which soon make the child the tyrant of the mother. The bedding under the child should be horizontal, with a fairly

hard, well stuffed straw mattress. Parents who can afford it may replace it afterwards with a horsehair mattress when the child has learned to be clean. The child's water, which is in the case of children brought up by hand particularly plentiful, of course penetrates not only through the napkin but also through the other clothes, for which reason it is a good plan to place a waterproof sheet between them and the mattress. For the child's sake it is most important to give it new dry clothes as soon as possible after those it is wearing are discovered to be wet. The same should be done after every motion, and the motions inspected. During the first half-year the evacuations are quite involuntary and very irregular: and no reasonable mother will be annoyed at having frequently to give her babe clean things. But exactly as a suckling child can be very soon accustomed to taking regular meals and sleep, so also the mother should not too long postpone teaching the child to be clean. After the sixth or seventh month she may begin to "hold out" the baby until it performs the natural operations.

First Attempts to Stand and Walk.

When the child approaches the end of his first year the time arrives for solving the problem of setting him literally "on his legs." He



Go-cart.

Leading-strings.

will already, whilst his mother's back was turned, have made various unsuccessful attempts to stand, and will probably have tried to get out of his cradle; and just at this epoch it is necessary to be careful that he does not in consequence of his enterprising spirit meet with an awkward fall. To set a child upon his legs too soon is not to be recommended. Just as in later life, it is desirable that he should possess a certain amount of moral strength before he attempts to be independent, so now it is important that he should possess a certain amount of physical strength before he tries to stand on his own feet. It is quite enough if the child can, at the age of eight or nine months, stand with the assistance of his mother's hand. But I must again repeat the warning that just at this period it is most important to preserve the child from the accident of a dangerous fall. Children very easily lose confidence in themselves when their first attempts to stand or to walk have painful consequences. It is not an uncommon thing to hear a mother say with distress, "Baby at first stood up quite bravely and boldly. But now if anyone attempts to persuade him to stand he begins at once to cry and throws himself on the floor."

Exactly the same thing happens in the case of walking. "Go-carts," once common in England, are still in use upon the Continent as an assistance to children in their first attempts to walk. "Leading-strings" may be distinctly recommended. But it should never be forgotten that for bringing up children the first thing necessary is patience, which will also most assist them to learn to stand and to walk.

CHAPTER IV.

The Diseases of the Suckling.

I am glad to be able to begin this chapter with saying that first of all the number of maladies from which babes at the breast suffer is small, and that secondly they all arise from similar causes more or less connected with errors in dieting.

As the leading principles of the proper dieting and rearing of children become known to the general public, and as mother's seriously take to heart the advice themselves to nurse their babies, whenever that is possible, there will be a distinct diminution in sickness among children, and also a great reduction in the infant death rate. It is principally owing to cholera nostras (choleraic diarrhœa) that the infant death-rate is at present so high. I shall not, however, begin with this most dangerous of all infantine maladies, but first direct attention to another almost more important infirmity.

General Weakness of Constitution and its Consequences.

It has been already mentioned that the average weight of a new born child is 114 ounces, or about seven pounds; but that children weighing so much as eleven pounds or even more are sometimes born alive, whilst on the contrary the weight of the new born infant is occasionally far below the average. Particularly when the period of pregnancy has been a troubled one; when, for example, the mother in consequence of frequent vomiting has been insufficiently nourished, or when she has had a premature confinement, a child is often born whose weight scarcely reaches four pounds, and sometimes is much below. These very delicate children very often die. In spite of all the attention bestowed upon them from the moment of their birth, the conditions of life in the world are too hard for them; but so long as they live they should on no account be despaired of. It is wonderful how often children prematurely born cling with tenacity to life and manage to make progress slowly but effectively.

Accurate experiments have proved that all children prematurely born, or born in a very delicate condition, have less natural heat than

normal children of a proper weight. Since this has been known, a great advance has been made in the treatment of these delicate babes. Their want of natural heat has been counterbalanced by wrapping them carefully in warm cotton wool. In France, where many constitutionally delicate children are born, a further advance has been made, and an apparatus called *couveuse* has been invented. In these couveuses the babies are kept in a temperature of 98° Fahrenheit (37° Centigrade), being removed thence only for a few moments for purposes of dieting and cleanliness. The general public, particularly at first, was enchanted with these rearing chambers, and it has been long realised that the artificial supply of the heat which is naturally wanting is the first thing to be considered in the rearing of these extremely delicate babes of a weak organism. But a second thing is also indispensable if the result is to be satisfactory, and that is the mother's milk. *The more delicate the babe the more necessary is it that it should be nursed at the mother's breast.* That is a fact which no mother who can nurse her child should ever forget.

But very often, even if fed with its mother's milk, and much oftener when that is not possible and the child has to be brought up by hand, the constitutionally delicate babe sooner or later sinks into a state of general prostration. This prostration must be described more at length, because in all its external symptoms it resembles exactly a complaint which may arise from entirely different causes. I mean phthisis or tabes of the intestines.

Phthisis or Tabes of the Intestines.

It is not a mother's fault, if her child, born with a weakly constitution, and perhaps weighing less than four pounds at birth, in spite of all her care makes no advance, but seems to become thinner and thinner. But nurses and mothers are very much to blame, who only at the last moment, and often when it is too late call in medical aid to a child which has been born sound, but has been by bad dieting brought almost to its grave. It is pitiful to look at some such poor, innocent little creature, which, ignorant of what is good for it, swallows patiently anything that a stupid mother or careless nurse (often bent only upon getting as much as possible for herself out of the money paid her for taking care of the child) puts into its mouth.

I wish here to speak quite plainly. The mother may be angry at being called "stupid"; and the nurse, or person whosoever she be, to whom the child is entrusted, resent my calling the farinaceous food which she gives the baby "a senseless diet." I wish to make it quite

plain that what is done is wrong, and to leave neither mother nor nurse the excuse that "they knew no better."

Look at this wasted, waxen-yellow coloured baby, every one of whose bones, every one of whose little ribs can be counted through its wrinkled and seemingly too large skin. Look at its dull, sunken eyes, and its face that wears the expression of an old man. Observe how it regards us indifferently whilst it continues its low moaning cries. Does it look like a healthy child? Are these the results of proper care and food?

A child born with a weakly constitution might no doubt come to this pass by no fault of the mother's. In that case the mother, who in spite of all her care sees her baby thus perishing, deserves all our sympathy: and we are face to face with the inevitable consequences of a general debility. But this other child was born whole and sound, and nothing but gross blundering could have brought it into this miserable condition.

Let us now for a moment turn our attention to the other symptoms which an infant suffering from a general phthisis (perishing) of the intestinal glands. It is necessary to put before the reader as complete a description as possible, in order that he may understand what kind of consequences neglect of a sucking babe can have. The whole body is reduced to a skeleton. Every morsel of fat has vanished. The muscles are reduced to thin insignificant strings. The half-closed eyes lie deep in their hollows. The skin of the face is covered with innumerable wrinkles; and the face itself wears the expression of an unspeakably sad despair.

The bones of the head deserve particular attention. In the first place the two great fontanelles (see figure) are still as large as they

Side view and vertical view of the skull of a new-born child. A. Fronta bone. B. Parietal bone. C. Occipital bone. D. Posterior Fontanelle. E. Anterior Fontanelle. F. Lowar jaw. G. Upper jaw. H. Temporal bone.

were at birth. The attachments of the bones of the skull appear also to be loosened. The fact that the spaces between the bones of the skull often sink deeply produces a cruciform depression on the top of the head. This has led to a superstition that the child has been born "marked with a cross," and that it has consequently been from birth doomed to die young. As a fact this appearance of the skull always arises after birth.

A closer examination of the child suffering from phthisis shows a scarcely perceptible stringy pulse. If the temperature is tested with a clinical thermometer (which is best inserted in the anus), a lowering of the temperature to 95° Fahrenheit (36° centigrade), and even to 93° Fahrenheit (35° centigrade) will be observed. The breathing is slightly accelerated, but very light. The digestion is almost invariably much disordered. The motions are very irregular, mostly small in quantity, and having a very foul smell, and a very liquid dirtyish green appearance. The quantity of water passed is small. The water itself is of a darkish colour, and leaves a sharply-marked edge to the stain which it makes on the clothes.

This really miserable condition of things may continue for weeks. The amount of food assimilated becomes constantly smaller, and the external signs of vitality more indistinct. The child's low crying is scarcely audible, and death comes at last as a release scarcely perceptible in a state of long preceding unconsciousness.

If real consumption (tuberculosis) comes also to complicate matters (which is very often the case), the progress of the malady is much more rapid, and the spectator does not receive the impression, otherwise the ordinary one, that the little patient is dying of hunger. Inflammation of the lungs also often hastens the end by weakening the action of the heart. Various other maladies, for example, extensive ulceration of the skin may influence the course of the disease.

Now we have to enquire how this disorder, which we call atrophy, tabes, infantile consumption, or glandular phthisis of the intestines originates, and in what manner thoughtless mothers and nurses are guilty of causing it.

The disease may be briefly explained to be the result of an overstraining of the infant's digestive glands, and their consequent destruction, caused by indigestible farinaceous food containing starch. It has been pointed out in several places, and more particularly in the sections devoted to the infant's diet, that the digestive powers of the new-born child are not equal to assimilating starch. The appearance of the first tooth indicates the time when it is allowable, *in addition* to

a diet consisting principally of milk to give the child a little milk-porridge or a little children's biscuit. If this law of nature is broken, and, in order to satisfy the hungry child, and at the same time to economise the milk, sopped biscuit, potatoe-mash, or any of the different kinds of farinaceous foods for infants are given during the first weeks of the child's life, a serious damage is each time done to the infant's intestines. The repetition of this finally destroys the intestinal glands, and so induces the serious disease above described.

Let us next see whether it is still possible to help the little patient, and so save him in some natural manner. It is evident from the beginning that the treatment must principally consist in dieting. A wet-nurse should be procured. This means procuring in the neighbourhood some mother who will allow the debilitated child to be fed at her breast. The child will not require much; the woman performs a noble action, and cure is often surprisingly rapid. Unfortunately it is often impossible to procure a nurse, and then bringing up by hand most strictly in accordance with the rules which have been already fully explained must be resorted to. But at the beginning, the cow's milk must be diluted with a quantity of sugar-water at least four times as great as the quantity of milk. If the child is too weak to suck through the nipple of the feeding-bottle, the milk must be carefully administered with a spoon. A little food should be given every hour, so that the labour of digestion may be made as easy as possible both for stomach and intestines.

If the child be an older one, of nine or ten months, half a beaten-up egg should be given it once a day, with just a grain of salt. An experiment may be also made to see whether the child will take, and can retain a teaspoonful of wine (or brandy) and milk, which then may be given twice daily. Finally, a daily bath is of the greatest importance. The bath should not last more than five minutes, and whilst the little patient is in the bath the water should be poured over him from a cup in order to stimulate him to cry, and also to bestir himself actively.

Decoctions of sweet-smelling flag, camomile, and thyme stimulate the skin, and may with advantage be added to the bath water. (See the sections on baths).

Little advantage, however, is to be hoped from the use of drugs.

Thrush.

Cases of thrush have certainly on rare occasions occurred in adults; but practically we have here to deal with a distinctly infantile com-

plaint. Thrush developes itself as a rule on the mucous membrane of the child's mouth, and only in rare cases (accompanied by great general debility in its last stages) penetrates into the stomach, or even passes thence into the bowels. Thrush generally occurs among the children of the indigent, and in cases where the parents, partly from want of time, and partly from ignorance, do not pay sufficient attention to the principles of thorough cleanliness.

The symptoms of thrush are as follows:—Little white spot; very slightly raised from the surface appear first upon the point of the tongue; then also on the base of the tongue, on the gums, and on the inside of the cheeks, in fact over the whole of the mucous membrane of the mouth. They appear to stick upon the skin like a furry coating. If an attempt is made to remove the white spot by softly scraping it with a blunt spoon-handle, the spot that is touched immediately reddens with blood. During the first few days the little patient does not appear to suffer much pain, but as the thursh spreads a distinct loss of appetite and of general health sets in. Frequent belching, a tendency to vomiting, and more particularly a fretful voice show plainly that the child is suffering under the disorder.

Thrush was formerly supposed to arise from a feverish condition of the blood, and the white furry appearance above described to be caused by exudations. Since 1842, it has been known from microscopic examination that these white spots are to be attributed to the growth of a fungus, which finds a favourable base wherever acid fermentation is going on.

It will be remembered that I mentioned above that all empty feeding-bottles should be placed in water, and thoroughly cleaned before being refilled; also I said that any milk left in the bottle after a meal should be thrown away, and on no account given the child for his next meal. And that perfect cleanliness is the surest preventative of thrush may be at once proved by this, that a child nursed at the breast hardly ever suffers from it—because he receives his food directly from the breast and perfectly pure. But there is another common source of thrush, the "sucking-bag," by whatsoever name it may be called, that comfort and refuge of mothers, who may be surprised to hear it condemned. I know indeed how charming it must be for the mother to be able, as if by magic, at once to stop the screams of her stout little youngster by presenting him with his "bag"; and it is really laughable to see how the little rogue, who a moment before was howling with all his might, now sets to work to suck as if he was working by contract. But the "sucking-bag" is unfortunately dangerous, and distinctly destructive of health when it is filled with

sugar and then placed in the child's mouth ; that it should be so is no wonder. In consequence of the over-charging of the stomach with sugar fermentations arise, and give an opening to all kinds of disease. Besides, to return to the subject of the thrush, the thrush-fungus requires for its growth a certain unwholesome bed, and prefers one of fermentation processes. This is the reason why almost all children are attacked by thrush who suffer from continuous slight disturbances of the digestion, acidity of the stomach, and similar maladies.

Thrush, if immediately taken in hand, yields in a few days to a simple treatment, but is liable to return if the cause of the madady is not removed.

In most cases it is quite sufficient to wash the patient's mouth several times a day with clean water that has been boiled, in which a few grains of alum have been placed. The feeding-bottles, and the indiarubber nipples must be kept very clean, and more than usual care must be bestowed upon the preparation of the food.

The very popular remedy of borax with glycerine and honey of roses is of very little use, and is prescribed mostly in accordance with an old custom. Neither the borax, nor the glycerine, nor the honey of roses has any power to affect the growth of the fungi. Any one who wishes to give a dose of medicine will do better to buy a little rhubarb and magnesia in the form of a powder, and to place as much as would cover the point of a small knife twice a day in the child's milk. This will counteract acidity and so remove the causes of a further development of thrush. To allay the thirst of the little patient give slightly sweetened fennel-tea, sage-tea, or barley-broth.

Finally, a warning must be added not to use chlorate of potash, which is sometimes used as a household remedy for washing the mouths of children suffering from thrush. Chlorate of potash is undeniab y very useful in diseases of the throat of older children, who can use it for gargling. But it may have a directly poisonous effect upon infants if it gets into the stomach, and for that reason should never be used unless by a professional practitioner.

Diseases of the Digestive Canal of the Suckling.

In beginning this chapter on the diseases of very young children, I mentioned that their number is happily small, and that the majority of them can be referred to mistakes in dieting. That this is so has been already shown both in the case of phthisis and thrush. It will be found to be even more true of the stomach and intestinal maladies of the suckling, to which the following sections will be devoted.

I must mention at the outset that I divide the diseases of the digestive canal of the suckling into two groups; inflammatory (acute) disorders, which arise suddenly, often as the immediate consequences of some previous injury, and always take a short course; and chronic (prolonged, slow) disorders, in which some constantly recurring mistake in dieting has produced a permanent weakness of the digestive organs with all the inevitable consequences.

It is by no means possible either in the case of the acute disorders, or in the case of the chronic forms of infant maladies of the stomach and intestines always to draw an exact line between closely connected forms of disease, which have different names, but arise from similar causes. The symptoms are often almost the same, and it must not be thought strange if the treatment which chiefly depends upon diet also seems to be almost identical. It is often advisable, even in the case of some apparently insignificant disturbance of digestion, to proceed as if a serious inflammation existed; for it often turns out that a derangement of the bowels, which at first seemed to be of no importance, suddenly assumes all the symptoms of a severe inflammation, and taking a violent course brings to its grave, in spite of all efforts, a child that was a few days before well and blooming.

Dyspepsia of the Suckling.

Slight uneasiness of the stomach and intestines is of all the forms of indigestion of the young child the one of smallest importance. It may attack any sucking child, in spite of every precaution, at some time or another, and after the source of the evil has been removed is cured in a very few days. It may arise from the most different causes, though the fact that children put out to nurse amongst the poor are chiefly thus afflicted, justifies the assumption that usually mistakes of diet are the cause. It is certain, however, that anything which strongly affects the feelings of a nursing mother, or anything that "turns" her milk, as well as a sharp chill taken by the child, will be quite sufficient to occasion all the symptoms which are commonly expressed by saying that "the child has upset his stomach."

The usual first sign that "the stomach has been upset," to use this popular phrase, is a sudden loss of appetite. Whereas yesterday the baby scarcely had patience to wait for the moment when the breast or the feeding-bottle should be given him, to-day he turns away unwilling to take nourishment. At the same time his breath smells foul and sour, and noisy evacuations of wind accompany his movements of refusal. The whole belly is distended like a drum, and appears to be inflated. To have his belly touched seems disagreeable to the

child ; and, if the hand is softly laid on the belly of the patient, it is possible to feel the convolutions of the intestines moving under the hand, at the same time that the bowles rumble and gurgle. The number of motions is generally increased. For a child to have eight in the day is not unusual. The evacuations are sudden, and accompanied by wind, and the fæces always broken, of a bad colour, and very offensive to the smell.

Though this suddenly developed disorder may seem a just cause for anxiety, it generally passes off quite satisfactorily if the mother proceeds quietly and sensibly, and does not in her anxiety try one remedy after another, which will certainly do no good, and may do a great deal of harm.

As we here have certainly to deal with a process of fermentation and decomposition going on in the contents of the stomach and intestines, our first care must be as quickly as possible to remove the putrid matter from the patient's body. We shall, after that, seek for the cause of the indisposition, which will be almost always in some way connected with the diet, and then exert ourselves to remove it.

The first step—the removal of the putrid matter in the intestines—has been generally effected by the patient himself by means of bringing up wind, and by his frequent motions. But no harm will be done in giving a warm injection of camomile tea, to which may be added a tea-spoonful of castor oil.

Respecting the diet, the first thing to be done, as has already been said, is to discover the origin of the malady, which is almost always in some way connected with the diet. If the babe is being brought up by hand, and this will generally be the case, attention is first to be paid to the cleanliness of the feeding-bottle, and to the cleanly preparation of its contents. Perhaps the milk itself is the cause of the child's indisposition, in consequence of some change in the food of the cow. If this is discovered to be the case, that is a sufficient reason for procuring the milk from some other source. If the child has been fed with porridge, biscuits, perhaps with potatoes or meat *

* Whilst writing these lines, a case occurs to my memory which occurred a few years ago, and may be related for the instruction of my readers if they wish to to know what not to do. I was summoned to the house of a well-to-do farmer, whose only child, now two months old, was reported to be seriously ill. The symptoms indicated a disturbance of the stomach and bowels, and the mother, in answer to my enquiries, said, "Oh, yes, Doctor, you are quite right; his stomach must be out of order; until yesterday, he eat his egg fried in butter every day, and now he won't look at it." Whilst I was puzzling my head how I should make the mother understand that it was exactly this egg diet that had made her child ill, I perceived that she was cutting a slice an inch long off a fine fried sausage, and giving it to my patient to keep him quiet. I should like to ask the reader whether he thinks it easy or difficult to teach women of this kind how they ought to feed their children.

even, or fruit, any repetition of such unwholesome food must be of course forbidden. If a child nursed at the breast is suffering from trouble of the stomach and bowels; and the cause is something that has strongly affected the mother or the nurse, the child should not be removed from the breast, because there is every reason to suppose that the milk will soon recover its previous good qualities. Even the reappearance of the menses, which can occasion the child an indigestion, is only then a reason for removing the child from the breast, when they continue for eight days, which indeed is not rarely the case. If, however, the mother resolves to continue to nurse the child, she should certainly not do so too often; at the most not oftener than every 3½ hours.

No hesitation should be felt about keeping the little patient for a few days upon a very spare diet, but without keeping him hungry. Thin cold tea (lime-flower tea) is a very good remedy against the thirst which is generally excessive. A small spoonful should be given every few minutes, and will be readily taken.

Damp warm compresses around the abdomen (see the end of the book) are to be recommended in cases when the babe shows by drawing his knees up to his belly, and by noisy evacuations of wind, that the gases generated by the complaint are giving him pain. But great care must be taken that the child is not chilled at the moment when the bandages are changed. If the child has previously contracted a slight chill, it will be better instead of using bandages to give him a bath. The temperature should be 93° Fahrenheit (34° Centigrade). The bath should last five minutes, and will generally produce a good result.

Under this treatment a distinct improvement will generally be noticed after two or three days, particularly in cases when the clinical thermometer inserted in the anus does not register a height above 101° Fahrenheit (38·5° Centigrade). But it is the duty of the parents to be very careful about diet, even when the cure is already apparently complete. Just at this epoch the little patient has a voracious appetite. If the parents are weak-willed, and run to the child with the feeding-bottle whenever he cries, a relapse may ensue before it is perceived. The case is now a more dangerous one because it is evident that the child's natural powers of resistance must have been diminished by the preceding attack.

Acute Intestinal Catarrh of the Suckling.

In adults, and in older children the maladies of the stomach can be clearly distinguished from those of the intestines, both in their

symptoms and in their treatment. But this distinction cannot be drawn in the case of the suckling, whose stomach practically represents nothing more than the uppermost part of the small intestine. It is only towards the close of the first half year that the gastric glands of the stomach appear. It is only after the fourth month that the stomach (at first of a tubular shape) begins to separate itself from the intestines, both in its form and its functions, by the formation of what is called the fundus (bottom) of the stomach. In consequence, we may use the term stomach-intestinal-catarrh of the suckling, which will mean that both organs are to be regarded as simultaneously affected, and that no injury can be done either without the other's being affected by it.

In this case we find again that the majority of children affected are those of indigent parents, and children put out to nurse. We find, too, again, that almost always mistakes in dieting are the occasion of this disease, which generally sets in suddenly, and may be considered an acuter form or an aggravation of the simple dyspepsia described in the last section. But acute intestinal catarrh is distinguished by something that invariably accompanies it, which we never find in cases of mere dyspepsia. This is a rise in temperature, or fever. This alone gives intestinal catarrh a serious significance. In very young children fever easily produces weakness of the heart and loss of strength, and generally speaking, always implies danger to the life of the child. There can be no doubt that this fever indicates that the contents of the stomach and bowels are not only vitiated by processes of fermentation, but have been also affected by an invasion of septic germs, and the products of the decomposition of these germs have passed into the blood. As we are aware that heat favours all kinds of putrefaction and decomposition, it will be no surprise to us that the majority of disturbances of the digestive organs both in young and old occur during the hot summer months of July and August.

Children almost always sicken of acute intestinal catarrh very suddenly. One day the mother is delighted by the zest with which the baby tries to hold the feeding-bottle with both hands, as if resolved not to have it taken away from him sooner than he chooses; and the next day he refuses almost everything that is offered him. The little legs are drawn up close against the belly. The belly itself is not so swollen with wind as in the case of simpler pains caused by indigestion. But the sensitiveness of the whole abdomen is very great; and it will be observed that the little patient frequently cries piteously, and only seems to be more easy for a few minutes when he has succeeded in relieving the tension of the belly by breaking wind.

These evacuations of wind are generally accompanied by small simultaneous evacuations of liquid matter. In consequence of their frequency the anus and the region around it become after a day or two red and inflamed unless some preventative is applied which may hinder the soreness. The motions are very frequent: and may very probably be twice as frequent as in dyspepsia. The appearance of the motions is also very different. In dyspepsia a good deal of solid matter is found in the napkin. In acute intestinal catarrh, already on the evening of the first day, the motions are thin and colourless, and have very little smell. This could hardly be otherwise. After twelve hours of continuous diarrhœa the child's bowels are almost completely empty, and the subsequent evacuations consist almost exclusively of the mucus of the intestines. The tongue, thickly furred, the heat that seems to emanate from the little body, and, not least of all, the burning thirst of the little patient all show us that fever, which has already been mentioned as an invariable concomitant of every acute disorder, may have reached a very considerable height. It is best to take the child's temperature not as usual in the anus, because the intestine is much inflamed, but under the arm-pits. The temperature may be 102° Fahrenheit (39° Centigrade), or even more. (See the sections on fever and taking the temperature in fever.)

To proceed to the treatment of the disorder: it is evident that in this case we must be guided by considerations that differ a good deal from those that apply to mere dyspepsia. In dyspepsia our first aim was as quickly as possible to purge the digestive canal. After that we had only to deal with mistakes in diet, and a rapid cure was certain to be effected. In the case of acute intestinal catarrh we have not only as quickly as possible to check the child's violent diarrhœa, so that no injurious results may follow from it, but we have also to banish as fast as we can the accompanying fever if we wish for any prospect of cure.

We pointed out that in dyspepsia the child has himself effected generally a complete cleansing of the intestines. And this is still more the case in acute intestinal catarrh, so that no occasion exists for any injection.

The first prescription is a rigorous diet, and in this case the best diet is—hunger. There is no occasion to fear that a sucking child will die of hunger if he goes, for once in a way, twelve hours without food. On the contrary, the less the child takes the less he will have to evacuate, and the less the evacuation so much the more time for recovery. To quench the excessive thirst weak tea can be recommended in this case also. When it can be procured I prescribe a

desertspoonful of brandy* and two desertspoonfuls of French red wine in each cup of weak tea. Every five minutes a desertspoonful of the mixture should be placed in the mouth of the little patient, who will eagerly accept it.

When the patient has for some twelve hours taken nothing but the tea it is time gently to begin a suitable diet. Milk is advisable only in the form of mother's milk. Children who are being nursed at the breast should be put to the breast. Children who are being brought up by hand should not be given any milk for four or five days. Barley broth, oat-meal broth, cocoa, or gruel may be tried, and, indeed, whichsoever of these may be most easily procured.

If a distinct improvement is perceptible after a few days it is advisable to return gradually to a milk diet; particularly if the child is not more than four months old; as we have already seen that his delicate intestines cannot for long bear a diet containing starch. But the return to milk should be made very gradually, a little more being given each day until the quantity of milk previously given is again reached.

On account of the tender age of the patient, it is better to abstain from attempts to check the fever by the usual medicinal means. The medicines in question are two-edged swords; that is to say, if they are beneficial in one way, they are detrimental in another, whether they are called "antipyrine" or "antifebrine" or what not else. Much more good may be done by baths, and the little patient should certainly have two every day. The first bath should be given about ten in the morning. Its temperature should be 93° Fahrenheit (34° Centigrade), and it should not last more than five minutes. The second bath should be given about six in the evening. Its temperature should be at first 93° Fahrenheit (34° Centigrade), but whilst the patient is in the bath, cold water should be added until the thermometer sinks to 88° Fahrenheit (34° Centigrade). The babe should then be wrapped in warm woollen clothes, and the anus and its vicinity then be wiped dry with warmed woollen cloths, and the anus and the parts around it sprinkled with zinc-powder, as a preventative against soreness. Two or three tea-spoonfuls of the mixture of tea, brandy, and red wine above mentioned should be given after the bath, so that after the cooling bath a comfortable warmth may circulate in the little body.

---

* The aim of the brandy is to keep up the heart's action. The red wine not only strengthens the intestines, but also has a good effect upon the diarrhœa.

After this, all that is in our power has been done to put the patient in the way of recovery. The rest depends principally upon the constitution and the general condition of the sick babe. If the child is really strong, after the diarrhœa has been checked, if no weakness of the heart ensues in consequence of the fever, the critical point is turned in four or five days, after which a gradual cure is effected in the course of time. Poorly nourished babes, and those that are unfavourably circumstanced, on the contrary, very often sink with general symptoms of severe prostration, not rarely accompanied by cramp.

Cholera Nostras. Summer Cholera.

Just as we have described acute intestinal catarrh as a severer form of the dyspepsia of "a stomach that has been upset," so we may fairly consider cholera nostras or children's cholera as a severer form of acute intestinal catarrh. Frequently we meet with cases that on the first day appear to present nothing more than a derangement of the child's digestion, but during the night assume, in consequence of the appearance of fever and of the repeated evacuations from the bowels, the character of an acute intestinal catarrh, and the very next morning present so clearly all the symptoms of cholera nostras, that it is difficult to understand how so grave a malady has developed in so short a time.

Unfortunately, we cannot blink the fact that children's cholera of the hot summer months is a positive destroying angel of young children. Neither rich nor poor, neither the tender babe of six months old, nor the stout child of two years is spared by it. To indicate its principal symptoms we may say, that whereas in acute intestinal catarrh, the chief danger for the patient lies in the violent diarrhœa, in this case the danger is increased by a violent vomiting, which often follows every attempt to give the babe even the smallest quantity of food. It can well be understood that the diarrhœa and vomiting, together with the high fever, which is seldom absent, are sufficient to produce a complete collapse in a very short time.

This children's cholera, which frequently appears as a real epidemic during the hot months of July and August, and yearly claims a large number of victims, shows indeed no compassion for the children of the wealthy; but it does (like the other diseases of the digestive canal which we have already considered) principally attack those children whose parents (either from want of time or attention) have bestowed too little care upon their nurture and diet. In the hot

summer months it also makes a great deal of difference whether a babe sleeps together with a whole host of brothers and sisters as well as its parents in a single badly ventilated room, or whether it has at its disposal a large bright nursery, where care is taken for the free admission of light and fresh air. In the summer months even parents with straightened means should therefore be careful to use their best and largest room as a bed-room. But to ask this is likely to be wishing for impossibilities so long as the housewife remains convinced that the best and largest room in the house must be kept for a parlour which is seldom used, whilst the kitchen is good enough to live and eat in, and any little room does for a bed-chamber.

But it must not be understood that errors of diet or bringing up necessarily precede cholera nostras. The disorder appears where the greatest care has been taken. And this circumstance taken in connection with the extremely violent course of the disorder suggests the suspicion that we have here to do with an infection. And that is in fact the case, but perhaps in a sense somewhat different from what many would understand by the word. The malady arises without doubt, from the entrance into the child's intestines of a particularly dangerous disease-producing germ. This germ, as soon as it has reached the milk in the digestive canal of the child, multiplies itself enormously, under the favourable influence of the warmth of the child's body, and then floods the child's whole organism with the poisonous products of its decomposition.

As for the general symptoms of children's cholera, it will be seen that they resemble those of acute intestinal catarrh as regards the fever and the diarrhœa; but the vomiting will prevent us from confusing one disorder with the other. It is further important to remark that in cholera nostras, the abdomen of the patient does not appear to be either painful or distended with wind—both which symptoms we found in dyspepsia and in acute intestinal catarrh. On the contrary, the belly of the child is generally sunken and hollow so that the lower ribs stand out very distinctly.

The vomiting is generally very sudden and violent, so that the small mouth can scarcely open itself sufficiently widely to give passage to the very sour smelling contents of the stomach which are violently ejected. The evacuations of the bowels are of a similar character, they seem to be actually shot out, and are so frequent that it is scarcely possible to supply a sufficiency of dry napkins. The colour of the fæces may be very different, and passes in the course of a few hours through various changes, but generally by the evening of the first day, the napkin already contains nothing except colourless,

slightly smelling mucus from the intestines.—The temperature of the fever is very variable and but little decisive. A marked rise in temperature is often perceptible from the outset. After this, the temperature may suddenly fall, and then rise again, which must be generally regarded as an unfavourable sign. Often, also, the fever sets in only towards the end of the attack, and then rapidly produces death in consequence of weakening of the heart. The most hopeful cases are those in which the temperature, even if it be high, presents no very great variations.

All forms of true cholera nostras are accompanied by an extraordinarily rapid collapse of the child's strength. This is a direct consequence of the great quantity of fluid lost by the tissues, and the influence of the poisonous products of decomposition upon the infant heart. Temporary intensification of the collapse presents us with an appearance that may be compared with a fainting swoon. The forehead is covered with cold, sticky perspiration. The extremity of the nose, the hands, and feet feel cold. The respiration appears to have completely stopped. Even the pulse can be detected only by the closest observation.

But the little heart is still beating, and generally after a few minutes the blood returns into the vessels. The paroxysm has passed. If after this the vomiting abates, and the diarrhœa ceases, all may turn out well. It is incredible with what persistence many delicate children cling to life; and one often sees, incredible as it may appear, stout, well-nourished infants suffering from cholera nostras succumb more rapidly than delicate ones. But if the moments of fainting recur, and the vomiting and diarrhœa continue, hopes of rescuing the child's life are considerably diminished.

The fontanelles of the head are seen to sink slowly, as in tabes. The eyes begin to lose their light. The corners of the eyes are filled with crusts, and the little patient, unequal to the combat with so severe a malady, sleeps in a state of evident unconsciousness.

If we now look around us for means of rescuing the child from this terrible cholera nostras, after all our care has been unavailing to protect him from the disease, we find, as we might have anticipated, that innumerable medicines have been brought out against this formidable malady. But it would be wrong not to add that the majority of them are quite powerless to effect what is expected of them.

The great aim is to remove the serious infection, and its excitants; and as that is not immediately possible, the only thing remaining is to leave the organism to make its own spontaneous and natural efforts

to expel the poison from the body. It is another matter—and here we can give real assistance—to try to help the little patient through the great loss of fluid, consequent upon the vomiting and diarrhœa.

For this purpose we may have recourse to deep injections into the bowels, which often have good results. A thin, slightly greased elastic indiarubber tube is carefully inserted, generally to the length of a foot and a-half into the anus, so that it reaches far into the intestines, and through this we pour into the bowels by means of a glass funnel three large cups of luke-warm water, in which a small portion of common salt has been previously dissolved. Even if a portion of this water is a few minutes afterwards evacuated, another part is certain to be absorbed by the intestines. A distinctly stronger beating of the pulse will be observed in a few minutes; and a similar injection may be given again after the lapse of a few hours. If, as sometimes happens, the intestine is so irritated that it retains none of the water, a weak solution of common salt in water must be injected into the child's tissues by means of hypodermic injection with a hollow needle. It is needless to add that this extremely simple and almost painless remedy needs an experienced hand, and must be applied by a medical man. But in any serious digestive malady of an infant it must be understood that professional assistance should always be sought as soon as possible.

It is always to be regarded as a favourable symptom when the vomiting abates, and the patient begins to be able to retain a little weak tea, which should be given cold, and only by a teaspoonful at a time. The moment when the child is able to retain this may be almost always regarded as the turning point. The tea, which the child will swallow readily, not only assists the parched tissues and the blood-circulation after it has been absorbed by the intestines, but can also, if a little good brandy be added to it (a teaspoonful to a tea-cupful), react favourably upon the dangerous weakening of the heart.

The bath, a warm one of 95° Fahrenheit (35° centigrade), should not be neglected. It is a good plan, in order to obtain a powerful cutaneous irritation, to add a little mustard. The simplest way of proceeding is to bind up two handfuls of mustard in a small linen bag, and to throw it into the water. The bath may last from eight to ten minutes.

Whether medicine should be given internally or not must be decided on by the attendant medical man in each case. Here all that need be mentioned is that camphor and ether are specifics against weakness of the heart. Opium and calomel (bichloride of mercury) are employed to allay the disorder of the stomach and intestines.

In the preceding sections we have studied the acute disorders of the digestive canal of the suckling, and have seen how frequently the child's powers of resistance succumb beneath them. Turning our attention now to the chronic maladies of the stomach and intestines, we shall find ourselves in more hopeful regions. It is true that much patience is often necessary before the malady is conquered; but the victory means a human life rescued, which, but for our assistance, must slowly but certainly have perished with the symptoms which we have described under phthisis.

Chronic Intestinal Catarrh of the Suckling.

Chronic intestinal catarrh must be considered the most serious of the chronic disorders of the digestion of the suckling, for this reason that it is the most common of all, and only an early recognition and treatment of the disorder can save the patient. Here too grave errors in dieting are almost always the cause of the complaint, and for this reason the greater number of the patients are either children put out to nurse or children whose mothers do not take so much care of their children as they should. The symptoms point almost invariably to the consequences of feeding the child too soon with farinaceous food containing starch, and the insufficiently nutritious qualities of the food, as well as a constant excessive quantity at last induce a chronic intestinal catarrh.

The first indications that the child is not perfectly well are the child's numerous motions (which often at first seem like a harmless looseness accompanying teething), and a slight loss of weight. But as the child appears to like the food given him, no more attention is paid to the matter, or the mother contents herself with reflecting that some such slight disturbance of the bowels may be a mere consequence of teething. But after a time the mother is startled by discovering that the child's motion, not only have a very foul smell, which might be compared almost with that of decomposing meat, but also by observing that blood and pus appear with them. After this, various symptoms of disease rapidly follow one another. The previously happy child becomes fretful and nervous. The smallest sound suffices to make him start. When he cries his face exhibits a number of folds that did not previously exist. If the small body of the patient be examined naked, a distinct loss of flesh is perceptible; but the abdomen is generally swollen like a drum, and exhibits near the surface many blood-vessels which show through the skin. The fontanelles of the head are slightly sunken. The features commence

more and more to exhibit the expression of those of an old man; and, in effect all the symptoms of phthisis of the intestines, whose further consequences have been already described, are present.

As the treatment of this equally serious and frequent infant disorder has been already explained elsewhere, it will be necessary here to add only some general important practical cautions respecting the beginning of chronic intestinal catarrh.

First of all, any careful mother or nurse, as soon as she observes that the child has begun to lose weight, should not console herself with supposing that this is the result of some difficulty in teething, or of some other unimportant cause, but should rather immediately try to ascertain whether the child is being properly nourished by the food that is given him. Inspection of the child's motions is the best way of learning this; and for this reason I shall here explain how the child's normal motions ought to look, and how often they should occur.

The child who is being nursed upon milk (whether the mother's milk or cow's milk), should, in the earliest months, regularly have five motions every day, without these being at all too many. The fæces should have a yellow colour, be almost without smell, and neither loose nor solidly formed, but about of the consistency of potter's clay. After the first four months the number of motions ordinarily sinks to three or four a day; when in the sixth or seventh month biscuits or farinaceous food are added to the diet, the motions take a more solid form, and have a darker colour and stronger smell, in fact a nearer resemblance to the fæces of adults. If, therefore, a mother perceives from the contents of the napkin that the child's digestion is out of order, that is if the child's fæces show either by their colour or their foul smell that some disorder of the bowels exists, she should as quickly as possible alter the diet. At the outset it is generally not difficult to effect a cure in a short time; and the mother is pleasantly surprised to see the child who was recently loosing weight now recovering it after the highly lauded, and unfortunately too soon used farinaceous food has been set aside.

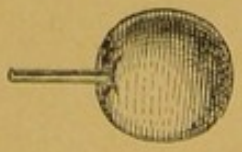
Chronic Constipation of the Suckling.

It has just been said that a sucking child may normally have five motions in the course of the day during the first months of his life, without this indicating any disorder of the digestion. But we often meet with cases in which the child from the very day of his birth exhibits a strong tendency to constipation, and has a motion only

once in two or three days. The general health of the child is frequently quite undisturbed until the fæces, in hard lumps, having passed through the lower intestines, are about to be evacuated. The child now becomes distinctly uneasy: he cries loudly, or lies with darkly-flushed head whilst he labours to pass the tough lumps of fæces, which at last often appear stained with blood.—It may be granted that when this sluggishness of the bowels (for constipation may be correctly so described) appears in the case of older sucklings, who during the first months of their lives had regular motions, the disorder is often a consequence of the too early use of farinaceous food. But on the other hand an obstinate tendency to constipation is sometimes observed in babies during the first week, and even in the case of babies nursed at the mother's breast. This can evidently be explained only by costive properties of the mother's milk (a supposition which may be almost excluded), or by a congenital weakness of the muscular action of the infant's bowels. Naturally in all cases of severe constipation, it is right to ascertain that it does not arise from any malformation of the anus—which does occur in rare cases, and demands artificial enlargement of the orifice by surgical means.

If it be concluded that the cause of the obstinate constipation must be sought in the diet, that is to say, if the case is one of a child who during the first months whilst fed upon a pure milk diet had regular motions, but has become constipated since he began to receive farinaceous food, the simplest expedient for combating the disorder is evidently to return to the milk diet, and to wait some months longer until the child's intestines shall have become stronger before giving the farinaceous food. If this does not affect the desired result, or if the case be one in which the child's constipation arises from entirely different causes, recourse must be had to artificial means, and two ways then lie open. Either a mild aperient may be given the little patient, as much of a child's powder (rhubarb and magnesia) as will cover the point of a knife is the best. It should be placed in the feeding-bottle, and generally has a good result—or what is called a soap-suppository is administered to the child through the anus. Both remedies are good, if they are not employed either daily or too long. After a time the intestine habituates itself to the remedies and no result ensues. A

Child's metal clyster.



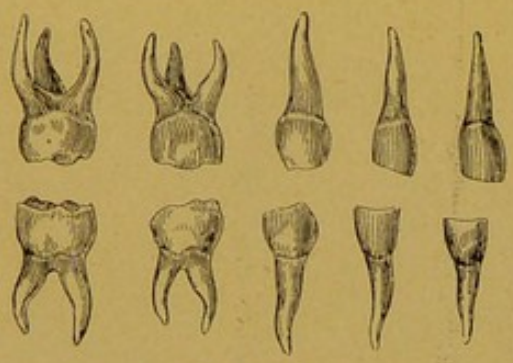
India-rubber clyster for children.

very simple instrument for giving the injection is the child's clyster in the form of an india-rubber ball, which has rightly supplanted the metal squirt by which much harm has been done.

It is quite sufficient that the child should have one artificially-produced motion in the day. Doses of oil, soap, or salts should be avoided. The delicate intestines of the suckling are uselessly irritated by them.

Difficulty in Teething.

That the appearance of the first tooth is sometimes accompanied by symptoms of disturbance of the health has been already mentioned in the description of the cutting of the milk-teeth. That children inclined to rickets cut their teeth much more slowly than thoroughly healthy children, and may reach their tenth, and even their twelfth month before a single tooth appears, has been also explained. In many cases one tooth appears after another without any disturbance of the general health being apparent. But we meet also with cases of children who suffer more or less over cutting their teeth. They become extremely irritable and fretful; and are constantly bringing both their hands to their mouths. The flow of saliva is abundant, and the strong inflammation and swelling of the flesh of the gums show us plainly where the pain is situated. Even mild symptoms of feverishness appear, and excitable children start up in the middle of their sleep. A violent diarrhœa often accompanies the days of teething, and a general eruption of pimples, the so-called "teeth-pox," which is often seen, prove that the nervous system of many children is particularly sensitive and irritated at the time of the cutting of the first teeth.



Milk-teeth.

On the one hand it must be remembered that it may be a mistake, during the months in which the first teeth are cut, to refer any appearance of diarrhœa, or in general any disturbance of the child's health to the teething. This convenient explanation has lead many a mother and nurse into making the dangerous mistake of at first neglecting some disorder of the child that had no connection of any kind with the teeth. But on the other hand it is going too far to

assert, as some medical men have asserted, that no indisposition accompanies teething, and that any disturbance of the general health must be therefore referred to some other cause.

Generally no particular treatment is necessary. The general symptoms should furnish a hint to what ought to be done. Formerly it was usual to lance the gums where the appearance of the next tooth was anticipated. This perfectly useless operation has fallen out of use. During teething, the greatest care should be bestowed upon extreme cleanliness in nursing and feeding the child. Great care should be also taken to preserve him from chills. Experience has shown that just at this period, children are particularly disposed to catarrh of the organs of respiration.

CHAPTER V.

The Disorders of Childhood.

We shall begin our description of the disorders of childhood by speaking first of those which are known as "infectious" disorders.

That being the case, this seems to be the right place to give some general, useful preliminary hints respecting the behaviour of parents in cases of infectious disorders, the isolation of the patient, and the destruction of infectious germs; and to add a few words respecting the care, dieting, and treatment of the sick child, exactly as we did above, before actually treating of the disorders of the suckling.

It makes a great difference whether one has to nurse and attend upon an infant of eight months, or a child of eight years old. Every one will agree with that who has had, for instance, to nurse a lively youngster, who, after recovery from typhoid fever, finds himself in the convalescent period, and has to be kept upon a very limited diet, as any mistake in that direction might lead to a relapse. One needs to be firm to be able to avoid yielding to the repeated petitions of the poor little fellow, who wishes now to have this and now to have that, and cannot understand why his very simple requests are refused. Nothing of this kind happens in the case of the suckling. His horizon extends no farther than the feeding-bottle or his mother's breast; and at the worst, he only begins to cry when he considers himself deprived of his rights.

A child's days of sickness are those in which a prudent training from the earliest years reaps its fullest reward. It is now that the mother is glad that her child with a throat affection learned whilst he was in good health how to use a gargle, and to wash his mouth daily in that way. Now it also appears whether the child has learned to be obedient, whether he will readily take any medicine given him, or whether he obstinately and perversely presses his teeth together, or tries to hide his head under the bed-clothes, so that it is necessary to force the medicine into the forcibly opened mouth of the patient, under which circumstances half the dose is wasted.

I said above, respecting teaching the baby at an early age to be clean, that the education of a child could not begin at too early an

age, that "the tree must be bent whilst it is young."

No man of sense, and least of all a medical man, would recommend parents to treat their children harshly and inconsiderately—as children unhappily are treated in some homes. A child's disposition is naturally impressionable, and easily affected by any influence, and it is, for this reason, a great mistake to intimidate children by harshness, and to scoff at their fears. But to treat them on the other hand with the indulgence and idolatry of which many parents are guilty is equally blameworthy. This is mistaken affection, by which children are not educated but "spoilt." The child has no need to eat of everything that is on the table. It is much better for him to accept dutifully what his more experienced parents put before him. He has no need to be always hearing how good and dutiful and obedient he is. The only consequence of that will be that he will be very much surprised when he discovers that his schoolmaster is of a different opinion and punishes him. And this word punishment of which some parents have a superstitious dread: in reality, it is no punishment, but a benefit that is conferred upon the child when he receives for his misconduct, whether from the hands of his parents or his teachers, some sensible correction, of course proportioned to his age. A child should early learn quite plainly that regulations exist with which he must conform, and that punishment invariably follows when he transgresses them.

The child's principal virtue is obedience. A child should be trained to obedience from the earliest age. This virtue contains in itself all others, and may be well regarded as the bridle by which a child should be ruled, not only in the days of health, but also in those of sickness, from which no child can entirely escape.

The Child's Sick Chamber.

Let us next turn our attention to the room in which the child is confined during sickness. If there be a pleasant bright room available in the house, that is undoubtedly the one which should be chosen before all others as the sick room. Unhappily, great mistakes are made about this matter. As has been already remarked, many parents are erroneously convinced that the darkest and most unpresentable room will do for a bedroom or sick room; whilst the housewife is resolved that the pleasantest and best room must be furnished as her reception room, which is used only on Sundays or on occasions of social reunion. This is proceeding on fundamentally false principles. A fairly large and airy room, where the strength

may be recruited by refreshing sleep, where there may be room for doing, during the day, all that may be required is desirable in good health, but becomes indispensable during sickness. Strange to say, the greatest mistakes on this subject are made in the country, where everyone ought to know the value of pure fresh air, having it always at their disposal. But, any one who has lived long in the country, or has happened to have an opportunity of discovering what a cottage bedroom or sick chamber is, knows the horribly close, choking, stifling sensation that is experienced on entering it.

Is it possible to imagine anything more inconsiderate than the attempts of an ignorant mother positively to bury under innumerable blankets and counterpanes a child suffering from fever; to exclude by hanging curtains over the window the very possibility of the entry of fresh air; whilst outside a warm spring sun is shining gaily, and would willingly brighten the sick chamber with its rays?

Let us as soon as possible cast away for ever this old perfectly unreasonable fear of fresh air and bright daylight. Neither should ever be wanting in a sick chamber: besides, does not the medical man require to see a sick child plainly in the daylight in order to be able to judge the expression of its face, or the exact nature of an eruption?

What should be the temperature of the child's sick room? It is not possible to say without some knowledge of the complaint from which the child is suffering. But as a general rule a temperature of 67° Fahrenheit (20° Centigrade) is the best for children confined to their beds.

The patient's bed and clothes should be as simple as possible. It must not be forgotten that after cases of very infectious disorders (such as typhoid, scarlatina, and diphtheria) it may be found necessary to destroy both the linen and the bed-clothes that the patient has used. And this will be agreed to the more readily, if their value is not very great. It is also important so to place the patient's bed that it may be possible to walk all round it, and that it may stand in a good light. But care should be taken that the bed is not placed between two doors or two windows, which would expose the patient to draughts.

The mattress should be hard and level. Featherbeds and coverlets stuffed with feathers are on no account to be permitted in the sick chamber. If thick coverlets are needed they should be of wool, which can be more easily cleaned. Expensive hangings, curtains, and carpets are not only useless in a sick chamber, but actually dangerous ornaments. Experience has proved that infectious germs locate

themselves readily in such furniture. Anyone who cannot resolve upon having all such things either burned or at least chemically purified after an infectious disorder will do better not to permit them to be in the sick chamber.

Before proceeding to speak of the infectious diseases of childhood, we have yet one thing to say: that is to explain the use of a very important instrument which is absolutely necessary if we are to form any idea of the severity and of the course of any of these disorders. This instrument is called the clinical thermometer.

Many medical men consider it a mistake to initiate the public into the use and method of employing the clinical thermometer. I have heard them declare that "it never leads to any reliable results." But my own experience is different. It is true that to use the clinical thermometer a little intelligence is necessary, and also some attention. But one might take both for granted in the case of parents who, for example, wished to know whether their child, who had all the day seemed indisposed, and in the evening appeared feverish, was really suffering from an increase of temperature. Personally I myself have often been pleased, and have approached the child's sick bed with a double interest, when the parents have said to me before I began my examination of the patient, "Yesterday the child's temperature was 101°. To-day it has gone up to 102°: and we thought it better to send for a doctor."

In order that my readers may clearly understand the importance of taking the patient's temperature, and the manner in which this is to be done, it is necessary not only to describe the clinical thermometer, but also to say something about the nature of fever.

The thermometer most commonly used in England is the Fahrenheit. Another, however, is sometimes employed, particularly for scientific purposes, known commonly as the Centigrade. The Fahrenheit thermometer marks 180 degrees between freezing water (32°) and boiling water (212°). The Centigrade thermometer marks 100 degrees between freezing water (0°) and boiling water (100°).* Both instruments are based upon the natural law that bodies expand when heated. They have at one end a small vessel filled with mercury which upon being heated rises to a less or greater height in a small glass tube.

* A third division, that of Réaumur, 80 degrees between freezing water (0°) and boiling water (80°) is used in Germany; where the Centigrade is generally known as Celsius' Thermometer. The rules for converting temperatures, Centigrade into Fahrenheit, and *vice versa*, are a little complicated: but anyone acquainted with some elementary mathematics will at once solve the problems by the following formulæ. Let F = number of degrees Fahrenheit, and C = number of degrees Centigrade. Then

$$F = \frac{9C}{5} + 32 \qquad C = \frac{5(F - 32)}{9}$$

The ordinary bath and chamber thermometers are made on wooden or metal frames to protect them. The clinical thermometer consists only of a thin glass rod. It may be placed either under the arm-pits or in the mouth. In taking the temperature of children it is best to insert it in the anus. Some years since, thermometers called maximum thermometers were invented. These have this advantage, that the mercury remains fixed at the highest point which it has reached until it is shaken down again by a sharp movement.

If a clinical thermometer be placed under the arm-pit of a healthy man or child,* and the arm be drawn over the breast so that the instrument may be completely surrounded by the skin, the mercury will rise to 98·4° Fahrenheit (36·8° Centigrade).

The variations from this temperature in health are very small, less than half a degree, so that it may be said that the temperature under the arm-pits of a healthy man is from 90·4° Fahrenheit (36·8° Centigrade), to 99·° Fahrenheit (37·4° Centigrade).

It has been said that the temperature of children is best taken in the anus. The child should be laid upon his side or upon his stomach, and the thermometer should be protected with the hand so as to prevent its being broken by any movement of the child. We must add that the temperature in the anus is about 1° Fahrenheit higher than that of the mouth, for which an allowance should be made.

Clinical Thermometer.

To proceed to the meaning of the word "fever." This word means simply that the temperature of the body is higher than the normal temperature mentioned above. With the increase of the temperature there is a corresponding increase in the activity of the heart. This is shown by a quickening of the pulse.

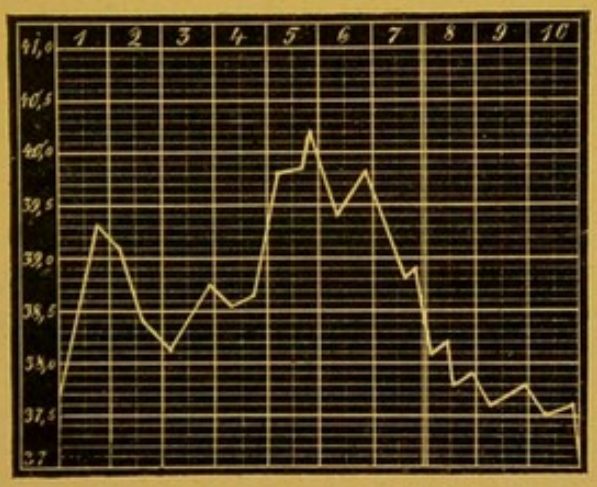
We, however, under certain circumstances, meet with a fall of temperature below the normal point. Thus we find that children who are suffering from phthisis or atrophy shortly before death, often show a temperature of 94·5° Fahrenheit (35° Centigrade). In cases of severe bleeding, and accompanied by fainting, in asiatic cholera, and

* New born children during the first eight months of their life have a slightly lower temperature. The difference is about a quarter of a degree Fahrenheit.

other serious disorders, marked decreases of temperature are observed, and are always bad symptoms.

The highest temperatures are reached in those infectious disorders which begin with severe shivering fits (rigor). Puerperal fever and blood-poisoning may be mentioned as examples. In both of these disorders the temperature shortly before death may rise to 108° Fahrenheit (42·5° Centigrade).

The temperature (both in health and sickness) is also different in the morning and in the evening. In general, a man is ¼° Fahrenheit warmer in the evening than in the morning. For this reason, if one wishes to get a clear idea of the course of a fever in a fever patient it is desirable to measure both the temperature and the pulse twice in the day. The result obtained can be best set down in what is called a fever curve. From the variations of the fever on the different days, a clear notion of the nature of the disorder can be obtained, and every fairly instructed medical man can at once tell from the curve, without anything else, not only the name of the disorder, but also its course. This is in particular true of those infectious disorders which have what is called a typical character, that is to say maladies which run through a fixed number of days, and afterwards, with a sudden decrease of fever enter upon the stage of recovery or convalescence. We shall see that the very first of children's infectious diseases, which we shall study in the next section, namely measles, affords us an instructive example of this phenomenon. We give an illustration of the measles fever curve, on account of its general interest.



Fever Curve in Measles.

The curve in diphtheria is quite different. This complaint does not take a critical course with a sudden diminution of fever, but must be reckoned among the number of diseases which are not ruled by any fixed duration or variations of temperature.

When explaining what is meant by fever, we mentioned that the heightened temperature is always accompanied by an increased activity of the heart. In the number of the beats of the pulse in a minute we have a simple and certain evidence of this activity. The

pulse can be most clearly felt on the underside of the forearm, on the outer side near the ball of the thumb. It should be felt with the finger-ends of the second and third fingers.

The pulse is nothing more than the projected throb of the heart, and gives evidence of the number and of the force of the contractions of the heart's muscles. As the pulse varies considerably at different ages, it may be helpful to give the number of pulsations in a minute at the different ages of man.

Number of pulsations.	Per minute.
Of the fœtus in the womb in the ninth month	140—150
Of the new-born child	about 120
Towards the end of the first year	,, 110
,, ,, second year	,, 100
,, ,, fourth year	,, 90
,, ,, sixth year	75—85
,, ,, twelfth year	70—75
,, ,, twentieth year	75—80
From the 25th year to the 50th	70—75
After the 50th year	60—65

There are naturally some variations, so that this table can make pretensions only to approximate accuracy. I myself, when a young student, had a friend, of whom I have since lost sight, whose pulsation was only 26 per minute, though he enjoyed perfect health.

Infectious Disorders, with Special Reference to Childhood. Measles.

The name of measles will be familiar to all parents. It is often said that everyone must have the measles once, and that everyone who has recovered from them is secure from a second attack of the complaint. Both these opinions are mistaken. A child may have the measles more than once. Cases of this have come under my own observation. But this does not prove that everyone must pass through this disorder: because no one can possibly sicken with measles unless he has been infected with the measles virus. This much we know for an absolute certainty, that measles are an infectious disorder, that is to say, one that is transferred from one individual to another by a definite poison or virus, an extremely small germ which occasions the disease.

The fact that almost all children have measles once, and that measles almost always appear epidemically, that is in such a way that a great many individuals suffer from it at the same time, proves that the infecting substance is very easily transmitted, and that the

organisation of children is particularly susceptible to the attacks of this virus if they come into contact. As a rule, to have once passed safely through the complaint suffices to render the organism immune from further attacks; but this rule, as I have already mentioned, is not altogether without exceptions.

The excitants of most infectious diseases have been identified by microscopical investigation. I may mention for example the bacillus of consumption, the bacillus of typhoid, and the cholera bacillus. The excitant of measles has not, however, yet been discovered. The facility with which the infection can be carried from one child to another is shown by the fact that often whole classes in a school sicken of the measles one after another without a single child escaping. This proves that the infectious matter can be carried by the air, whilst in the case of some other excitants of disease, the typhoid bacillus for example, it appears to be carried by water.

In general, measles are considered amongst the least serious of children's disorders. And I freely admit that in many years the whole form of the disorder is so mild that the patients seem to be scarcely indisposed, and one could easily believe that one had made some mistake about the complaint, did not the punctual appearance of the well-known eruption scatter all possibilities of doubt. But years also occur in which measles are really serious, and one may see such violent allied disorders complicate the simpler appearance of measles, that one may be reasonably glad, after weeks of anxious nursing, to see the patient emerge alive.

Sucklings in their first year appear to be immune from measles, as well as from scarlet fever. And this is very important, seeing that both disorders set in with fever, with which the tender organism of the suckling is ill able to contend. The younger the patient is the more dangerous is the disorder. It is especially dangerous to young children who exhibit general symptoms of rickets, as well as to those who are poorly developed and suffer from general debility.

Proceeding now to the more particular description of the fixed symptoms of measles, I shall begin with a very common misapprehension about this disorder. Often on approaching the bed of a patient covered with the measles rash the doctor is informed by the mother, "The child must have caught the measles to-day." That is not so. The child has been suffering from measles for fourteen days, and it is only to-day that the appearance of the eruption denotes the culminating point of the malady.

Every infectious disease has its "incubation period." This means that just as a seed remains some time in the ground before it sprouts

and begins to develop itself, so the different germs of disease, after they have invaded the body, require some time—different in different disorders—to perform their preliminary operations before they become strong enough to make their effects externally visible in the manner peculiar to their various injurious influences.

In the case of measles the duration of this period of incubation is exactly known. It lasts eleven days. That is the time required by the measles virus to disseminate itself in the body of the child. During these eleven days some children show no signs of indisposition. Others exhibit an unusual want of energy, and give evidences of fatigue. After the eleventh day the special symptoms appear. They last three whole days. On the fourth day, or the fourteenth day after the infection, the characteristic eruption gives evidence of the culmination of the disorder.

The above-mentioned period of three days, which immediately precedes the appearance of the eruption, which may be called the precursory period, almost always begins with a general debility or *atony* of the patient. He is unwilling to eat or drink, sits about idly, remains sulkily in the house whilst his playfellows make merry out of doors, and shows distinctly by his dull state that something is wrong. On the following morning, whilst his parents are still paying no particular attention to his humour, which might have arisen from commonplace causes, a short hoarse cough attracts attention, a nasal catarrh, and an unusual watering of the eyes. His mother probably concludes that he has caught a cold. But whilst she is wondering how he can have caught it, she is struck by the child's puffed swollen face. The child's eyes are also unnaturally sensible to the light, and he will willingly take refuge in the darkest corners of the room—as a patient does who is suffering from granular catarrh of the eyelids. (See granular conjunctivitis.) The mother now becomes puzzled, and tests the child's temperature with a thermometer. The temperature is 100° Fahrenheit (32° Centigrade), and sometimes more. The mother now knows that the child is ill, and suffering from fever. The third day of the precursory period, particularly if the mother is careful, and has at once put the child to bed, generally shows a distinct diminution of the symptoms of disorder, and the parents very likely come to the conclusion that after all the child has merely caught a chill, until the fourth day arrives with a sudden heightening of all the symptoms. The temperature rises to 103° Fahrenheit (40° Centigrade). Frequently violent bleeding from the nose (a common concomitant of children's infectious disorders), a rapidly increasing catarrh of the organs of respiration (which makes itself manifest in a

grating cough), even cramps and vomitings intensify the symptoms, until the eruption (accompanied by a slight perspiration) appears first on the face and then passes downwards to the neck and chest. Scarcely two days after the first appearance of the eruption in the face the whole body is generally completely covered. If we look more closely at the spots we shall at once see that they are all of different sizes and forms. In some places, particularly on the back and the abdomen, spots originally separate slowly coalesce into big patches, and irregularly bounded indented shapes appear. A slight prominence of the eruption above the healthy skin can be felt by the touch. The colour of the measle spots is at first a soft distinct red, which after some days turns to brown, and then as the eruption subsides gradually becomes pale. A slight peeling off of the skin (exfoliation) generally accompanies the disappearance of the eruption. But this exfoliation does not always take place; and is always much slighter than in the case of scarlet fever.

The force of the attack seems almost always to be broken as soon as the eruption has appeared. All the evidences of fever are still present on the fifth and sixth days, but on the eighth day the fever diminishes "critically," that is abruptly, and the patient enters on the same day into the period of convalescence. This convalescence is so rapid that after a few days the patient entirely recovers his spirits, and his parents have some difficulty in keeping him for a short period longer in the sick chamber.

We now proceed to the treatment of simple measles, unaccompanied by any complications. The first direction is that every child must be immediately put to bed as soon as it is concluded from the symptoms above mentioned that he is suffering from measles.

Respecting diet; the patient's appetite is generally so small, that it is the rarest thing to have to guard against giving him too much to eat. In measles, as in all cases of feverish disorders of children, it is best to give them thin broths not containing much fat, a little thin veal broth with rice, or bread soup. Milk soup, or water gruel passed through a strainer may also be recommended, if a little change in diet is desired. Bread and meat, farinaceous foods, and all flatulent vegetables are to be absolutely avoided. As the thirst, in consequence of a more or less high fever, is always excessive, it is advisable to give to quench it, plenty of thin lime-blossom tea, or a cool lemonade. If the patient is constipated, stewed fruit may be recommended.

To relieve the rough cough that accompanies the earlier stages (a cough that no medical man would attempt to check, but only to relieve), and for the very common catarrh of upper organs of respiration,

decoctions of marsh-mallow roots with the addition of a little licorice juice may be given. This is, or course, supposing that no more serious affection of the respiratory organs demands stronger remedies.

The window of the sick chamber ought to be slightly curtained, for the protection of the highly sensitive eyes which are shy of the light, in such a manner that the daylight does not fall on the patient's face. On the other hand the practice of many parents who make the sick chamber of the patient suffering from measles so pitch dark by covering all the windows entirely, that one cannot see an inch in front of one, must be condemned as a mistake. It is well to wash the patient's eyes twice daily (particularly in the morning, when they will often be found to be completely glued up) with luke-warm water. A frequent washing of the mouth and nostrils with water that has been boiled and contains a few grains of permanganate of potash is also to be recommended.

The complete isolation of the measles patient from all his brothers and sisters should depend much upon the particular character of the epidemic. It is a common practice purposely to expose the rest of the children to infection, so as to have done once for all with the measles. If the epidemic is common throughout the neighbourhood, and the measles are of a distinctly mild character, and are running their course without complications, it may seem advisable that all the children of the household should get through the measles together. But if the epidemic appears in a virulent form, if it is reported that inflammations of the lungs, and purulent catarrh of the ears (otorrhoea) are in the neighbourhood accompanying measles, it would be better to get the children, which have escaped infection, as soon as possible out of the house, and to send them to stay for at least two or three weeks with friends or relatives.

Further particular treatment of measles is not necessary, but I may add that the sick chamber should not be too cold. It may have a temperature of about 62° Fahrenheit (20° Centigrade). It is good for children suffering from measles to be well covered up, so that the skin may be kept gently moist, but without perspiration. A common erroneous opinion exists that children suffering from measles should be kept in a state of continuous perspiration, so that the measles may "come out" well, and not be "driven inwards." This is not a correct view, but a misconception based upon isolated cases, in which the eruption is for some reason very slight, and an attempt, more or less successful, is made to favour its development on the skin, by keeping the whole upper part of the body wrapped in moist warm compresses.

I consider the use of baths during measles inexpedient, unless the

high degree of fever, or a complication in the shape of inflammation of the lungs absolutely demands them. I consider that under other circumstances it is better to allow the attack to subside completely, and then advise a daily bath (temperature 86° Fahrenheit, 30° Centigrade) which will quickly restore the strength and appetite of the patient. I have already said that the patient's spirits are rapidly recovered in the period of convalescence. But during this period of convalescence it is necessary to exercise redoubled caution. Naturally the intestines which have, during from eight to fourteen days, been fed only on thin broths, should not be immediately supplied with meat and farinaceous foods. It is also necessary to reply with an energetic "no" to the child's wish to spend hours out of doors in the fresh air after he has been for more than a week confined to his room.

As has been already said, this comparatively simple disorder which we have now described, can often, unfortunately, be complicated with other apparently independently developed maladies; particularly children weakly from their birth, or those that have inherited delicate constitutions, if infected when only two or three years old, or children which show general symptoms of rickets; in short, all children whose powers of resistance are slight, show after measles a tendency to all kinds of disorders. One might almost imagine that these disorders knew that now when he has just got through the measles, was their time to get at the little patient whom his mother's care has hitherto kept out of their reach.

All of a sudden a violent intestinal catarrh sets in; or a purulent inflammation of the ear; or, even more serious, a severe inflammation of the lungs threatening weakness of the heart. I can remember a widely extended epidemic of measles in the year 1895, in the course of which more than a dozen of the children who had caught the complaint developed extended formations of abscesses under the skin, and, which was remarkable, more particularly under the hairy scalp.

It may remain doubtful whether the suddenly developed complications arise from what is called mixed infection (that is to say the simultaneous entry into the body of various excitants of disease), or whether germs of disease which were already in the body are set free to act by the development of the measles virus, and the higher temperature which it occasions. But these complications and consequences (sequelæ) of measles are more dangerous than the measles themselves.

If a sudden intestinal catarrh appears, milk diet should be immediately stopped, and the food limited to well boiled soups and gruel. If it be further observed that the patient begins to suffer from

shortness of breath and that his nostrils have a rapid movement, that the lungs seem strained, and (to borrow a phrase from the mechanicians) that "the machinery is in danger of working hot," the whole chest should be immediately wrapped in a copious moist covering. If this produces no effect, but the patient's fever and difficulty of breathing increase, he should be immediately immersed in a warm bath, and treated for inflammation of the lungs.

I have already mentioned that the eyes of the patient suffering from measles are extremely sensitive to light, that there is an unusual secretion from the tear-glands (lachrymatory glands), and that the eyes are frequently in the morning completely glued up. The symptoms do not always end here. In the course of the measles, or more often after the measles, severe inflammations of the organs of sight ensue, and make prompt medical assistance indispensable. Scrofulous children in particular are disposed after measles to purulent inflammations of the cornea of the eye, which can be very dangerous to children, unless proper treatment (which is very simple) is immediately begun.

Respecting the case when whooping cough and measles are prevalent at the same time, instructions will be given in the section on whooping cough. I reserve also for a subsequent section the discussion of inflammations of the middle ear, and gangrenous inflammations in the region of the larynx, which may appear as complications both of measles and of scarlet fever.

Scarlet Fever.

Scarlet fever is another infectious disorder of childhood, appearing in an epidemic form, from which the individual suffers usually only once. The two disorders resemble each other also in this respect, that some epidemics are slight and presents scarcely any fatal cases; whilst another brings with it so many complications and dangerous sequelæ that one child after another becomes the victim of this malignant disease.

"Malignant" is an excellent description of the character of scarlet fever. The attack is often so mild that the parents feel but little concerned. (An experienced medical man will never express an opinion about the result before the patient has entirely recovered). And then a serious aggravation completely changes the aspect of what previously seemed to be a mild attack, and the scarlet fever shows its real character and its virulence.

Children in their earliest years appear to be immune from scarlet

fever. This has been already mentioned. And we may be glad that the proclivity of childhood to scarlet fever is by no means so great as the proclivity to measles, which almost every child has to go through. Children appear to be most susceptible to infection from two years old to six; for how else could we explain that children most frequently catch scarlet fever between these ages?

From the manner in which the malady begins, from the course it takes, and from its infectiousness, we can conclude with certainty that the cause of the scarlet fever is some tiny organism by which it is spread. We have, however, as in the case of measles, not yet been able to discover this specific microbe with the microscope.

The time of incubation (I may again mention, that we mean by this the time between the infection and the appearance of the specific symptoms) is not so exactly determined in the case of scarlet fever as in the case of measles. But it certainly is not so long. Generally only from two to five days elapse between the moment of infection with the virus of scarlet fever and the appearance of the first symptoms of the disorder. These are so marked that very often a child who is in the morning bright and well is in the evening a patient suffering from a severe malady.

A most important point, by which scarlet fever may be soon detected, is this, that the disease first shows itself almost always by vomiting, pains in the throat, and simultaneous shivering fits. If scarlet fever is prevalent in the neighbourhood these symptoms should be immediately seriously regarded, and all the other children at once separated from the one suspected of having caught the fever. Other indications very soon show whether the suspicion was well grounded, and how wise the precautions were. The clinical thermometer will register 103° Fahrenheit (40° Centigrade), and the feverishly labouring heart show 130 and even 140 pulses in the minute. Appetite is completely absent; only violent thirst tortures the patient. We offer him a glass of cold water, and—this is distinctly characteristic of scarlet fever—we shall see from the painfully contorted face of the sufferer that swallowing gives him pain. Often it is quite impossible.

If the child's mouth be now examined, the tongue being held down with the handle of a spoon, the few moments at our disposal suffice us to see little more than that the tongue is very much furred, and that the inflamed tonsils have no fur. That is for the present sufficient, as it shows that we have not to deal with diphtheria. But an experienced eye, that for instance of the medical man, or of the father who has previously seen children suffering from scarlet fever, will have seen a great deal more whilst examining the mouth and larynx Though he

had but a few seconds' view of them, the dark red lines of the walls of the larynx and the swelling of the inflamed tonsils will be enough to convince him that the case is probably one of scarlet fever.

The very next day also almost always brings assurance by the appearance of the scarlet fever eruption. This appears first either on the neck or the breast, then on the abdomen, the back, the arms, and the legs; sometimes also on the face—the lower part of which, however, always remains free from the eruption. The eruption is in the form of pointed bright red spots. At first these are separate, but after a few hours join together to make larger or smaller patches. Particularly on all parts of the body that are exposed to pressure (for example on the back or the haunches) the spots are several times as large as the hand, whilst on the side of the lower leg they retain their small dotted form. But it must be here added that the scarlet fever eruption can present very great variations both in colour and virulence. Sometimes it is scarcely recognisable by the eye, or can be seen only for one or two hours.

So long as the eruption is not fully developed the height of the fever continues uninterruptedly. In some cases it continues to rise to still higher temperatures, and in these cases leads to a fatal termination.—The eruption seldom lasts fully developed for more than two days, and then gradually disappears. After this the fever abates in the same time as it took to develop. Whereas in measles the disappearance of the eruption is often followed by a slight peeling off of the skin, it should be remarked that in scarlet fever the skin comes off in large rags; and elder children amuse themselves in the time of convalescence in pulling it off in long strips until it is completely renewed.

This is, on the whole, the course of a mild simple scarlet fever with an uninterrupted convalescence.

Unfortunately the disorder only too often takes a much more serious and more malignant form, both during the first actual weeks of the malady and in the period of convalescence; so that it is really the complications and consequences (sequelæ) that make scarlet fever so terrible an enemy to children. In the general interest of our readers we shall not here neglect to enter more fully into these serious aspects of the disorder, though it will be only natural, and a matter of course that all parents will in cases of scarlet fever obtain medical assistance, so as to ensure as far as possible the safety of their children.

To deal first with the general condition of the patient during the first week of the disorder, that is from the beginning of the fever until the disappearance of the eruption. The patient's condition at this

time is often very abnormal. Especially in the case of very young patients severe cramps are common, as we may observe in other severe cases of poisoning. Practically in all infectious diseases, and so in scarlet fever, we have to deal with a poisoning of the organism; as we are fully justified in assuming that it is not so much the scarlet fever germs themselves as the products of their decomposition (called ptomaïne) that do the mischief. These products of decomposition passing into the blood corrupt it chemically, or, to speak more simply, decompose it.—Some children become quite unconscious. I remember distinctly one severe case of scarlet fever of a girl of eight years old, who from the first day showed so strong a disposition to sleep, that she only opened her eyes twice or thrice during eight days. After this she passed into a perfectly normal convalescence, and recovered without any sinister consequences.

The swelling of the tonsils, which has been already mentioned, deserves particular notice, and the condition of the inflamed swollen pharynx. It is a very rare thing for the difficulty in swallowing, above alluded to, to be absent, as the scarlet fever virus from the very first attacks the pharynx, and develops in this region the severest symptoms of the disorder.

That the lymphatic glands of the neck can in scarlet fever be felt, even from the outside, to be swollen (just as the lymphatic glands of the neck of scrofulous children, which are permanently swollen), is not at all remarkable. On the contrary, it would be strange if this were not the case. Those glands swell which are in the vicinity of poisonous germs. But in scarlet fever these germs (still unknown to us) which cause the disease seem to aim particularly at the tonsils. Often in the first days the tonsils may, by a purulent compaction, or even by a kind of foul swelling ulceration, change the simple form of scarlet fever into one that is almost hopeless.

This inflammation of the tonsils in scarlet fever has been called scarlet fever diphtheria; though it has actually no connection with real diphtheria, but is to be entirely attributed to the entrance, with the products of decomposition of the scarlet fever germs, of well-known pus-producing microbes. The severest forms of scarlet fever diphtheria resemble a general blood poisoning, and are, as has been said, almost hopeless. But even in its milder form this complication increases (by the consequent swelling of all the regions around the tonsils) the difficulties of swallowing, and consequently of feeding the patient. It may become necessary for days to give nourishing injections, or to pass the necessary milk into the pharynx by means of a small india-rubber tube through the nostrils.—But even so one may not have

got the better of the consequences of this scarlet fever diphtheria. Frequently the pus-producing microbes make their way out from the pharynx and pass with the circulation into all parts of the body. In consequence of this we see for weeks after preceding scarlet fever severe purulations in different joints; and purulent inflammations may occur in the pleura or the heart. I remember a very severe case of so-called scarlet fever diphtheria, in which the patient was a girl of eleven, who had for days to be fed with a tube. After the pharynx had at length recovered itself, and had thrown off the mortified parts, the child had first *three* holes, about the size of a bean, in the soft palate, by which her speech was for a long time impeded. When we at last believed her out of all danger, a severe purulent inflammation of the knee-joint set in, which took many weeks to heal. Happily the child was not lamed.

The microbes, which in every case of scarlet fever are found in great numbers in the pharynx, very often wander through the tube called the Eustacian tube into the inner ear. Here they occasion a well-known and alarming accessory disorder of scarlet fever, known by the name of purulent otitis media (inflammation of the middle ear). It is almost always possible to know when this malady begins to develop itself in children. They frequently place their hands during sleep behind the affected ear, as if they seem to feel some pain. For the treatment of this malady I shall refer the reader to the sections that deal with diseases of the organs of hearing. But I must not here omit to warn parents seriously that they must immediately in this case procure the assistance of a specialist if the ear does not discharge. The ear under these circumstances *must* either discharge, showing that the pus behind the membrana tympani has broken through, so as to be able to escape outwards, or the pus crowded behind the membrana tympani will destroy the bone and annihilate the hearing; a case which can, unhappily, often occur.

These complications, that is to say disturbances of the normal course of scarlet fever, and connected disorders, mostly appear in the first weeks of the malady. We will next speak of a very serious disorder following after scarlet fever, that is the scarlet fever inflammation of the kidneys. Here the comparison, which we have previously made, with the case of a more or less serious poisoning of the organism will again suggest itself to us; for we often find inflammation of the kidneys caused by poisoning. We know that the kidneys perform somewhat the functions of a chemical purification institute for the body. Their function is to expel from the body the final nitrogenous products of metabolism (changes of matter) in the

form of urine. Hence it will be easily understood, that the kidneys become irritated, when the work placed upon them becomes too great; and this happens when the living self-protecting energies of the organism hand over to the urinary system to be dealt with excessive quantities of the products of decomposition of the scarlet fever germ. The first signs of scarlet fever inflammation of the kidneys almost always appear on the twelfth, thirteenth, or fourteenth day after the first symptoms of the disorder; and it is almost always those cases in which the eruption has been slight that end with the inflammation of the kidneys. We cannot be surprised at this when we know that the skin as well as the kidneys operates in the removal of injurious matter from the body.* When the skin in consequence of the imperfect development of the scarlet fever eruption has performed its task of purification insufficiently, so much the more work remains to be done by the kidneys, which easily explains their inflammation produced by excessive demands upon them.

The first evidence of the beginning of inflammation of the kidneys is given by the matter which they produce—the urine. We observe first a diminution in the quantity, which is very marked. The colour also is darker, and a sediment settles at the bottom, which, if the vessel is shaken, changes the whole contents into a discoloured mixture not unlike dirty water, and affords evident proof of an inflammation of the kidneys. A scientific examination of the urine (which is not difficult, and can be performed in a very simple manner) further shows that the urine is strongly charged with albumen, a positive evidence of inflammation of the kidneys. What inflammation of the kidneys denotes, how it develops itself, and how it is to be treated, will be fully explained in the sections which deal with diseases of the kidneys. I shall here remark only that as soon as the urine has a turbid appearance (and the urine should be every day examined during scarlet fever), care should be taken to give the patient a diet as free as possible from irritants—the best is pure milk; and further, the skin should be stimulated by daily warm baths of the temperature of 99° Fahrenheit (35° Centigrade). The baths should last ten minutes.

Though I have now spoken of the most important concomitants and sequelæ of scarlet fever, it must by no means be imagined that no

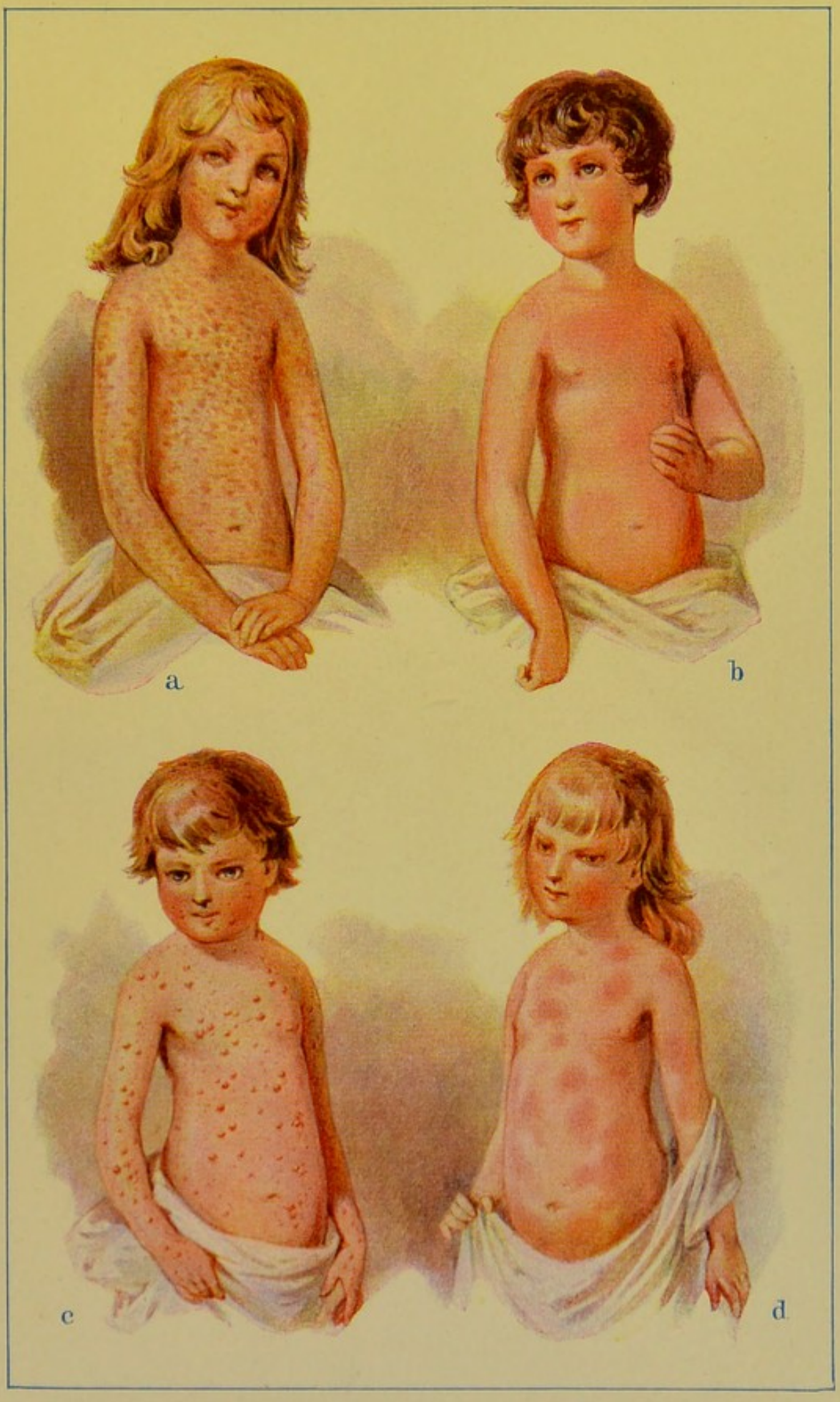
* How important this function of the skin is may be understood from the following fact. A man who has had more than one third of his exterior skin burned is doomed. The remaining uninjured portion of his skin is not sufficient to keep his body duly free from carbonic acid.

other disturbances of the normal course of the disorder are possible. As I have already said, scarlet fever is most appropriately described as a "malignant" disorder. Weeks after the attack, when the patient has appeared to be out of all danger, almost any organ may become inflamed by the effects of the products of decomposition of the germs.

The Treatment of Scarlet Fever. I began my directions in the case of measles with the injunction that the patient should be immediately put to bed. This direction is of even greater importance in the case of any child suspected of having caught scarlet fever. As soon as this suspicion is confirmed either by the medical man, or by the unmistakeable appearance of the eruption, it is most important immediately to determine who is to undertake exclusively the task of nursing and waiting upon the patient. This duty can, of course, be entrusted only to an adult, since, as we have seen, all kinds of complications may occur even in a mild case, and may make great demands both upon the nerves, and the endurance of the attendant. The next point will be the choice of the sick chamber. This should be if possible so chosen that neither the brothers and sisters of the patient nor indeed anyone else should approach the patient nor come in and out of the room. Grave mistakes are often made in this particular.

Scarlet fever is one of the diseases which come under the Infectious Diseases Notification Act of Parliament, whose provisions may be here mentioned once for all. This act requires that all cases of small-pox, cholera, diphtheria, membranous croup, erysipelas, scarlatina, scarlet fever, and the fevers known by any of the following names :— typhus, typhoid, enteric, relapsing, continual, or puerperal shall be notified to the medical officer of health. This notice must be given by the head of the family, or in his default, by the nearest relative of the patient present in the building or in attendance on the patient, or in default of such relative by any person in charge of or in attendance on the patient, or in default of such person by the occupier of the building. It may be added that owners or occupiers must cleanse and disinfect house or articles likely to retain infection, or the local authority may, after 24 hours notice, do so and recover expenses. A person suffering from any dangerous infectious disorder, wilfully exposing himself in any public place or conveyance, or transmitting infected clothes is liable to penalty; as is a person letting a house, or room, that has not been properly disinfected after occupation by a patient suffering from a dangerous infectious disorder.

The sick chamber need not be kept so warm as in the case of

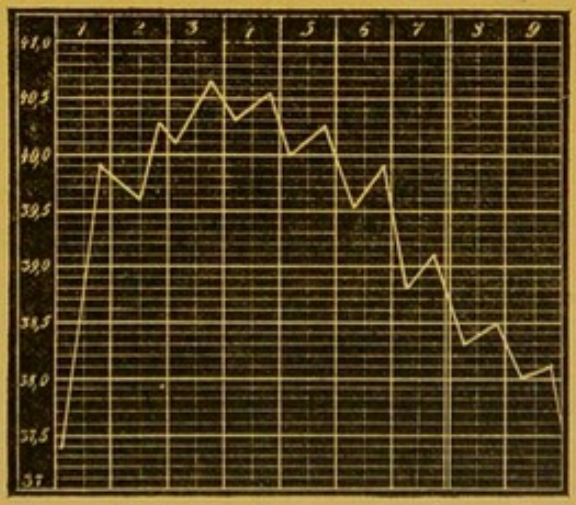


a) Measles. *b*) Scarlatina.
c) Chicken-pox. *d*) Roseola.

measles. The scarlet fever patient is best in a somewhat lower temperature that should not exceed 62° Fahrenheit (17° Centigrade). Care should be taken to admit fresh air several times daily by opening the window. Whilst the window is open the patient should be completely covered up.

The diet, as in all cases of children suffering from fever, should be thin and spare. The same broths as are mentioned above for measles patients may be given. Meat, eggs, and all heavy food are absolutely prohibited on account of the danger of inflammation of the kidneys. If the appetite is extremely small, or if the child is unwilling (on account of pain in the throat) to swallow, he should not be tormented to eat, but care taken that he now and then takes a little warm milk. It is advisable from the first day to treat the throat with compresses. These should be changed every two hours. Internally the throat should be cleansed by gargling with a decoction of citron water. This applies, of course, to patients who know how to gargle.

In cases of children suffering from very high fever, of those who at the merest suggestion of gargling lock their teeth, partly from fear of pain in the throat, and of very young children who cannot gargle, rinsing the nostrils twice daily is very beneficial. The simple nose syringe of india-rubber that can be purchased of any chemist may be used. The rinsing should be with a pale rose-tinted solution of permanganate of potash, which is useful on account of its disinfectant qualities.



Fever curve in scarlet fever.

Hydropathic treatment is beneficial, and can, if rightly applied, lead to excellent results. But it is necessary to caution the parents strongly against attempting the use of antipyrine or any similar expedients for reducing the fever. A severe weakening of the heart's action would be the ordinary consequence; apart from the fact that both antipyrine and antifebrine, if mistakenly used, must be described as actual heart-poisons.

As I have already said, hydropathic treatment is the one to be recommended. In scarlet fever I prefer generally complete immersion in baths of about 90° Fahrenheit (32° Centigrade), and of five minutes

duration to damp wraps. Simultaneous douches on the shoulders and back act as stimulants to the frequently weak respiration; but they should be attempted only with patients of strong constitutions.—Immediately after the bath an attempt may be made to give the patient a comfortable sense of warmth by giving a few small spoonfuls of weak warm tea with a little brandy, and then wrapping the patient up warmly. On the other hand a former common practice of attempting to produce a direct perspiration, by giving some sudorific tea, or making the patient extremely warm in bed, is not to be recommended.

The sinking curve, that is to say the cessation of the fever, shows us when the regular treatment with baths may be discontinued, and when the patient enters upon the stage of convalescence. As we have seen that this period may be disturbed by the appearance of scarlet fever inflammation of the kidneys, the condition of the urine should be still daily examined for some weeks.

What we have had to say about scarlet fever will have sufficed to show how dangerous and malignant a disorder this is. When it exists in the neighbourhood every possible precaution should be taken to keep children out of the way of infection.

It is, however, to be hoped that something else will have been learned from what has been said about the infectiousness of scarlet fever. Everyone should feel it a positive duty to do all in their power to preclude a possibility of their neighbours and their families becoming infected. For this reason it is right that after a case of scarlet fever in the house every effort should be made to destroy the infectious germs.

After the sick chamber has been thoroughly aired it should be completely cleansed. The walls should be stripped and re-papered, the floor thoroughly scrubbed with soap and water, and the ceiling newly whitewashed. The patient's bedding, clothes, and linen, and the window curtains, can in large towns be chemically disinfected. In small towns or in the country, where this is not possible, they should either be destroyed; or if the parents cannot make up their minds to that, they should be boiled in soap and water and be left hanging to dry in the open air at least for a whole week before they are used.

Diphtheria or Membranous Croup, and Diphtheritic Laryngitis.

Diphtheria is a perfectly well-known excessively infectious disorder of childhood which generally appears epidemically. It seldom attacks the same individual more than once, but I have myself observed cases

of its recurrence after an interval of some years.

Generally children from the age of two years to ten show the greatest susceptibility to the virus of diphtheria. It appears, however, also at an earlier age, and adults present cases of true diphtheria, which are then almost always very severe.

The specific excitants of some infectious disorders, of measles and of scarlet fever for example, have not yet been identified by the microscope. But in the years 1883, 1884 two German savants succeeded, independently of each other, in discovering the microbe which occasions diphtheria. This microbe has been since known by the name of the Klebs-Löffler diphtheria bacillus. This bacillus can be always found in every case of diphtheria; and enables us to recognise the disorder with absolute certainty, which is of great importance particularly at the beginning of the malady. But to know this diphtheria bacillus is useful not only for diagnosis (that is for enabling us to recognise the disorder), but also because it enables us to draw useful conclusions from the conditions of life of the microbe. Thus we know that the diphtheria bacillus cannot endure heat, and perishes at a temperature of 140° Fahrenheit (60° Centigrade). It can, on the other hand, bear being dried almost as well as the bacillus of consumption.

This circumstance makes it plain to us that the danger of infection in diphtheria is very great because the atmosphere favours the distribution of the bacillus. It will follow too that there are also cases in which the germ of the disease is carried either in the clothes of the patient himself, or in those of his attendant, if not also by the medical man.

That diphtheria is commonest in cold months can be explained most naturally thus. The much greater susceptibility of children to colds during the autumn and winter enables the bacillus to have a better chance of development, because it is always on the mucous membrane of the pharynx that the bacillus first takes a hold.

As in most infectious diseases (in measles for example and scarlet fever, as we have already seen) we receive in diphtheria an impression that the patient appears to be suffering from poisoning. Practically this is really the case. The bacilli themselves which have entered the patient's body are not so much the causes of the serious symptoms of the disorder, as the poisonous products of their decomposition. We shall see this more clearly by and by.

Diphtheria being a true infectious disease has, of course, its period of incubation—an expression which will be by this time familiar to the reader. The period is a comparatively short one, and never lasts

more than five days. After this, the general symptoms of the disorder appear in a more or less violent form.

The course of the malady in diphtheria may be either distinctly mild, or exceedingly violent, according to the susceptibility of the patient, and the virulence of the germs that have attacked him. We shall first give a description of a moderately severe case, and afterwards proceed to the different modifications, connected disorders, and sequelæ.

The disorder appears almost always as suddenly and unexpectedly as "a thunderbolt from the blue sky." Just as in scarlet fever we have first fever, vomiting, and sore throat. An examination of the throat shows at first nothing more than a deeply furred tongue, and large swellings and inflammation of the mucous membrane *without* fur on the tonsils, so we are unable for the moment to say whether scarlet fever or diphtheria may be impending. But with a temperature of 103° Fahrenheit (39·5° Centigrade), and a pulse of 120 we are justified in concluding that the ailment must be one or other of these disorders, and do well to take our precautions accordingly—isolation of the patient, choice of sick chamber, and nurse, etc., as mentioned above. In the case of scarlet fever the eruption soon shows itself. If this has not appeared on the second day, that proves that the case is one of diphtheria, and another examination of the pharynx will also now show us various symptoms of this alarming malady. Whilst one of the tonsils shows a few purulent spots only here and there; a part of the other tonsil, if not its whole surface is already covered with a dirty greyish white furry coating, which reminds of the thrush of an infant. The extent of this coating spreads rapidly, and a few hours later both tonsils, the uvula, and a part of the soft palate will be found to be covered with a white skin. Along with this visible extension of the action of the malady a deterioration of the patient's general condition goes hand in hand. To swallow becomes more painful; the patient speaks "through the nose," the fever slowly increases, and the appetite completely vanishes. Thus pass three or four days. They are for the parents days of the intensest anxiety if they have ever previously watched a case of diphtheritic laryngitis and fear that this attack may also develop into it. But it does not. On the fifth or sixth day there seems to be a general improvement in the patient. The thermometer confirms that by showing a distinct fall of temperature. The white layers on the throat exhibit a tendency to separate from the substance beneath them. The speech is easier; to swallow has become more easy, and a day or two later the whole larynx is gradually freed from the white skin that comes away in rags

by gargling.

Happy is the patient who gets off so easily, and can a few weeks later say that all danger is past; for we shall soon see that in the first place the diphtheria bacillus by no means always limits itself to the larynx, but is much more disposed to wander like the scarlet fever bacillus; and, also, that the products of the decomposition of the diphtheria bacillus, which have beeu recognised as poisonous albumen (called toxalbumine) can be the occasion of most serious injuries to the child's organism.

Respecting the wanderings of the microbe, we may observe that, from the pharynx, two roads lie open to it. One is upwards into the naso-pharyngal space, the other leads downwards into the regions of the gullet, the larynx, and the trachea. An advance of the bacilli upwards into the cavity of the nose is by far the rarer form of intensification of the malady which we have already described. An attack in this direction shows itself in a strong foully purulent discharge from the nostrils. This is sometimes mixed with blood, and almost always accompanied by a renewed increase of fever.

Far more common and by far more dangerous is the descent of the bacilli. Whilst the upper portion of the gullet, where the microbe appears to find little to favour its development, is seldom affected, the larynx is much more susceptible. As soon as the bacilli have planted themselves on its mucous membrane, the malady assumes the form of diphtheritic laryngitis, and the course of the disease begins to have a different and much more serious aspect.

Formerly, diphtheritic laryngitis was regarded as a disease wholly independent of diphtheria. At present there is no doubt that this opinion was mistaken. Diphtheria laryngitis is nothing else than an infection with diphtheria bacilli; whether these have primarily, that is to say from the outset, settled themselves on the mucous membrane of the larynx, or the disease is in its form a secondary one, that is a consequence of diphtheria of the pharynx having spread downwards.

No one who has ever seen a case of severe diphtheritic laryngitis will ever forget it. The little patient throws himself from one side to another in a state of perpetual restlessness. The expression of the eyes is anxious. The fists are closed and again opened; and all the muscles of the organs of respiration are strained in the effort to satisfy the craving for breath. A short, stridulous cough is almost always the first symptom of the affection of the larynx. The cough increases rapidly and breaks occasionally into a kind of spasmodic yelping. The patient becomes fretful, and catches at his throat as if something was situated there which he wanted to tear away, in order

to be able to breathe freely. The voice becomes almost inaudible, and it is soon evident that the breath is drawn only with difficulty. The forces of nature are strained to their utmost to draw air into the lungs, and the forehead becomes covered with a sticky perspiration. But whilst presently the efforts of the patient gradually subside, as if he had become convinced of the uselessness of his efforts; on the other hand there already appear, very slowly it is true, but with painful certainty the first symptoms of the overcharging of the blood with oxides of carbon,* which cannot be sufficiently quickly removed by the respiration. According to the patient's powers of resistance, and according to the degree to which the respiration is hindered, the fight for breath may go on for hours. But the symptoms become ever worse and worse if no help is given. Now and then a long wheezing breath is drawn with labour. The deep inhalation is marked by the movement of the abdomen and the sides of the belly. The pulse becomes weaker, and the face bluish, in consequence of the increasing carbon poisoning. Consciousness seems to be entirely lost, and the moment of decease is scarcely perceptible.

But we find the normal course of diphtheria aggravated not only by a local transmission of the original diphtheria of the pharynx to the nose or larynx. A general poisoning of the whole body by the chemical products of the decomposition of the diphtheria bacillus can also lead to an extremely serious and almost hopeless condition. This general infection is generally indicated by a great lethargy of the patient who will take no notice of anything. An extreme prostration, and a faint, scarcely perceptible pulse accompany these symptoms. Frequently a sudden failure of the heart brings about the end, before the whole gravity of the case has been completely realised.

Two other organs must be mentioned which are often affected, sometimes whilst the child is suffering from diphtheria, sometimes subsequently, these are the lungs and the kidneys. Both organs are directly exposed to becoming sympathetically diseased; but whilst the reason of the inflammation of the kidneys must no doubt always be a too great strain laid upon them, the inflammation of the lungs can certainly arise from a direct passage of the bacilli from the larynx into the trachea, and thence into the upper regions of the lungs. The treatment of these inflammations of the lungs and kidneys will

* The function of the lungs is in inhalation to supply the blood with oxygen; in exhalation to pass off into the open air the injurious carbonic acid, they perform the same service as the skin exhalations.

be found in the sections treating of those organs.

Purulent inflammation of the middle ear is not uncommon at the end of diphtheria. It is to be explained by a wandering of the microbe into the interior organs of hearing, and will be described in the sections dedicated to those organs.

The sequelæ of diphtheria are almost exclusively of a nervous kind, and appear in the shape of paralysis. They almost always begin some weeks after the conclusion of the disorder; and, for this reason, it appears to many parents scarcely credible that any connection can exist between the diphtheria from which the patient has satisfactorily recovered and the paralitic symptoms which reveal themselves. Nevertheless, the latter are the direct consequences of the former.

The most dangerous of all the forms of paralysis that can occur after diphtheria is paralysis of the heart. This is by no means uncommon. It appears whilst the patient is seemingly enjoying perfect health, and occasions death as quickly as unexpectedly without any possibility of rescue.

The other forms of paralysis are generally of a transitory sort. One of the commonest is a paralysis of the soft palate. This generally begins to show itself three or four weeks after the disappearance of the diphtheria. The child begins frequently to swallow his food and drink the wrong way, chokes, and returns the contents of his mouth through the nose. The speech at the same time becomes indistinct and nasal. Another form of paralysis affects the muscles of the eye. The child has a difficulty in seeing objects near him.

Paralysis of the muscles of the arm, of the legs, and the haunches, are rarer. But they are sometimes distinctly observable, and generally about eight or ten weeks after a recovery from the attack of diphtheria.

In what manner the poisonous products of the decomposition of the bacilli injure the nerves, and how these paralysis are to be scientifically explained is a question still under investigation. But, for the consolation of the parents, it may be at once said that all these forms of paralysis are of a transitory nature. Experience shows that a complete recovery from them is a question generally of a few weeks only.

The treatment of diphtheria. As diphtheria, on account of its extreme infectiousness, may attack any child who comes into contact with the virus of the malady, the patient should from the outset be isolated from all the rest of the family.

It has been already mentioned that diphtheria is one of the diseases that come under the Infectious Diseases Acts.

All the children in a house where a patient is suffering from diphtheria should thrice in the day, in the morning, at mid-day, and

in the evening, wash their mouths with a weak solution of permanganate of potash.

As in the case of scarlet fever, a single person should, if possible, be chosen to wait upon the patient. Not only the other children, but the parents also should avoid going near him. The sick chamber should be several times a day freely aired; and, with a view to the subsequent disinfection, should contain only the simplest and most necessary furniture.

It is advisable to place in the sick chamber several large basins containing two per cent. carbolic water for washing both the hands of the attendant, and also the vessels commonly used (plates, glasses, spoons, *etc.*), before the latter are handed from the sick chamber to be cleansed in boiling water.

To come to the patient himself, we may first speak of his diet. It will be at once evident that a meat diet is entirely out of place, and the preference must be given to thin broths, gruels, and milk soups. But it is important to see that children suffering from diphtheria should be generously fed, in order to keep up their strength. For this reason it is advisable every day to give the child a raw egg beaten up, or to put a beaten-up egg into the soup, or to give cocoa with the milk. For the weakness of the heart, which may very soon show itself, I consider it advisable that a teaspoonful of port wine (or when this is not procurable, the mixture of weak tea with brandy and red wine, which I have already mentioned) should be given several times a day, both to quench the thirst and to keep up the strength.

As regards the direct treatment of the disorder I consider it advisable that every child suffering from diphtheria should at first immediately receive a hypodermic injection of Behring's serum. (Diphtheria antitoxin).*

The limits of this book will not permit me to explain to my readers the scientific principles upon which Behring founds his teaching. But this much is clear from all the experiments which have been made with this specific, that it certainly produces a good effect. It seems even likely that the regular use of Behring's serum is destined to render impossible epidemics of diphtheria, this disease so fatal to children.

Many parents have a mistaken notion that their children must suffer a great deal of pain from a hypodermic injection. This is a complete mistake. The sufferings which a child will have to endure

* This, of course, means the services of a medical man, and is not a proceeding to be followed by anyone else.

if the disease passes to the larynx, and the little patient has to fight desperately for breath, are infinitely greater.

The whole operation consists in injecting under the skin of the child suffering from diphtheria the contents of the small bottle which holds the serum. A part of the body is chosen where the skin can be easily lifted in a fold. The instrument used for injecting the serum is one provided with a fine hollow needle point. The tiny prick is afterwards covered with a morsel of sticking plaster. Smaller or larger quantities of the serum should be used to destroy the virus of the disease, according to the severity of the attack.

The effect of the serum, which may be simply described as an antidote to diphtheria, is almost always plainly perceptible a few hours after its injection into the body of the patient. The advance of the disease first appears to stop; but very soon after this a quick diminution of the coating almost always follows, and the coating itself liquifies under the action of the serum.

Naturally, it must not be supposed that after the serum has been given all has been done that is necessary to effect a cure. It is necessary to seek for many other means of assisting the patient through the painful hours of the disorder.

However, before proceeding to these, I wish to say a few words about the treatment of the coating of the pharynx. Many parents seem to regard its removal as a most important point. Here I must plainly say that I have never been able to understand why all kinds of means and methods have been recommended and attempted for removing the formidable visible tokens of diphtheria from the pharynx. In my opinion, cauterisation, penciling, and burning the coated pharynx have no use, so long as it is not possible simultaneously to prevent the diphtheria microbe from descending into the larynx.

If it is desired to disinfect the whole region of the laryngeal mucous membrane, and to render it proof against the attacks of the diphtheria bacillus, it would be better to inhale a weak, about one per cent., solution of carbolic acid. This will be much more useful to the child than compelling him to hold his mouth open in order that the layer on the pharynx may be treated with all kinds of acrid fluids. Lime water and oil of turpentine may be recommended instead of carbolic acid; but I consider the carbolic acid best, but must immediately add that this specific is to be used with care. Carbolic acid, if used injudiciously, or too strong, can develop poisonous properties.

I do not consider it necessary, indeed it is hardly possible here to

describe the inhalation machine. There are various kinds, constructed upon different principles, and my explanations might be only partially appropriate. Every inhalation machine is also accompanied by full directions for use, from which everything necessary to be known can be learned.

If the truth is to be told, the various medicines which are often given for diphtheria do very little good; at least in the way of affecting the visible tokens of diphtheria, the coating on the pharynx, or of hindering the descent of the bacilli.

Thorough gargling with a three per cent. solution of chlorate of potash, and rinsing the nostrils with a three per cent. solution of boric acid are to be highly recommended in the case of elder children. Otherwise I advise that all medicines should be avoided, and only some means of strengthening the heart be as soon as possible procured so that it may be used if a sudden weakness of the heart should occur—such as port wine, brandy, or other suitable stimulants. In addition, the use of water is indispensable in the treatment of diphtheria.

Apart from the fever which will be distinctly reduced by complete immersion in tepid baths of a temperature of 89° Fahrenheit (32° Centigrade), water is also serviceable in the form of throat compresses.

Whether a perspiration cure is in all cases successful seems questionable. Probably warm wraps, together with sudorific teas, have been applied as soon as the first symptoms of an affection of the larynx were observed. But in diphtheria it is always necessary to take primarily into consideration the condition of the heart. Now, a perspiration cure invariably involves a great increase in the work which the heart has to do. It would consequently seem to be advisable only in the case of very strong children whose hearts were thoroughly sound.

We must not conclude the subject of diphtheria without a mention of an expedient by which the lives of many thousands of children have been already saved from certain death—this is called tracheotomy.

When all expedients have not succeeded in preventing proliferation on the larynx, and a threatening difficulty in breathing begins, produced by the passage through the larynx becoming continuously narrower, the medical man will ask the parents' consent to the last remedy, the opening of the wind-pipe, to save the child's life.

Sad to say, too many parents either will not consent, or consent too late to the performance of this operation, which offers the greatest hope of rescue when it is performed in good time—that is to say, before the flooding of the blood with carbonic acid brings about a poisoning of the whole organism and weakness of the heart.

But all parents may believe me when I assure them positively that the child, who is before the operation struggling with the most horrible want of breath, feels nothing at all during the operation, which is always performed under anæsthetics; and also assure them that the operation is by no means so serious or radical as the public are disposed to imagine. In reality the whole operation consists merely in opening the wind-pipe (trachea) close below the obstructed larynx, and passing into this opening a small tube, through which the child breathes until the larynx is again opened by the disappearance of the coating; which happens generally in three or four days.

The principal thing is that the operation should be performed soon. To that innumerable children owe their lives.

It is to be hoped that the wider use of anti-diphtheritic serum will make the necessity of tracheotomy rarer; since as I have already said, this serum seems destined gradually to make diphtheria more and more rare.

Small-pox.

Since the introduction of vaccination the number of persons who suffer from small-pox has become so comparatively small, that it is difficult now for anyone to imagine the former extent of the ravages of this disorder, the number of the victims it claimed, or the number of survivors whom it left disfigured. That the extent of the disease has been so extraordinarily limited is due to vaccination alone. In countries where vaccination is not compulsory the number of those who suffer from this horrible malady continues to be very great.

Small-pox is an extremely infectious disorder appearing epidemically. To have suffered once from it gives an almost certain immunity from a second attack. In the eighteenth century, and at the beginning of the nineteenth, it was regarded, and deserved to be regarded, as one of the disorders of childhood, as it appeared, at most, exclusively at an early age. In the course of the nineteenth century it assumed the form rather of a disorder from which children and adults suffer equally.

To describe the appearance and general course of small-pox briefly (few readers of this work will be likely to have personally seen a case of this malady), it may be said that it begins with an incubation period of from two to three days. After this the patient, under a high fever, which appears suddenly, and great general infirmity, develops a vesicular eruption first on the mucous membrane of the mouth and nose, afterwards on the face and the hairy scalp, and finally all over

the body. The eruption consists of an immense number of small vesicles similar to those of vaccination, situated more or less close to one another.

Delicate children of very tender years almost always die before the eruption is fully developed. Strong, older patients lie in a state of great physical prostration approaching insensibility. Some two days later small purulent pustules form upon the summit of each tubercle. They exhibit a strong tendency to ulceration; and only after ten days begin to dry up. The skin now commences to purify itself, with an abrupt abatement of the fever, by throwing off the scab of the ulcer; but not without their trace remaining in the well-known pock-marks, by which anyone who has recovered from small-pox can be easily recognised.

Act of Parliament, as has been already mentioned, requires that every case of small-pox should be notified.

But it is even more important to know how to guard against small-pox effectually than to know how to treat it judiciously. And the results are by far more satisfactory. That vaccination is certainly capable of preventing epidemics of small-pox has been long ago demonstrated by competent statisticians. To any one who is unprejudiced, it will always appear an inconceivable thing that any such person as an "anti-vaccionationist" can exist. These people who agitate for a removal of the enormous advantages proceeding from a legislation that compels vaccination, are simply ignorant of the facts of the case, and would do far better were they to try to understand the foolishness of their aims.

Many of the objections put forward by "anti-vaccinationists" are so foolish that it is not worth while to contradict them. But if it is insisted that in vaccination from arm to arm, that is to say when the vaccination was from the blood of one child to that of another, it might sometimes occur that in spite of all precautions, a direct transmission of some infectious disorder took place; no such transmission is any longer possible, as only pure calf lymph is now used in vaccination; the lymyh having been previously guaranteed by competent experts.

Children who have been vaccinated, as well as those who have not, can naturally suffer from scarlet fever, measles, diphtheria, and other childrens' disorders. To make this an argument against vaccination (which is sometimes done) is absurd. The vaccination is a protection against small-pox. And from that is does protect.

The sole case of any injury arising from vaccination that has ever come under my personal observation was one of erysipelas, which was

developed by a child after being vaccinated. This one solitary case is very easily explained. The bacillis which is the excitant of erysipelas had entered the incision (in itself perfectly harmless) made for the purpose of vaccination. Such extremely rare accidents are doubtless to be deplored. But there are no reasons for declaring a campaign against vaccination.

The history of the origin of vaccination is as follows. In the year 1794, Edward Jenner, an English country doctor, performed the first vaccination with cow-pock lymph. It had been many years before observed both by medical men and by the country people that milk-maids who had become infected with cow-pox* from milking the cows never contracted small-pox. Basing on this observation a conclusion that the cow-pock would give immunity from small-pox, Jenner inoculated with the former disorder as a preservative against the latter.

On his first proclaiming his discovery to a circle of learned men, he met with contempt and ridicule; but on his proceeding a few years later to London, there thousands of persons whom he had thus inoculated were able to boast that they had been in the closest contact with patients suffering from small-pox without contracting infection. Vaccination made rapid progress, and became known not only in England, but also in Italy, Austria, Germany and America, proving everywhere to be a sure protection against the dreaded small-pox.

Vaccination was first made compulsory by law in Bavaria in 1807 when the country was suffering from a severe epidemic of small-pox. Other countries followed this example. The age at which compulsory vaccination was ordered at first varied; because a mistaken impression existed that a single vaccination would ensure life-long immunity from infection. In Germany at present, by the Imperial Vaccination Law of 1874, not only a first vaccination, but the repetition of vaccination is enacted, the whole Empire being divided into districts for the effectual carrying out of the law.

So immensely beneficial has this German Vaccination Law proved, that as a matter of fact small-pox is virtually stamped out in Germany. Other countries with less satisfactory legislation have yearly to return a number of deaths due to small-pox.

A remarkable example of the direct advantage of universal vaccination, which everyone will do well to take to heart, was afforded during

---

* An eruption occasionally appears upon the udders of the cows, and may be transmitted to the hands of the milkmaids. On them it produces a pustule exactly like that with which we are acquainted in vaccination.

the Franco-German War of 1870—1871. The returns are based upon accurate numbers. Of the German Army, which had been pretty thoroughly vaccinated, 450 individuals died of small-pox. The official return of the French Minister of War in 1809 mentions that of the unvaccinated French Army twenty thousand men, in round numbers, perished of the same disease.

Should it be asserted that statistics gathered during a campaign are not trustworthy, here are others from the great industrial German town of Chemnitz, which suffered from an epidemic of small-pox in 1870. The population was 64,255. Of these 53,891 (83·87 per cent.) had been vaccinated: 5,712 (8·89 per cent.) were unvaccinated: and 4,652 (7·29 per cent.) seemed to be immune in consequence of their having previously had small-pox.

Of those who had been vaccinated 953 (that is only 1·76 per cent.) were infected. On the contrary, of those who were not vaccinated 2,643 (46·27 per cent.) caught the small-pox. It is still more instructive to add that of the 953 vaccinated patients only seven died (0·7 per cent.). Of the 2,643 who had not been vaccinated 240 (9·8 per cent.) lost their lives.

The vaccination laws at present in force in England are far from being so satisfactory as the law of the German Empire—with the natural consequence that small-pox is much more common.

All children born in England must be vaccinated within six months of their birth, unless a public vaccinator or medical practioner certify that any such child is not in a fit state to be vaccinated. Neglect to have a child vaccinated renders the parent or guardian liable to a penalty. The Public Vaccinator is, on request, to visit the child's home. In case of non-vaccination within four months from birth the Public Vaccinator is directed to visit the child's home, after at least twenty-four hours' notice to the parent, and to offer to vaccinate with glycerinated calf-lymph, or such other lymph as may be issued by the Local Government Board. No parent or person having custody of a child is liable to any penalty under the Vaccination Act if, within four months from the birth of the child, he satisfies two justices, or a stipendiary or Metropolitan police magistrate, that he conscientiously believes that vaccination would be prejudicial to the health of the child, and within seven days thereafter delivers to the vaccination officer for the district a certificate by such justices or magistrate of such conscientious objection on his part.

To conclude our remarks on vaccination, we will briefly describe the course of a normal vaccination.

The medical practitioner makes on the left arm of the child three

(seldom four) slight scratches, which only just penetrate the skin, about half an inch apart. Into these scratches which show only a drop or two of blood, a small quantity of lymph is introduced, and the whole operation, of which some mothers entertain an extraordinary horror, is concluded.

On the fourth or fifth day a slight redness and swelling appear around the places of vaccination. A small, and at first, clear, vesicle is then formed at the points of vaccination. On the seventh day its contents become cloudy; on the eighth it forms itself into a pustule. On the tenth day this begins to dry up; and finally, sometimes as soon as the fourteenth day, but often a little later falls off in the form of a dry scab, leaving behind it the familiar scars of vaccination. The health of the little patient during these days is different in different cases. Many children exhibit no disturbance of their general health, and merely on the fifth, sixth, or seventh day, show by taking hold of the vaccinated arm that they feel the itching, which the formation of the pustule occasions. But we meet also with cases in which children as early as the fourth day are impatient and fretful. A simultaneous increase of temperature is generally perceptible; but on the eighth day all these symptoms rapidly diminish. The appetite is regained, and as soon as the pustules begin to dry, the general health is as good as before the vaccination.

Any particular treatment is altogether superfluous. The only thing demanding attention is that the vaccination spots should not be squeezed or scratched. No change should be made in the ordinary life of the child. The baths should not be discontinued; only the mother should take care that on the sixth and seventh days the vaccinated arm of the child should be held up by some other person so that it may not lie in the water.

Bandaging with a solution of acetate of alumina is beneficial for the smart itching and general inflammation of the arm at the end of the first week. I must add a warning against rubbing the spots with oil and butter; this is running a risk of erysipelas.

If the parents believe that the child has become ill in consequence of vaccination, they should inform the medical man who has vaccinated the child; it will be his duty to take any necessary measures.

Treatment of Small-pox. Should however the disease of small-pox be incurred by the patient—whether by want of the due protection of vaccination—or as may possibly happen, in spite of it, how is it to be treated? In the first place, it is most important to lay down as quite definite, and well established by experience, that

should the disease be acquired by a child, adolescent, or adult, who has been properly vaccinated, the disease in such a case runs a mild course, and is very rarely fatal. The actual treatment of the disease when recognised, resolves itself into the usual treatment of acute febrile disorders. The room in which the patient is kept in bed should be as large, airy and free from curtains, carpets, and stuffy furniture as possible. The daily airing of the room by open windows, whilst the patient is carefully covered over in the bed, is most important.

The skin demands the most careful attention. Frequent and very careful sponging with tepid water with a slight addition of some antiseptic, a few grains of permanganate of potash or a very weak carbolic solution. The body linen and the bed-linen should be changed constantly, and the utmost cleanliness observed. The treatment of the eruption, with the main object of preventing subsequent "pitting" has invited the trial of many methods. It will be safest in such a work as this to recommend the use of carbolic oil—1 in 40.

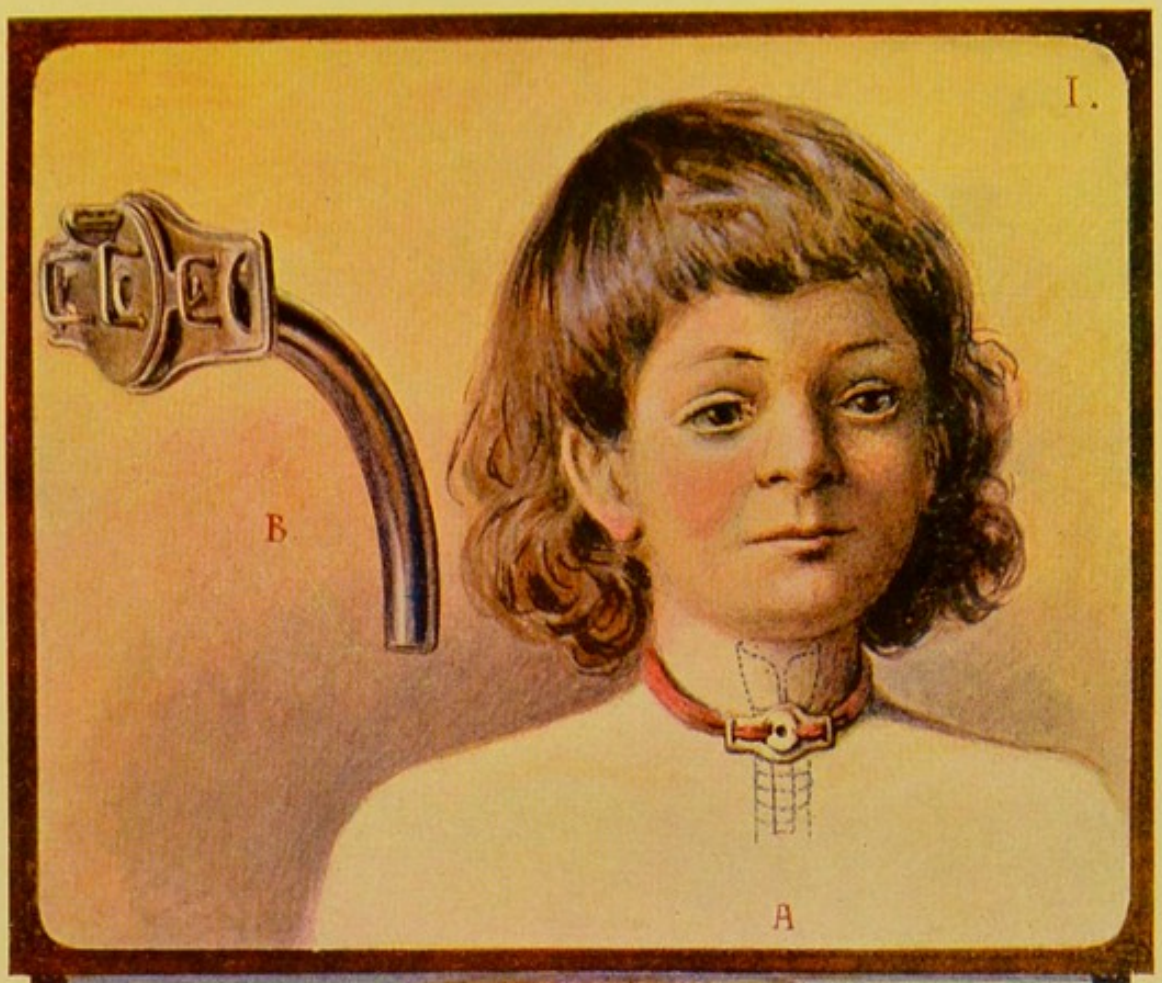
The bowels, if constipated, may require some medical attention; a mild dose of castor oil sufficient to effect an action will suffice generally; but diarrhœa may sometimes occur, and if troublesome, should be met, after cleansing the bowel with a dose of castor oil, by small doses of tincture of opium (laudanum).

The diet will be as for all cases of febrile disorders, as light as possible. Milk, broths, and their various alterations, as in milk puddings, milk and egg mixture, soups, jellies, and so on.

If the main point of the case is failure of the heart's action, stimulants must be used in conjunction with these foods, small doses of brandy, or port wine being added as advised by the medical man. No case of small-pox should be on any account treated without a medical attendant, if such is anywhere within reach. In most countries, the disease is of necessity notified by the parents or householder and by the medical attendant to the sanitary authorities, under penalty for non-observance.

Complications may arise, and in severe cases generally do. Laryngitis, acute catarrh of the nose and pharynx, and bronchial affections. These must be treated on the general lines laid down for the same under their special sections. All these call, as a rule, for increased nourishment and stimulants, to be carefully given in small quantities at regular intervals.

As in most cases of acute infectious disorders, it is not so much a matter of giving medicines, as of careful nursing and management, and this can only be carried out properly by trained assistants under



1. *A.* Child treated by Tracheotomy. B. Tube.
2. Butterfly form of Erysipelas.

the guidance of the medical man. The doctor again will be the only reliable judge as to the use of opium to allay the great pain that small-pox patients often suffer. Most people know what it is to have a bad arm from re-vaccination. Let them imagine what it must be to have the whole body in that state, to be lying on the back covered with pustules, or, in other stages, the maddening state of itching.

Chicken-pox.

It must not be imagined that, because I mention chicken-pox here next after small-pox, any connection exists between these two disorders; or that, as one sometimes hears it asserted, chicken-pox is a mild form of small-pox. The two maladies have nothing in common but their name.

Chicken-pox is an infectious disorder of childhood. In itself it is harmless. The irritant which causes the malady is not yet known. The incubation period is about fourteen days, and the germs of infection are very easily transmitted.

The malady may attack a very young sucking child, or a child even of fourteen. It has never been observed in adults. The disorder begins without any marked alteration of the general health. At the worst some few patients show a slightly heightened temperature in the earliest days. This recedes as soon as the external signs of the complaint appear on the skin.

Chicken-pox on the first day of its appearance shows an eruption which consists of numerous small pale-red spots about the size of a pea, and slightly raised above the skin. In a short time a vesicle forms in the centre. This rapidly increases, and soon occupies the whole space of the spot. The contents of these small vesicles is as clear as water. It dries in a few days, and the whole process is then over, unless a subsequent eruption ensues, which may occur in about fourteen days. After this no further formation of vescicles follows, and as the eruption leaves no scar it may be considered the most harmless of its kind.

No particular treatment of chicken-pox is necessary. It is as well to keep children who are at all feverish in bed, simply to guard against any other malady's supervening. Attention should be paid to suitable diet; and a few days will then demonstrate the harmlessness of the complaint by the complete healthiness of the child, even in cases when a second eruption occurs.

Asiatic Cholera.

The Asiatic cholera first appeared in Europe, whence it had travelled

from its home in India, in 1830. Since then it has, in various epidemics, carried off thousands of human beings. It is one of the most infectious of infectious diseases. The bacillus which causes the disorder was discovered by Professor Koch in 1883, and on account of its curled form named the "comma-bacillus." It is found in enormous quantities in the contents of the intestines of cholera patients, flourishes best in a temperature of 96° Fahrenheit (36° Centigrade), and soon perishes when dried, whilst in fluids of the temperature above named it can live for weeks.

The intestines must be in some disordered condition for them to be able to furnish the cholera-bacillus that has entered favourable conditions for its development. In other words, it does not follow that a man will suffer from Asiatic cholera because a cholera bacillus has entered his bowels. If the intestines are in a healthy condition the bacilli perish, exactly as the germs of tuberculosis perish in the lungs of a healthy man. This is why those men are most exposed to cholera who suffer from disturbances of the stomach and bowels: whilst, on the contrary, medical men with sound digestions have purposely swallowed large quantities of cholera bacilli without the least injury to their health.

The incubation period of cholera is very short, and never exceeds forty-eight hours. After this the disease appears in its general form, accompanied by more or less violent symptoms, according to the virulence of the infection, but always by vomiting and frequent diarrhœa.

The whole course of cholera in childhood almost exactly agrees with the symptoms which we have already described in the section treating of our summer cholera nostras; to which the reader is referred. But it may here be further mentioned that delicate children under two years old seldom survive the second day; and that when, after a complete cessation of the urine the external skin begins to feel very cool, this is a sign of an approaching death.

The treatment of Asiatic cholera is exactly the same as that of a violent diarrhœa. Both young and old are best protected from this terrible malady by a sufficient but careful diet. It is by this that disturbances of the digestive canal should be guarded against during an epidemic.

Whooping-cough.

Many parents may be surprised to find whooping-cough mentioned amongst disorders so dangerous as the acute infectious diseases of

which we have been speaking. They have been accustomed to regard whooping-cough rather as an obstinate sort of cold. But the truth is that all experience and observation go to prove that whooping-cough is a disorder of childhood due to direct infection. It appears epidemically, that is to say, numbers suffer from it at the same time; and attacks both the suckling but a few weeks old, and strong children of fourteen. Cases are even on record of adults, and particularly of mothers who are nursing their infants, and of pregnant women who have been tormented by it for weeks.*

In the case of whooping-cough also we have not yet succeeded in certainly identifying the irritant that produces the disorder. It is true that certain twin-bacteria (known as double-cocci), always found in the viscous saliva of children suffering from whooping-cough, have been claimed as the cause of the malady. But the full investigation of this problem is not yet concluded.

The incubation period seems to be of about the same length as in measles. At least it has been observed that children often showed the first symptoms eleven days after having been with others suffering from whooping-cough.

Like measles, after the incubation period, whooping-cough has a certain precursory period (prodromios). This lasts eleven or twelve days, and is commonly called the preliminary or the catarrhal stage. During this period the infected children (generally without the parents having any suspicion of what is really the matter) show increasing signs of cold and bronchial catarrh. They cough and sneeze, have running noses, watery eyes, and puffy faces—in short, they have all the appearance of having caught a severe chill.

But, notwithstanding all the care that may be bestowed upon the children, these symptoms, instead of diminishing, after about twelve days assume a definite character. It becomes possible to see clearly something different from the appearance of a general chill. The parents now begin to suspect that these remarkable fits of coughing are definitely characteristic of something. Other people in the neighbourhood are making the same remark. And they learn with regret that for some months past whooping-cough "has been about."

The following day confirms the suspicion. The child has passed from the first catarrhal introductory stage of whooping-cough into the most severe period, the time of the convulsive coughing attacks.

* I have never myself witnessed a case of whooping-cough in an adult; and shall leave the question open whether hysterical attacks, with symptoms resembling whooping-cough, may have been mistaken for the malady itself.

These generally last from six to eight weeks, and at the beginning are very trying to the patient.

To describe one of the paroxysms of coughing is not easy, although they are so characteristic that no one who has once witnessed them is likely ever to forget them. They may be described as consisting of a whole series of coughs following one another rapidly, and separated by a noisy inhalation of the breath. The head is generally bent forward, the face becomes red, the eyes, streaming with water, appear ready to start from their sockets, and whilst the skin is covered with perspiration, the child finally—often with simultaneous vomiting—voids from the throat a small quantity of viscous thread-like phlegm.

The number of these attacks of coughing is various, depending upon the severity of the malady. Sometimes fifty or more such attacks can be counted in one day. It may also be observed that either a severer and a milder, or a severer and two milder attacks follow one another. In the case of the majority of children these attacks occur mostly at night. During the day the general condition may, in favourable cases, be surprisingly free from trouble between the attacks.

The children play about the room, and exhibit few symptoms of ill-health. But when one of these attacks of coughing does come on during the day the child will half-a-minute before it run anxiously to its mother, catch hold of her dress, and show plainly by its whole behaviour that it is somehow made conscious of the approach of the attack before it comes on.

Generally after three weeks these paroxysms of coughing diminish both in frequency and violence. But the second stage of whooping-cough, that is the stage of the convulsive paroxysms, must be reckoned at six or eight weeks before the children pass slowly into the third stage, that of recovery. This stage resembles the preliminary catarrhal stage both in its duration and in its symptoms.

But it is false to assume that every attack of whooping-cough must necessarily last eighteen weeks, as many mothers assert. On the contrary, it may be reckoned that a period of from ten to twelve weeks is sufficient to free a patient from this tiresome complaint.

Whooping-cough differs favourably from other infectious disorders in this respect, that it is generally unaccompanied by fever, and does not appear to be capable of poisoning the patient's organism, like scarlet fever or diphtheria. But a severe attack of whooping-cough may be secretly charged with many dangers. In the first place, in consequence of the length of its duration it creates favourable opportunities for other disorders; more particularly as it weakens the

natural powers of resistance of the patient, and, to a certain extent, his powers of throwing off disease. The irritant of whooping-cough has also the very undesirable peculiarity of a great inclination for connection with those of measles or diphtheria.

To speak first of the first mentioned peril. Here we have principally to fear inflammation of the lungs, which both during and after whooping-cough may set in very seriously, particularly in the case of young and delicate children.

But much greater than the danger of inflammation of the lungs (whose treatment we shall describe at length in the sections dedicated to the organs of respiration), is the danger of the slow development, after a severe attack of whooping-cough, of disease of the kidneys. In the case of delicate children of consumptive parents, and particularly in those who exhibit general symptoms of rickets, it is common to observe that, in spite of their apparently passing well through the whooping-cough, they begin to lose flesh strikingly. Feverishness in the evening, swelling of all the glands, severe coughing, disturbances of the bowels and a general loss of strength then pass rapidly into the shape of infantile consumption, which has already been sufficiently described.

It has been already mentioned that measles have a distinct tendency to associate themselves with whooping-cough. It is in fact remarkable how often we observe that as soon as an epidemic of whooping-cough seems over, an equally extended epidemic of measles falls upon the children who are but barely cured of the whooping-cough. It is self-evident that such patients run double risks, and that the danger will be the greater, the shorter the period for recovery of strength between the two maladies has been.

Also simultaneous sickening with both whooping-cough and measles sometimes occurs, and the prospect of saving the child's life under such circumstances is a small one. I myself can recollect several cases in which stoppage of the heart occurred suddenly on the very day on which the measles eruption was about to appear.

Treatment of Whooping-cough. The number of remedies for whooping-cough which are advertised is a suspicious evidence of the small value of any of them.

In reality, the medicinal treatment of whooping-cough has hitherto been crowned with small success. Personally, I have found quinine the most beneficial. I have given this for a period of many weeks to little children in the form of decoctions of Peruivan bark with a large admixture of syrup of squills. Older children take quinine most readily in chocolate tablets, which, at least to some extent, disguise

the bitter taste of the medicine.

Rosorcin, antipyrin, and phenacetin, which I may mention by preference out of a number of medicines do not *cure* whooping-cough. But, under favourable circumstances they may shorten the duration of the malady, and mitigate the violence of the paroxysms of coughing; and so may appear to have some value.

In my opinion, the best medicine for whooping-cough is *a generous diet, plentiful baths, and, in fine weather, plenty of fresh air.* It is not at all necessary to keep the children all day long in a room. They may amuse themselves out of doors; but should be charged to avoid other children, so that they may not infect them.

There is no legal obligation to give notice of whooping-cough. But it is advisable to keep children away from school for a few weeks after recovery. At this time the child has need of opportunity of recovering his strength; and both lessons and play at school may hinder this.

Erysipelas.

Erysipelas is also one of those infectious maladies which are occasioned by the invasion of the body by microscopic organisms. The microbe of this disorder always invades the injured skin.

A few decades ago erysipelas was one of the commonest disturbances of the normal healing of wounds, an equally constant and dreaded visitor in all operating rooms. Recent times, which have introduced an unhoped-for improvement in the treatment of wounds, have made the cases of erysipelas in our hospitals the rarest of occurrences.

In a healthy and uninjured state the skin appears to be a sufficient protection against the invasion of injurious microbes. Consequently some slight injury must exist to enable the minute irritant of erysipelas to find its way into the human body. And this fact that the erysipelas readily quarters itself upon any open wound is further demonstrated by the fact that lying-in women and new-born children frequently suffer from erysipelas. For the microbe enters easily into the open organs of the mother, or can attack the new-born child through the navel wound.

The place at which the microbe enters may be infinitesimally small. The smallest scratch, even the harmless prick given for vaccination, suffices to make the entrance of the erysipelas microbe possible, as has been already remarked in the section on small-pox.

Independently of the erysipelas of lying-in women and of new-born children above mentioned, the disorder appears by far most frequently

in the face. It will be seen that this is natural if we consider how, in ordinary life, the rest of the body is partially protected from attack by the sheltering clothes.

Erysipelas seldom appears in real epidemics, although it is very infectious. A single attack affords no security against subsequent ones. On the contrary, many people are attacked many times in succession by this malady.

The incubation period appears not to be longer than two days. The patient (we will assume her to be a girl eight years old) feels, after the lapse of these two days, a painful, clearly defined spot on the face near one of the nostrils. The skin seems to be stretched above it. A finger feeling the place can distinguish distinctly that the place is hard and hot. Soon after this the mother, to whom the child complains of her pain, sees that the whole of one side of the girl's face is swollen, and near the nose slightly flushed. Headaches, fever, and general weakness almost always compel the patient to go to bed. Meanwhile the inflammation makes rapid progress, and by the end of the first day appears to have attacked the bridge of the nose. But the microbe wanders constantly further and further in the skin, and passes into the other cheek. On the third day a halt is made. By this time the whole nose, and both the cheeks, are alike inflamed and swollen, which gives the patient an altered and singular appearance.

The course of an attack of erysipelas can be divided into three equal periods. Ordinarily three days elapse before the external visible inflammation is fully developed in the face of the patient. This inflammation remains during three days unaltered and equally painful. And in the course of three days the swelling, redness, and pain slowly disappear, with a simultaneous diminution of temperature.

Unfortunately erysipelas often disappears from the face only to reappear in some other portion of the body. This wandering erysipelas, visiting in turn every part of the child's body, may continue for several months.

Very often the upper scarf-skin of the portion of the body which has been affected by erysipelas falls off by vesication. In reality no very serious significance need be attached to this phenomenon, although it does indicate that the attack has been of some severity. Erysipelas is most likely to have disagreeable consequences when it attacks the hairy scalp: as a danger then exists of the watery contents of the vesicles become purulent in consequence of infection.

To proceed to the other secondary effects of erysipelas, a mother should never be surprised if her child exhibits, especially on the first day of the disorder, general disturbances of the digestive canal. The

appetite, as always in feverish conditions, is small, the tongue thickly furred, the bowels inactive, and the fæces of a dark colour.

Nervous disturbances are also not rare. During the first five or six days, children are wont to complain not only of frequent headaches, but also, when the temperature is high, to give evidence of the really infectious nature of erysipelas by vomiting and delirium.

The Treatment of Erysipelas. In the opening lines of this work, I remarked that one of the best defences against a danger was to understand it thoroughly. In no case is this more true than in the case of recurrent forms of erysipelas. Before everything else, we must look for the entrance by which erysipelas gains admission, in order by closing that entrance to exclude the disorder from the human body. Our investigations will be almost always crowned with success. In patients who suffer from frequent recurrence of erysipelas, we shall find on the nose, or at the corners of the mouth, on the hairy scalp, or else in the ears, spots either chronically purulent or covered with scab which serve the microbe of erysipelas as entrances. In all these cases our attempts must be directed to getting rid of this frequently easily remedied evil.

In treating erysipelas (which with the exception of cases of lying-in women, and new-born children almost always runs its course in nine days) our first care will be to maintain the strength of the patient by a supporting diet. We shall also take care that the concomitants of erysipelas, fever, head-aches, and disturbances of the bowels, should not become severe. Fresh water as a drink to prevent thirst, also stimulating baths are to be recommended before everything else. Cold packs seem to me to be less appropriate, particularly when the patient is less than four years old; as I consider that the full bath with its rapid effect upon young patients is preferable to wrappings; unless the wrappings are intended to produce some continuous effect, as for example in cases of inflammation of the lungs. If *one* bath in the day does not seem sufficient to keep the temperature within the desired limits, two, or even three, if necessary should be given. The baths should last eight minutes, and should have a temperature of 89° Fahrenheit (32° Centigrade).

In cases of vesicular erysipelas, I have never hesitated to prick, with a clean needle that has been placed in boiling water, the head of the blister, so as to give free exit to the transparent contents. The places should then be judiciously and lightly powdered with boric acid powder, with which the whole inflamed surface of the skin may be powdered. If the erysipelas attacks the hairy scalp, I recommend the patient's hair being cut so short as to allow the

formation of the vesicles to be plainly seen. The head should be wrapped in a thin layer of clean aseptic, absorbent cotton wool, in order to protect the vesicles from the pressure of the pillow.

The simplest remedy for the constipation will be an injection of pure luke warm water. But I must not omit to mention that occasionally instead of constipation we find diarrhœa, which generally lasts only one or two days.

To attack the erysipelas locally, that is to say, to take measures against the visible inflammation of the skin does not really seem to be necessary, and this will in all probability disappear of itself in nine days—except in the rare cases of protracted erysipelas. If, however, it is desired to do this I recommend lightly covering both the whole of the visibly inflamed surface and the regions bordering it with pure white vaseline, which can be bought from any chemist. This will relieve the painful and tedious feeling of the stretching of the swollen skin.

Hypodermic injections of solutions of carbolic acid, or of other bacteria-destroying fluids, in the regions bordering the edges of the inflammation, are not only very painful, but also rather risky experiments, and cannot be recommended. Much more advisable are cold damp poultices of acetate of alumina, or of lead-lotion, which will assure relief by their cooling properties.

Painting the visibly inflamed portions of the skin with collodion or ichthyol ointment is also a favourite expedient, intended, like the application of strips of sticking-plaster, to check the further progress of the erysipelas bacilli. I must freely confess that these three methods of treatment, which give the patient the appearance of an Indian adorned for the war-path, are considerably more profitable to the apothecary than to the patient. However, they can certainly do no harm; and anyone who believes in them is at liberty to try them.

Typhoid or Enteric Fever.

Long before Professor Koch first succeeded in identifying in the fæces of typhoid patients the distinctive bacillus which is the irritant of the disease, it was known that typhoid was an infectious disorder directly transmissible from one individual to another. Not only the course of typhoid, and all its symptoms showed this, but also the fact that isolated cases of the disease hardly ever occur; the malady generally appearing in more or less wide epidemics, which, however, are singularly limited in *local* extension, being almost invariably centred in some small district.

This last phenomenon has direct connection with the fact that the typhoid bacillus (which works infectiously principally by means of the fæces of typhoid patients) requires moisture: whilst the tuberculosis bacillus, on the contrary, can resist drought, and may be carried through the air.

Typhoid (in the form of what might be called a household epidemic) has appeared frequently in barracks, schools, and similar localities where a number of individuals live together in a crowded community. In such cases it is plain that some common cause of the disease must exist. This is generally found in the drinking-water, which comes from some source that has been polluted by filtration through the earth, by impurities from a privy, or similar contamination of the soil. The fact that nurses or laundresses who come into direct contact with the linen of typhoid patients often, some weeks later, sicken with typhoid, also points plainly to the mode of infection; and shows the grave importance of scrupulous cleanliness (especially of the hands) when anyone is compelled as medical man, nurse, or merely as inhabitant of the same house, to come into near contact with a typhoid patient.

Typhoid may occur at any age. That it is most common from 16 to 24 arises, in my opinion, principally from the fact that young persons are mostly at this period in schools, barracks, &c., and are so more exposed to the infection.

But typhoid is not a very rare disease in childhood. During recent years the methods of investigation in the case of infectious diseases have been immensely improved (particularly since the microscope has made it possible to procure direct evidence of the nature of the disorder), and there is no doubt that many a case of typhoid in childhood formerly passed under the favourite term of "gastric fever," and was so treated, before the fact that the disease was occasioned by a bacillus was known.

Before attempting to describe the general symptoms and treatment of typhoid (which are so various and multiform, that it seems almost impossible to give an exhaustive description of them in a few pages), I wish first to assure parents that to recognise typhoid in a child is, at an early stage of the malady, extremely difficult. The medical man, therefore, must on no account, be accused of inaccuracy in his investigations, or of insufficiency of attention, nor an assertion made that "he attached too little importance to the case," if he is able only after eight or more days to assert with certainty that the case is one of typhoid, whilst at first he regarded merely as a case of feverish catarrh of the bowels. The views of the public regarding the

diagnosis of diseases differing from one another are still very erroneous. If it was a perfectly easy matter to recognise any disorder on the first day of its appearance, and if it were also possible to cure every malady (as soon as its name was known) by the same regulation process, the art of healing would become as easy as a number of swindlers (who have no hesitation about enriching themselves at the expense of their fellow men) are desirous of having it believed; and then the most different diseases might all be cured by the same medicine, which might be forwarded by post. But the public forget that what has to be dealt with is not the disease but the patient, and that a hundred different particulars (such as age, sex, natural robustness, external circumstances, dwelling place, and many other things) must be taken into consideration, and the treatment conducted according to their exigencies.

But to return to typhoid. Typhoid is accompanied by great mental disturbance in the patient, and by delirium; by which patients suffering from typhoid fever show that they have no consciousness of their surroundings.

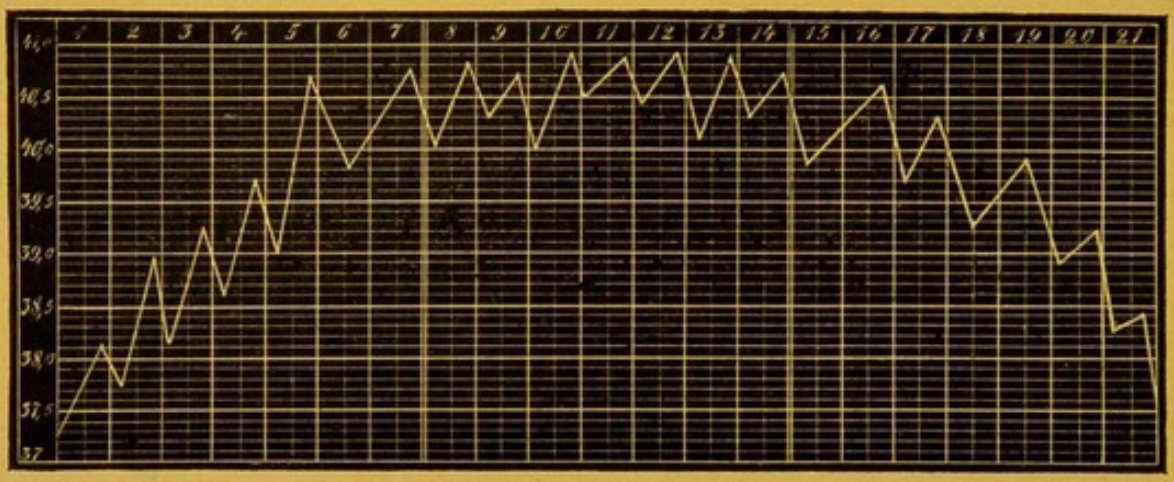
The beginning of typhoid presents very various symptoms. These appear to depend upon the length of the period of incubation, which varies from two to three weeks. It has been observed that the shorter the period from the infection to the first appearance of the symptoms of the disease, so much the more violent is the attack.

As in all other infectious diseases, so particularly in the case of typhoid, an accurate observation and registration of temperature is of the greatest importance. There is, in fact, no other disease in which the fever curve is so important as a means of recognising the disorder as in typhoid.

We have already whilst speaking of infectious diseases distinguished the three stages of advance, culmination, and retrogression. This same division into these stages presents itself in typhoid, and a first glance at the fever-curve of a normal case of the disease given below will show that the fever at first increases slowly but continuously, the advance then remains for a period stationery (culmination), and finally again diminishes slowly (retrogression).

It is hardly ever possible to determine the actual first day of the malady, the actual day of infection. The first impression is generally that the patient must be suffering from catarrh of the stomach, or from some other form of influenza, which shows itself in disturbances of the digestion, fever, pains in the limbs, and a general sense of fatigue. It is generally the continuous rise of the temperature to higher degrees, that first raises a suspicion of a case of typhoid;

after this suspicion has been conceived, other indications follow which make the recognition of the malady the more easy.



Fever Curve of Typhoid.

The peculiar fever curve as a rule shows five days of advance, ten of culmination, and about seven of retrogression; but these periods may be much exceeded and great irregularity is common. Next the swelling of the spleen, the appearance of the roseola (or rose rash), and the behaviour and appearance of the motions of the bowels assist us most to recognise typhoid fever.

Respecting the swelling of the spleen, it must be observed that it is often difficult even for an experienced medical man to be able to ascertain it with certainty. The spleen, even when swollen, lies so concealed that it cannot be very accurately examined.

Simultaneously with the swelling of the spleen, that is to say, about the beginning of the second week, the typhoid roseola appears. These are very small spots of a pale-rose colour, slightly raised, and about the size of the head of a large pin. They appear principally upon the abdomen of the patient and on his sides, scattered without any regular order; and disappear after a day without leaving any marks.

As similar spots occur only in syphilis and in some forms of severe blood-poisoning, the appearance of this eruption is of importance as an indication of typhoid. But their absence does not prove that the malady is not typhoid.

Very important also, and often absolutely decisive, is the behaviour of the intestines and of the digestion. That the appetite should completely disappear, that the tongue should be thickly furred, and the whole oral cavity often present the appearance of thrush, will not appear surprising. These symptoms are familiar in all feverish

disorders. Of more importance are the number and appearance of the motions, which are so characteristic, that they might be called typhoid motions. From time immemorial the appearance of the fæces has been compared with that of pea soup; and I have myself had many opportunities of observing how accurate this comparison is. The number of these evacuations is eight or ten a day. Sometimes they occur involuntarily; but generally the patient is aware of their approach, and there is time, according to the age of the patient, to provide a chamber or a slipper bed-pan.

But the evacuations of the typhoid patient are not always of this thin diarrhœic character. On the contrary, it is possible, particularly in the first week, that a stoppage of the bowels may occur; and here we have another proof of how few really certain indications are at our disposal for certainly determining in the earlier stages of the malady that the case is one of typhoid fever.

I may next mention the leading features of the affection of the nervous system. Even patients suffering from a moderately severe attack of typhoid exhibit great restriction of the intellectual powers, which sometimes amounts to positive hebetude. The patients appear to understand completely what is said to them, but they cannot follow out intellectually the meaning of the simplest sentence, and frequently do the absolute opposite of what has been said. Often the excitation of the nervous system reveals itself in fancies and deliriums, which render it very difficult to keep the patient in bed. This is especially the case with children. Sometimes the patient imagines himself pursued by some imaginary persecutor; and then he is all of a sudden at play with his fellows. Meanwhile, he is perpetually mumbling unintelligible words; and his busy fingers either fumble about his head, or tug at the bed clothes as if he desired to push something out of his way.

Real sequelæ, that is to say, disorders which arise as direct consequences of the action of the typhoid virus (as paralysis follow after diphtheria) do not exist. On the contrary, it is both remarkable and delightful to see how soon and how completely children recover after they have entered upon the period of diminishing fever. It is true that a complete loss of the hair is common after typhoid, but it soon grows again. Often there is also an increased tendency to inflammation of the lungs. But respecting this it is necessary to remember that lying in a sick bed for several weeks would naturally of itself produce a weakening of the child's organism, and an increased liability to other disorders.

In fact, when the fever has once begun to subside there is less

occasion for anxiety about any secondary disorders than about the possibility of a recrudescence of the typhoid itself. This is, unhappily, very common in childhood, amounting to ten per cent. of all the cases observed. How far mistakes in dieting may occasion these relapses is difficult to say; but often, after the patient has been during eight days already free from fever, and the hour is anticipated with pleasure, when he will be for the first time allowed to leave his bed, the fever suddenly rises again to its former height. The relapse into typhoid generally runs a milder and more rapid course than the first attack. But it must none the less be remembered that double foresight and double care will now be necessary to bring the already so seriously weakened patient through a second attack.

The mortality from typhoid in childhood is not so great as that in later years. At present it is calculated that in England ten per cent. of the patients succumb. Thirty years ago the percentage of deaths was twenty-five in every hundred.

Generally, either failure of the heart's action, or supervening inflammation of the lungs occasion death about the end of the second week. The alarming diarrhœa, with a fatal conclusion, of adults, is much rarer in the case of children.

The Treatment of Typhoid. Any one who in treating typhoid anticipates cure by the use of all kinds of medicines will certainly be mistaken. Attentive nursing, a proper regulation of the diet and the water treatment which is admitted to be most beneficial, are far more wholesome and serviceable than pharmaceutical remedies, which may be entirely dispensed with in treating typhoid in children, though adults may receive great advantage from them.

The typhoid patient, whether he be young or old, always has a number of wishes and desires. For this reason it is desirable, whenever it is possible, to arrange from the outset that the nursing and care shall be undertaken by an experienced hand. This, however, is possible only in hospitals, or where trained nurses can be procured. In many places, and in country localities especially, the parents are glad if they can find anyone who will upon reasonable terms undertake the nursing. But here it will be most important to select someone who can really second the medical man who has charge of the case.

The sick chamber, which should have a temperature not exceeding 67° Fahrenheit (20° Centigrade), should be bright and airy. Unremitting care must be bestowed upon cleanliness and ventilation. The patient's bed should stand in such a position that it may be easily approached on all sides. The patient's bedding requires

particular attention. The bedding under the patient should be distinctly hard, but above everything smooth, so as to save the patient from becoming sore by lying; as a preventative against which washing the back and seat with methylated spirit may be employed, with care.

Typhoid being one of the infectious disorders which come under the provisions of the Infectious Diseases Acts, care is to be taken that the patient's fæces, which always contain the infectious typhoid bacillus, should be carefully, and as soon as possible, disinfected by the addition of a strong solution of carbolic acid. Any bed or personal linen that happens to become soiled should be immediately removed, boiled in soap and water, and then disinfected. The nurse should be well acquainted with the risk of infection of her own person, and instructed always to wash her hands with soap-lye before placing food in her mouth, after rinsing in disinfecting fluid.

Typhoid, as we have seen, is an infectious disease of the bowels. During the malady their mucous membrane is in a condition of inflamed swelling. It will be evident that for this reason the greatest care must be bestowed upon the diet of the patient. A liquid diet must be given from the outset; and the best diet is, beyond all doubt, boiled milk; which most patients will also take readily. From the first day tea may be added, brandy in small quantities, cocoa, beaten-up egg, in order to introduce a little variety into the patient's diet, as otherwise there is a risk of having before the end of the first week to contend with a rebellion against the milk on the part of the patient. There can be no objection to meat broth, nor to sago boiled very soft. Particular attention should be paid to the patient's having if small yet frequent meals, so as to keep up the strength without irritating or overloading of the organs of digestion.

I recommend additional attention to diet towards the end of the second and beginning of the third week. At this time, with the diminution of the fever, there is a return of a keen appetite. Patients, and particularly children, plead piteously, even with tears, for a morsel of bread, or for fruit, or something else forbidden. But to all such petitions, howsoever much it may pain the nurse, the reply must be a firm refusal. Consent would involve a rapid relapse.

For quenching the more or less excessive thirst, water that has been boiled may be given in large quantities without hesitation. On the contrary, beer, seltzer water, and effervescing lemonade are to be avoided, as they stimulate and excite the intestines.

I have already alluded to water treatment of typhoid. It was Dr. Brand, of Stettin, who during an epidemic of typhoid in that

town first demonstrated the beneficial influence of cool baths. Since then the treatment of typhoid by cold water baths has been tried by thousands, and has been found to have very good effects; and even opponents of water treatment have been compelled to admit that neither the cerebral symptoms nor the high fever temperature are so promptly and certainly moderated by medicine as by cold water baths.

On this subject Dr. Strümpel remarks:

"The great advantages of the water treatment are the following:—

"1. The baths, if their temperature is of a proper coolness, diminish the fever by a direct withdrawal of heat. All the injurious consequences which may result from the raising of the patient's temperature are thus as far as possible hindered by the baths.

"2. More important than the lowering of the patient's temperature is the influence of the baths on the nervous system. The sensorium (intellectual capacity) of the patient is freer, and the apathy and hebetude less intense; briefly the whole "typhoid state" (typical condition of mind produced by typhoid) is less common under the water treatment than in other cases. It can be seen at once that this effect of the baths on the nervous system not only produces an improvement in the patient's condition, but is the cause also of many other beneficial consequences. The patients take their food more comfortably. They are not so liable to choking. They cough more effectively. They can move more freely; and it is easier to keep both the body and the mouth clean.

"3. The influence of the baths upon the organs of respiration is of the greatest importance. Especially the incentive to deeper inhalations and a greater facility in relieving themselves by coughing must be taken into consideration. One of the most convincing proofs of the beneficial effect of the water treatment is the fact that severe inflammations of the trachea and inflammations of the lungs are rare in the case of patients who have had baths.

"4. The beneficial effects of the baths upon the skin must not be under-rated. Since the water treatment has been introduced bed-sores are rarer in typhoid than formerly."

It is evident that the temperature of the bath must be determined by the age and strength of the patient, and by the severity of the attack. In any case the cold water treatment must be begun cautiously; and the temperature of the first bath should not be below 90° Fahrenheit (32° Centigrade). Enough water should be placed in the bath to cover the patient's whole body, of course with the exception of the head. The first bath should not last more than five minutes. Each successive bath may last one minute longer until a

duration of twelve minutes has been reached. The patient is best deposited in the bath with the bed-sheet by two persons. Directly after the bath the whole body should be well rubbed and made warm. A mouthful of tea, strengthened with brandy, given directly after the bath, stimulates the action of the heart. A quarter of an hour later a quiet sleep proves that the bath has been beneficial to the patient.

In the case of children with weak hearts, and of those who exhibit great fear of the water, it is by far better (in order to avoid any excitement, which would be prejudicial to the patient), instead of baths to try wet packs, which might be applied for about an hour. The method of using these packs will be more fully described in its proper place. I shall only add that without absolute necessity, not more than three baths or three packs should be given in twenty-four hours.

Influenza.

Influenza has always been fairly common, but until quite recently attracted little attention. It was not until a number of severe epidemics in the last decades of the nineteenth century occurred both in England and all over the continent, that the name of influenza began to be feared.

It is only a person who can remember how, in 1889, this malady spread with extraordinary rapidity from town to town, and laid thousands of people on sick beds, that knows how surprised both the public, including the medical world, was to see the influenza (which previously as a sort of feverish cold had hardly been seriously regarded) suddenly reveal itself as a true infectious disorder, with all kinds of severe secondary consequences, and in a short time claim thousands of victims

Professor Pfeiffer (who made himself a great and well deserved reputation as a specialist in this malady) very soon succeeded in identifying the irritant of the disorder, a small bacillus, which is found in abundance in the excretion of influenza patients.

Since this discovery, it has been justly held that influenza is an infectious disease occasioned by this bacillus and communicated from one person to another by the excretions of the patient.

Influenza attacks persons of all ages, with the exception of babes less than nine months old. Its course differs somewhat in children and adults. Children present more of the general symptoms of an infectious disorder. In adults, the disordered condition of individual organs is more marked, and particularly that of the lungs.

The incubation period of influenza is short, not more than three days. I can adduce in support of that fact a personal experience. At Christmas, 1889, I travelled from a Southern German University to my home in the North with a fellow countryman. On our journey we both became aware that the then universal influenza had got hold of us, and we both of us reached home ill. Exactly three days later, four or five persons in my father's house and in that of my friend, who lived at a distance of about ten minutes walk sickened with the malady, which then distended itself from these two houses over the whole neighbourhood, and attacked several hundred people.

The first symptom of the malady is almost always a sense of general indisposition, great debility in the legs, and particularly in the lower part of the legs, as well as loss of appetite. It is not until two or three days later that the temperature rises, approaching a height of 103° Fahrenheit (40° Centigrade). Severe headache in the region of the forehead immediately above or behind the eyes, general pain in the limbs, and especially in the muscles of the calves, give the familiar indications of a severe cold, which shows itself also more particularly in a troublesome cough, and catarrh of the nose and of the mucous membrane of the pharynx. The fever remains at its highest temperature seldom more than two or three days, and during the following days recedes, of course with the exception of those cases in which symptoms of nervous irritation, or of a sympathetic affection of the respiratory organs appear—which in influenza is, unfortunately, often observed.

The digestion is almost always disturbed. In most cases the bowels are sluggish and inactive; but violent diarrhœa is sometimes observed.

I said above that children generally escape the affection of the respiratory organs, which, in the case of adults, are much to be feared. But I must limit this by saying that I mean strong and healthy children. Scrofulous children, and children who appear to have a tendency to consumption, and especially children who show signs of rickets, are always in danger, after recovery from a severe influenza, of falling victims to inflammation of the lungs—as they are after whooping cough.

After a few weeks most patients begin to feel their spirits recovering and their appetite increasing daily. After this they generally soon forget that they have had to go through the influenza.

Treatment of Influenza. The influenza patient will do wisely to retire as soon as possible to a warm bed, and to have himself completely enveloped in warm wraps. In these he may lie, according

to his age and strength, from one to two hours. A plentiful perspiration appears often to check the malady, that is to say to stifle it in the bud. At least I have myself observed that, when patients are immediately enveloped in damp wraps, the temperature never reaches so high a degree as one observes in those cases when the symptoms of nerve irritation resemble those of a commencing typhoid.

If the wrappings are not patiently endured, or if their beneficial effect is doubted, luke-warm baths of about 95° Fahrenheit (35° Centigrade) may be substituted. They should be carefully lowered by the addition of cold water to 90° Fahrenheit (32° Centigrade). These baths, accompanied by simultaneous douches over the shoulders, are particularly to be recommended in all cases where the commencement of secondary disorder of the respiratory organs is observed; respecting which I must beg the reader to peruse the sections on inflammation of the lungs and pleura.

External application of compresses may be particularly recommended to relieve the tiresome irritation of the cough. They have also a beneficial influence upon the catarrh of the pharynx which generally exists. Decoctions of marsh-mallow roots, with honey of squills, may be tried in the case of children—a small teaspoonful every two hours.

To restore a child's strength after influenza, the most important thing is a generous diet during convalescence. The expense of milk, eggs, and cocoa should not be grudged. It will be well repaid by the results. If the weather permits, and the sun is shining brightly, the fresh air will do more than anything else to obliterate recollections of the influenza.

Acute Rheumatism of the Joints.

Acute rheumatism of the joints has every claim to be regarded as an infectious disease; and although the bacillus that occasions it has not yet been microscopically identified, we need have no doubt of its existence. For this reason I shall here briefly describe the leading symptoms of this malady, which is by no means so rare in childhood as is commonly supposed.

Rheumatism of the joints is shown to be an infectious disease not only by its general symptoms, which consist principally in a feverish, rapidly-developed inflamed swelling of various joints; but also by this fact, that it occurs (if not exactly as an epidemic, yet as a disorder that affects a considerable number of individuals) at certain periods, particularly in spring and autumn, mostly after long spells of cold weather.

Though there is certain evidence that acute rheumatism of the joints can affect new-born children even in the first month, such cases are very rare exceptions. On the contrary, after the fifth year the liability to suffering from rheumatism of the joints increases. After the fortieth year the liability to this malady again decreases markedly.

It is at present uncertain how the infection takes place. To have passed through the disorder is no security against its recurrence. On the contrary, there are children, and indeed whole families, who show a quite remarkable proclivity to rheumatism of the joints, without any reason for this being apparent.

Rheumatism of the joints appears among children with almost the same symptoms as among adults. But the whole course of the disease in childhood takes a milder direction; though it must be admitted that the most serious secondary symptoms of rheumatism of the joints, that is to say, affection of the heart, is commoner in childhood than in later years.

The period of incubation is not yet known. Sometimes general fatigue, inclination to vomiting, and shivering fits give preliminary warning of the disorder; but as a rule children suddenly, without any preliminary symptoms, and almost always towards evening, begin to complain of great pain in some particular limb, an arm or a leg. This is accompanied by an increase of the child's temperature.

If the place indicated by the child is carefully felt, the increased temperature of the locality, which may be felt by the palm, will show that the case is one of an infectious disorder of the joint. The child is unable to move the limb, to say nothing of making use of it. After a few hours the exterior swelling of the joint becomes plainly visible, and points to the conclusion that this is a beginning of rheumatism of the joints.

Unfortunately, it is only in the rarest cases that the disease remains limited to the joint first attacked. Acute rheumatism of the joints has, on the contrary, the peculiarity of passing generally from one joint to another, and when the child who yesterday complained of the wrist as the particular locality of his pain, to-day says that it is his knee that hurts him, that may be perfectly true. A day later he may be unable to lift his arm because the disease has attacked his shoulder.

Generally, two or three weeks suffice to bring us to the end of the attack. But I have personally attended children of eight and ten who have been again and again attacked by new accessions of the disease for many months. On the contrary, mild attacks occur, in which only one or two joints are affected for a single day after which the malady disappears.

I have already hinted at the unfortunately frequent affections of the heart which accompany this disorder. These occur in fifteen per cent. of the case of acute rheumatism of the joints; and though a certain proportion of them may be cured in the course of time, disease of the heart contracted in consequence of rheumatism of the joints is the almost daily experience of medical men. This disease of the heart is a very inconvenient companion for life, and there are people suffering from it who have to be so careful about everything that they eat and drink, that they might be described as the slaves of the disease of their hearts.

Another striking phenomenon must be mentioned, hardly ever absent in cases of children who suffer from rheumatism of the joints, an extraordinary proclivity to excessive perspiration. This perspiration has an acrid smell, and is often so abundant that the patient's shirt can be actually wrung out. But I shall not venture to determine whether the tendency to all kinds of skin eruptions, nettle rash, and bleeding of the skin, which can often be observed in the patients, is connected with this.

We must distinguish between the secondary disorders following rheumatism of the joints in childhood which can be referred to the direct infection of a virus, and those which follow the rheumatism in consequence of a generally diminished natural power of resistence.

To the former belongs St. Vitus' dance (chorea), which I must mention here, as it is particularly common in childhood for this disorder to develop itself after an attack of rheumatism of the joints. Of the latter what are called rheumatic paralysis of the muscles are the most important. Whether these paralyses are results of the long inactivity of the muscles caused by rheumatism, or whether they are (as many medical men are disposed to hold), like the paralyses following diphtheria, to be referred to injurious influences upon the elements of the tissues (caused by the products of the decomposition of bacilli), is at present difficult to determine. It is, however, an equally striking and certain fact, that certain groups of muscles which work together are often, after a protracted rheumatism of the joints, so hampered and incapable of performing their duties, that all parents should be warned to pay particular attention to this phenomenon, as this weakness of the muscles must be combated at its commencement by methodical gymnastic exercises, of which I shall speak in their proper place.

The Treatment of Rheumatism of the Joints. The first (and often, unhappily, the most neglected) measure to be taken with rheumatism of the joints is rest, and rest in bed. It is entirely mistaken to allow

a patient who is suffering from an infectious disorder, although it may appear to affect the shoulder only, to run about the room. Every infectious disorder affects the whole organism, and every patient suffering from fever is by far best in bed. Care should also be taken to provide a position of repose for the affected joint, in order to diminish the pain which may be occasioned by the slightest movement of the part affected. A restful position may be most simply and easily secured by supporting the part with wraps and cushions. This is preferable to an older plan of protecting the several joints from unintentional movements by tight bandages.

The diet should be generous—young vegetables, thin broths, milk food, cocoa, soft-boiled egg, and similar viands are beneficial; whilst rich or fat flesh meat, potatoes, and all kinds of farinaceous foods, can be directly injurious, in consequence of their heating or costive properties.

In almost all infectious diseases, which we have hitherto considered, water treatment, either in the form of damp compresses, or in that of baths, is of the greatest service, and I should have no hesitation in saying that with children it is distinctly preferable to the use of drugs; but I would have it used only sparingly in cases of rheumatism of the joints. I have nothing to say against the use of compresses. They cool externally the joint affected by the rheumatism, and so, probably, somewhat diminish the pain which is felt within. But more must not be expected from water than it can do; and, as a rheumatic patient (as has already been said) needs rest above everything else, which is not consistent with baths and moist wrappings, water treatment must be dispensed with in rheumatism of the joints. And we have another most effective remedy at our disposal. This is salicylic acid, which at present is given principally internally, in the form of sodium salicylate, or salol.

That sodium salicylate is a direct means of cure in acute rheumatism of the joints, and at the same time an antidote to the products of decomposition of the bacilli has been so indisputably demonstrated in the case of thousands of patients, that it seems useless to enter into any discussion of its value.

At the same time many medical men assert that they have seen either little or no satisfactory results from the use of sodium salicylate. But the secret of this failure rests entirely in the mistaken use of this remedy. A great difference in the effect results from giving a patient seven grains of sodium salicylate every two hours, or twenty-eight grains three times in a day. In both cases the patient receives the same quantity in twenty-four hours; but whilst in the first case

hardly any improvement in the inflammation of the joints results, in the second case the patient would probably be free from all inconvenience in the joint which, the day before, gave him so much pain.

This case is exactly parallel with that of St. Vitus' dance and epilepsy, in which the proper administration of potassium bromide (this equally simple and economical remedy) almost always works victoriously; whilst the same remedy may be taken for months in incorrect quantities without producing any satisfactory result.

That salicylic acid, if taken for a long time in the cheap form of sodium salicylate may produce all kinds of unsatisfactory effects need not be denied. These effects are singing in the ear, feeling of faintness, and loss of appetite. But in this life it is often necessary to endure a small evil in order to be rid of a great one; and that is the case with this remedy. Sodium salicylate is no more poisonous nor directly dangerous in the small quantities which are taken for curing rheumatism of the joints than our common kitchen salt (sodium-chloride). We eat this daily without thinking at all about it; but, in point of fact, strong solutions of cooking salt are poisonous, and directly injurious to the human organism. In any case these patients are entirely mistaken, who, after the conclusion of a rheumatism of the joints assert that the salicylic acid "has driven the rheumatism to their hearts," and that the weakness of their hearts is due to the use of this remedy. These people do both the sodium salicylate, and the medical man who prescribed it a direct injustice; and I desire to state that emphatically.

Other remedies for acute rheumatism of the joints which have their supporters are salipyrin, phenacetin, antipyrin, and antifebrin. Of these salipyrin is certainly the most to be recommended. But it is as expensive as the salol which I have mentioned above; and the inexpensive sodium salicylate, if rightly used, has quite as satisfactory effects. Sodium salicylate tastes nasty and bitter, and should therefore be given to older children either in wafers or in a mouthful of black coffee. To little children, and also to those who cannot take it, otherwise it may be given in the form of an injection.

Children from six to fourteen should take at least 90 grains daily, and best 30 grains morning, noon, and evening. Younger children should daily receive for three successive days an injection of luke-warm water, in which suitable doses, according to age, of sodium salicylate have been dissolved. The effect (if the case be one of true rheumatism of the joints) will almost always show itself clearly after two or three days. In fact the remedy is so certain and prompt that if no improvement appears in spite of the use of sodium salicylate,

this will suggest a suspicion that some other disease of the joints exists.

A serious warning against the use of various widely-advertised quack prescriptions is indispensable. Most of them are valueless, and all of them dear.

Mumps.

I do not know whether I shall be justified in asserting that mumps are less common than they were. It is quite possible for certain regions to be for a considerable period free from a certain disorder, whilst cases of it may be elsewhere occurring daily. At anyrate, I am glad to be able to conclude my chapter on the diseases of childhood with this most harmless of all acute diseases.

The disease called mumps consists practically in an inflamed swelling of the parotid glands; and both glands are usually affected. This swelling is undoubtedly due to some specific infectious irritant, which wanders into the parotid glands from the mouth through the conducting ducts, and often a period of incubation of about a fortnight produces the disease.

I cannot remember having ever observed a case of mumps in a sucking child. Adults above five-and-thirty appear also less liable to infection than those who are younger, although the disorder is so infectious that it almost always appears in the form of extended epidemics.

The first symptoms are those common to all infectious diseases, that is to say debility, loss of appetite, and more or less marked fever. Heralded by these, and after the lapse of the long incubation period, a swelling of the cheek sets in, sometimes slowly, and sometimes tolerably rapidly, close below and in front of the lobe of the ear. The swelling is almost always at first on one side only, and reaches its height on the second day. After this (with very few exceptions) a similar swelling appears on the other side, resulting in a distinctly comical appearance, the children's faces becoming so altered and disfigured as to be barely recognisable.

But howsoever laughable the inflammation of the parotid glands may appear to an unsympathetic spectator, the unfortunate patient endures for some days a painful trial of his patience. The fever is generally not high, but the frequently serious swelling of the whole face is often such as to render the movement and opening of the jaws impossible—so that chewing cannot be thought of; and the muscles of the neck becoming sympathetically affected almost always produce a stiffness of the neck itself, the whole amounting to a very uncomfortable state of affairs.

After the fifth day the whole malady, with all the symptoms which have been described, generally subsides rapidly. Two days later the children are making vigorous attacks upon the bread and butter which they have somewhat sorely missed.

The Treatment of Mumps. The treatment consists principally in a fitting diet, rest, and an equable temperature, which can be best secured in bed. If the swelling of the face makes chewing impossible, solid food is necessarily impossible, and the patient must be fed with thin soups, milk, and cocoa to satisfy his hunger.

A compress on the neck may exercise a beneficial influence, and it will be the only prescription necessary, provided that there are no complications, such for instance as costiveness, or anything else of the same sort, which may make other measures necessary.

A distinct warning must be given against warm coverings of the face, as they may favour purulation of the inflamed parotid glands, which has been sometimes observed. This purulation is a concomitant of mumps, that occasionally appears, and must be referred to mixed infection. It should be opened tolerably soon, either internally or externally, and treated in accordance with the general rules for treating wounds.

It should be further mentioned that many boys experience, particularly during the culmination of the disorder, dragging pains in the testicles; and even swelling of the testicles may occur. But in what manner this swelling is connected with the inflammation of the parotid glands is not yet clearly explained.

As soon as the first signs of this singular secondary disorder appear, rest in bed, the holding up of the scrotum by means of a cloth placed beneath it, and the application of a compress to the part, are the means most likely to affect a cure in two or three days.

CHAPTER VI.

Structure and Functions of the Digestive Canal.

As, unfortunately, anatomy and physiology meet with little attention in schools, or, to speak plainly, the structure of the human body and the functions of its various parts are too seldom explained, for me to be able to suppose that the majority of my readers will have any distinct knowledge of such matters, I consider it not merely advisable, but absolutely necessary, to make in every case some prefatory remarks about the formation* and functions of the various organs whose disorders are to be described in the respective chapters of my book.

What is meant by "digestion"? And what is intended when we speak of "good" or "bad" digestion? To give a brief answer, I may say that the word digestion means the process to which what we eat and drink is subjected in the inside of our bodies. That sounds very simple. But we shall see that the nature of man has to be armed with manifold equipments, to enable it so to break up and transmute the food which we take, that the soluble and nutritive portions of it may be used for the building up and maintenance of our bodies.

The digestive organs of man constitute a single tube, lined throughout with mucous membrane, which is called the digestive canal. It extends from the mouth to the anus. All food taken in by the mouth must pass through it, until, after many chemical changes, it is at last evacuated in the form of the fæces. Into this digestive canal open also the excretory ducts of the digestive glands, whose juices make possible the transformation of the food. These glands are the salivary glands, the liver, and the pancreas.

The digestive canal is divided into several sections, which are in direct connection with each other: (1) the oral cavity and pharynx, (2) the gullet and stomach, (3) the bowels.

---

* I mention with pleasure that in the description of the anatomical relations I have followed the excellent explanations of Hyrtl.

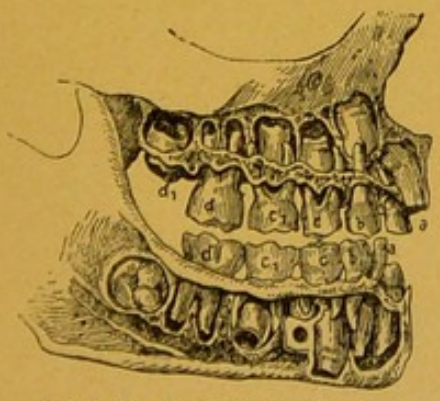
(1) The Oral Cavity and the Pharynx.

The oral cavity, which is on every side lined with mucous membrane, is divided into an anterior and posterior part by the teeth, and bounded by the mouth placed in front of it, and capable of being opened and shut. It is closed above by the hard palate, below by the tongue and the floor of the mouth, on the sides by the cheeks. At the back it joins the pharynx, the soft palate forming the boundary between the two. In the oral cavity are situated the teeth, the tongue, the soft palate, and the salivary glands, all of which will claim our attention.

The Teeth.

In the chapter which dealt with the new-born child I have already described the formation of the first or milk-teeth, and given a diagram of the order in which they, after the sixth month from birth, cut through the flesh of the gums and make their appearance. These first teeth, twenty in number, remain in the mouth till about the seventh year, and then, in the order of their appearance, drop out to make room for the permanent teeth. We call this substitution of the permanent teeth for the milk-teeth, changing the teeth. But the jaw, which in the course of the seven years since the birth of the child has become considerably larger, does not merely replace the twenty milk-teeth with as many new larger ones as the first fall out. If we count the number of teeth, after the change of teeth has been completed, we find that there are sixteen both above and below, in all thirty-two teeth, arranged according to the following scheme, which is called the human "dental formula":—

$$\frac{3\ 2\ 1\ 2 \mid 2\ 1\ 2\ 3}{3\ 2\ 1\ 2 \mid 2\ 1\ 2\ 3}$$



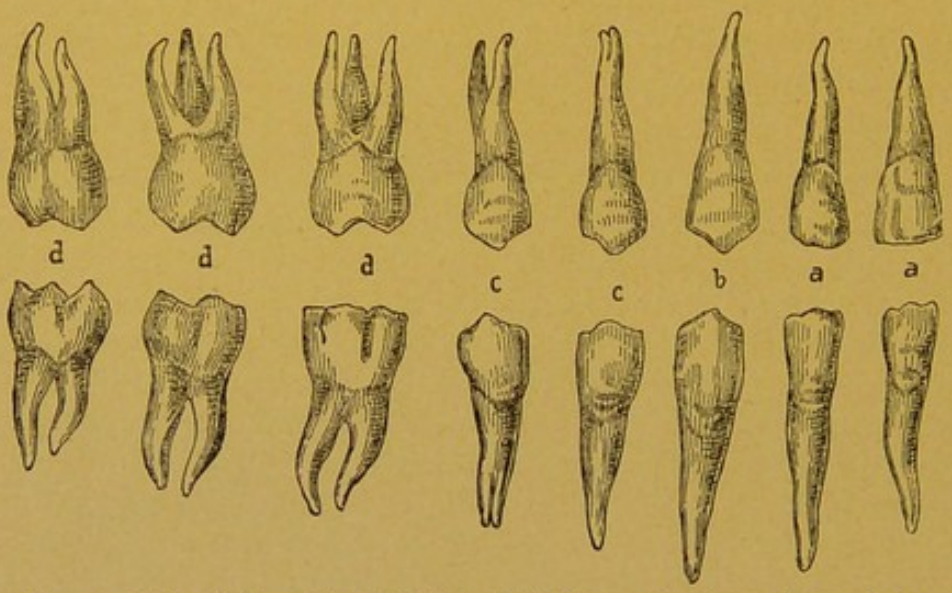
Jaw of a boy of eight, during the period of change of teeth. The teeth a, b, c, d, are milk-teeth about to be shed. It will be seen that the permanent teeth lie already formed in the jaw.

Thus the teeth of the adult differ from those of the child first of all in this, that the adult possess both above and below, both on the right and on the left three more teeth. These are those which we call the molar teeth.

The time of the appearance of the permanent teeth is very different. Generally the first four molar teeth appear about the seventh year. In the eighth year the eight incisors of the milk-teeth are pushed out, and

replaced by new ones. From the tenth to the thirteenth year the eighth cheek teeth follow suit. The four canine teeth appear in the eleventh year; the second four molars in the twelfth.

The jaws which are still growing are now fully furnished with teeth; but the four outermost molars are still wanting. These appear about the twenty-first year, for which reason they are called the wisdom teeth.

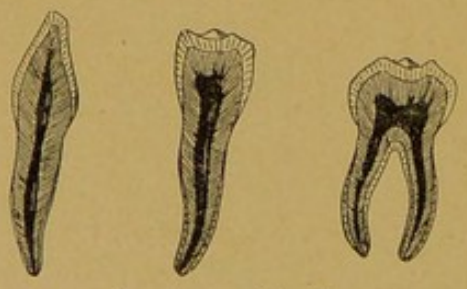


Forms of the different teeth in the adult jaw—a, incisors; b, canine; c, pre-molars; d, molars.

Each tooth consists of a crown which stands out free, of a neck surrounded by the gum, and of a root firmly fixed in the jaw.

The incisors have chisel-shaped crowns, and a single conical root.

The canine teeth have pointed crowns. The roots are plug-shaped and single; in the upper jaw they are often remarkable for their length, and are called eye teeth.



Sections of teeth.

The pre-molars (or front molars) have a crown somewhat lower than the canine teeth. The crown of these teeth is often flattened, and has on this chewing surface an outer and an inner pimple-like prominence. The roots have generally two branches. But the two arms are sometimes even from the first joined into one.

The molar teeth (or back molars) differ from all the other teeth by their size and by their extensive chewing surface. The upper molars

have three, the lower molars four prominences. The roots of the molar exhibit many differences. In the upper jaw, they generally have three branched roots; in the lower they often have only two; but such that they give the impression that two branches of the root have coalesced into one.

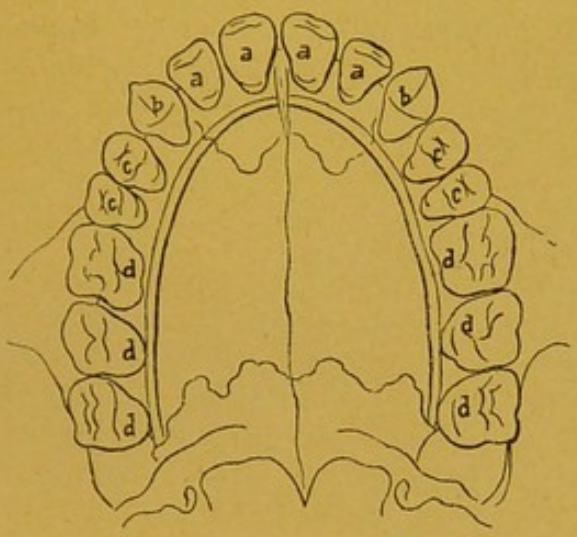


Figure of the human teeth after the change of teeth. a, incisors; b, canine; c, pre-molars; d, molars.

It is interesting to remark that many negro races of a low grade exhibit one more molar, so that sixteen molars exist in the place of twelve. The fact is all the more interesting because this number of sixteen molars is also found in the ourang-outang, or anthropoid ape, a fact urged by supporters of Darwin's theory as an evidence of the descent of man from the apes.

The Tongue.

The human tongue consists of a muscular lobe clothed with mucous membrane, and very richly furnished with blood vessels. Its anterior part is free to move in various directions, and can be altered in shape, whilst the posterior part, called the root of the tongue, which extends from the pharynx to the hyoid bone, appears fixed to its base. We distinguish in the tongue the upper and under surface, two side edges, the point, the body of the tongue and the root. When the mouth is closed, the upper surface of the tongue rests against the hard palate. It is thickly covered to the larynx with very small gustatory papules, which give it an appearance that may be compared with very closely shorn velvet. The gustatory papules are of three kinds, and we distinguish :—

(*a*) Thread-like papules which give the tongue its velvety appearance. They stand in parallel rows close to one another in immense numbers, approaching five millions, and occupy the whole of the upper surface and side edges of the tongue.

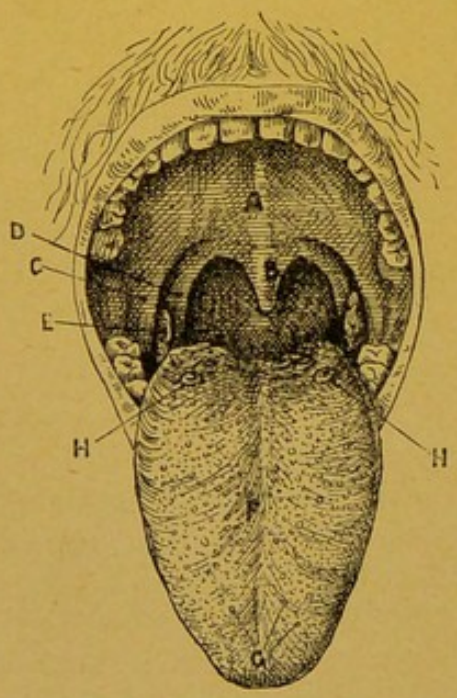
(*b*) Conical papules, which are found scattered in different numbers amongst the thread-like papules, and stand like very small fungus-shaped tubes, more particularly on the sides of the tongue.

(*c*) The circumvallate papules, which are the most richly furnished with nerves of all the papules of the tongue, and exist in the number of from twelve to sixteen in the form of a V, only on the posterior region of the surface of the tongue.

The lower surface of the tongue is much smaller than the upper, and has no gustatory papules. The floor of the oral cavity is bound to the tongue by the frenum linguae (tongue string), which prevent the tongue from being turned up backwards.

The Soft Palate.

The soft palate extends two folds of mucous membrane to the side borders of the tongue, these are called the palatal tongue arches. Behind them are the palatal larynx arches which pass into the mucous membrane of the larynx. In the nitch formed by these arches lie on both sides the tonsils, which can almost always be plainly seen when the mouth is opened. They consist of a mass of follicular glands, and are frequently subject to inflammations, of which we have already seen examples in scarlet fever and diphtheria. In the middle is the velum palatinum, separated into two parts by the uvula, a small appendage in the form of a blunt cone.



A. The hard palate. B. The uvula. C. The palatal tongue arch. D. The palatal larynx arch. E. The tonsils. F. Thread-like papules. G. Wedge-shaped papules. H. Circumvallate papules.

The Salivary Glands of the Oral Cavity.

We are acquainted with three pairs of salivary glands in the oral cavity, which pour the saliva which they form into the mouth. They are named, according to their respective positions, the parotid glands, sub-maxillary salivary glands, and sublingual salivary glands.

(*a*) The parotid salivary glands, with which we have had occasion to become acquainted whilst treating of mumps, are the largest of these glands. They lie close before and below the ear, and have a lobulated appearance. Each lobule is divided into a number of

smaller lobules, and each one of these into an immense number of racemose glands, in which the saliva is formed. The gland pours the formed saliva through a special duct that passes through the cheek into the oral cavity, and this duct opens on the inner upper surface of the cheek opposite the second upper molar.

(*b*) The submaxillary gland is about half the size of the parotid glands, and much less lobed. It lies in the triangular space which is formed by the lower edge of the lower jaw and the double-bellied lower jaw muscle. It has also its own discharging duct, whose mouth is situated in the oral cavity under the tongue close to the frenum linguae.

(*c*) The sublingual gland should probably not be included among the salivary glands, but is rather a mucous-forming gland. It is smaller than the submaxillary gland, and is situated close behind the middle of the lower jaw in front of the frenum linguae. Sometimes it has only a single discharging duct, which is often united with that of submaxillary gland. But it also often discharges its products into the oral cavity through a number of small orifices.

The pharynx. The lower border of the soft palate, the root of the tongue, and the tonsils bound an opening which leads from the oral cavity into the orifice of the pharynx, and for this reason is called the pharyngeal opening. The pharynx is a funnel for the œsophagus or gullet into which it immediately passes. The pharynx is connected with the nose by passages called the posterior nares, with the mouth by the pharynx which we have just mentioned, with the stomach by the gullet, with the inner ear by passages called the eustachian tubes, and finally also with the larynx. In every act of swallowing a separation of the whole orifice of the pharynx into two opposite regions takes place, the soft palate being thrust so far back that it touches the back wall of the pharynx. The upper one of the two regions is the nasal pharyngeal space, the lower the laryngeal space, which in every act of swallowing so protects itself by a corresponding position of the epiglottis that none of the food can enter the larynx, or as is commonly said "go the wrong way." This position of the soft palate against the back wall of the pharynx is assumed also in singing when chest-notes are produced, or in speaking when we pronounce the open Italian *a*.

We can now understand why children who have a congenital fissure of the palate (as has been mentioned in the sections on harelip and wolf's mouth) will always speak in nasal tones so long as they are not assisted either by an operation or by a palate plate. We can also understand the nasal speech of children who, after recovering from

diphtheria, suffer from a paralysis of the soft palate. We can see also why such children often choke in swallowing, and return a portion of their food through the nostrils. They are not able whilst swallowing to close the nasal pharyngeal space.—In this same space, and behind the centre of the soft palate, are a crowd of follicular glands, which are called the pharyngeal tonsils, and must be mentioned on account of their proclivity to purulation.

In the uppermost part of the side wall of the larynx are the laryngeal orifices of the eustachian tubes, which lead to the ears. They make a direct communication between the pharynx and the inner ear. This explains the frequent occurrence of purulent inflammation of the middle ear in all the infectious diseases of children, in which the bacilli, that are the irritants of the disease, come into contact with the mucous membrane of the oral cavity—scarlet fever, diphtheria, whooping cough, *etc.*

(2) The Œsophagus (Gullet) and Stomach.

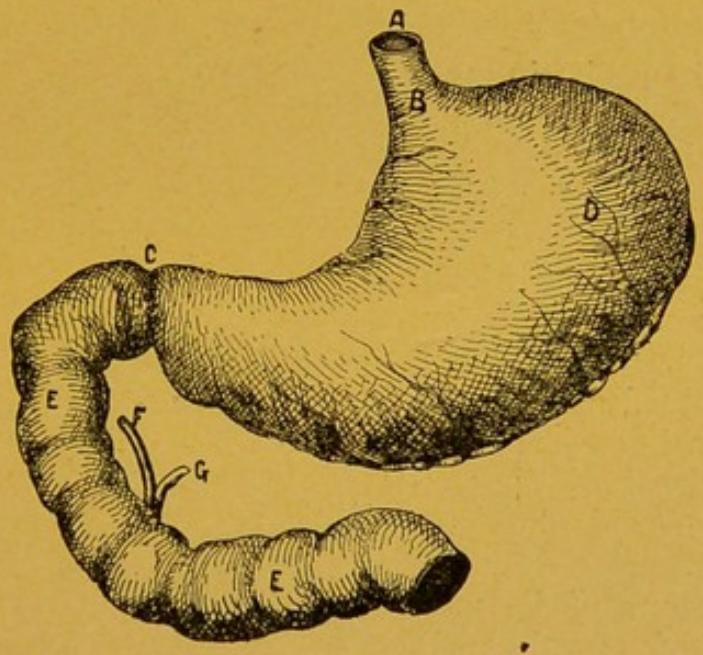
The second part of the digestive canal consists of the œsophagus and the stomach.

The œsophagus is really nothing more than the channel by which the food passes from the mouth into the stomach, and has nothing to do directly with the digestion. It opens directly into the pharynx, about the height of the sixth vertebra of the neck, and is a connecting tube between the pharynx and the stomach. It is behind the wind-pipe, and close in front of the vertebral column, and runs in a long curve around the great artery of the head, which is called the aorta. It passes through the diaphragm on the right side, and so reaches the entrance of the stomach, into which it opens.

The stomach. We have in an earlier part of the book called attention to the fact that the stomach of the new-born child, both in form and function, represents nothing more than an upper portion of the small intestines. But in adults it forms a large sack-shaped enlargement of the digestive canal. It lies immediately below the diaphragm, which its upper surface touches. Its lower surface borders on the transverse colon. The spleen is on its left, and the pancreas behind it. By far the larger part of it lies on the left side of the ventral cavity, and only a sixth part on the right. The following parts of the stomach must be distinguished: the entrance of the stomach, which is above, and is directly connected with the œsophagus; and the exit, or pylorus, which is connected with the first portion of the smaller intestine, the duodenum. During the

time of digestion the portal is closed against the intestine by a valve. But the entrance to the stomach is only imperfectly closed, so that, during digestion, air can escape upwards.

Below the entrance the stomach bulges out in the direction of the spleen, so as to form what is called the fundus of the stomach. As it approaches the portal it becomes again much smaller. The stomach has a front and back surface, which are joined by the upper and under curves. The upper smaller curve is concave, the lower much larger and convex. The front surface of the stomach is so far covered by the liver that only the fundus of the stomach, which lies towards the left, is dislosed.



A. Lower end of the œsophagus. B. Entrance to the stomach. C. The portal. D. Fundus of the stomach. E. Duodenum. F. Gall-duct. G. Duct of the pancreas.

The stomach consists of three different layers: the exterior peritoneal covering, which encloses all the organs of digestion which lie in the abdominal cavity; the muscular stratum, which is composed of longitudinal fibres and cross fibres, and enables the stomach to move itself during digestion in such a manner that the contents of the stomach are pushed from the entrance of the stomach towards the portal; and the interior mucous membrane, which is so loosely attached to the muscular stratum that, when the stomach is empty, it can close itself up in a fold.

Of these three layers, the mucous membrane is by far the most important for digestion. It contains in enormous numbers, in

millions, what are called the digestive glands, or peptic glands, which, during digestion, exude what is called the gastric juice. Besides these digestive glands, the mucous membrane of the stomach possesses also other glands, principally situated near the entrance of the stomach, and near the portal, which secrete a transparent mucous that mixes itself with the contents of the stomach during digestion.

(3) The Intestines.

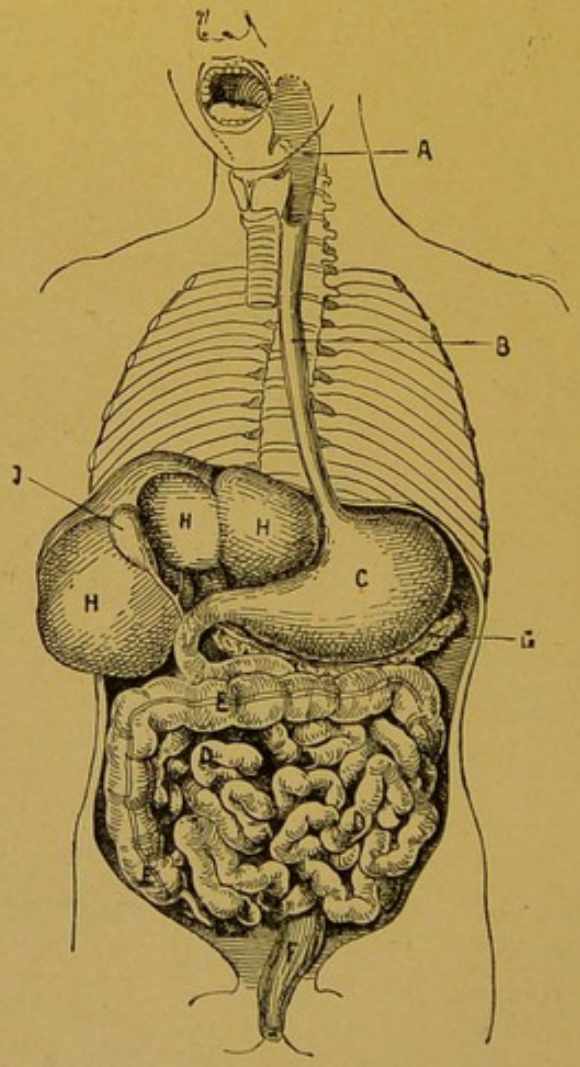
The intestines, which are divided into the small and large intestine, form the third section of the digestive canal.

The Small Intestine.

This is immediately connected with the stomach, and is considerably narrower than the large intestine. Its whole length is nearly five yards, and is divided into three portions: the duodenum, the jejunum, and the ileum.

(*a.*) The duodenum lies in the form of a horseshoe curve around the head of the pancreas, whose discharging duct leads into it. The liver discharges also one of its most important products, the gall, into the duodenum through the same duct.

(*b. c.*) The jejunum and ileum which generally pass into each other without any definite boundary form an extensive and very restless tube about fifteen feet long. Crumpled up into many convolutions, it is attached to the vertebral column by the mesentery, by which it is retained in its position in the abdomen and pelvic cavity.



A. Cavity of the Pharynx. B. Œsophagus, or gullet. C. Stomach. E. Colon. F. Rectum. G. Pancreas. H. Lower surface of the liver, which is turned up. J. Gall bladder.

The small intestine, like the stomach, consists of three layers, the peritoneum, the muscular layer, and the mucous membrane, of which the last is again the most important.

The mucous membrane of the small intestine is furnished with innumerable folds, which, especially in the first section, that is to say the duodenum, lie over one another like tiles on a roof, whilst as we approach the end of the small intestine they become flatter and flatter, and are less developed.

We find also all over the mucous membrane and also upon these folds numberless conical flocculi, which, if a portion of the small intestine of a pig is allowed to swim in water, float in the water like fans and have a finely tufty appearance. They are called also intestinal villi, and are millions in number. These are the active organs which absorb the nutritive and soluble food extracts.

The small intestine is also richly furnished with glands. Three kinds are distinguished.

1. Lieberkühn's glands. These perform for the intestine the same offices as the peptic glands for the stomach, and secrete the intestinal fluid.

2. Brunner's glands. These stand so closely crowded together in the first part of the duodenum, that they might be regarded as a single widely distended gland. In the jejunum they become fewer, and entirely disappear in the ileum. They secrete a fluid which, in appearance and effect, resembles the secretion of the pancreas.

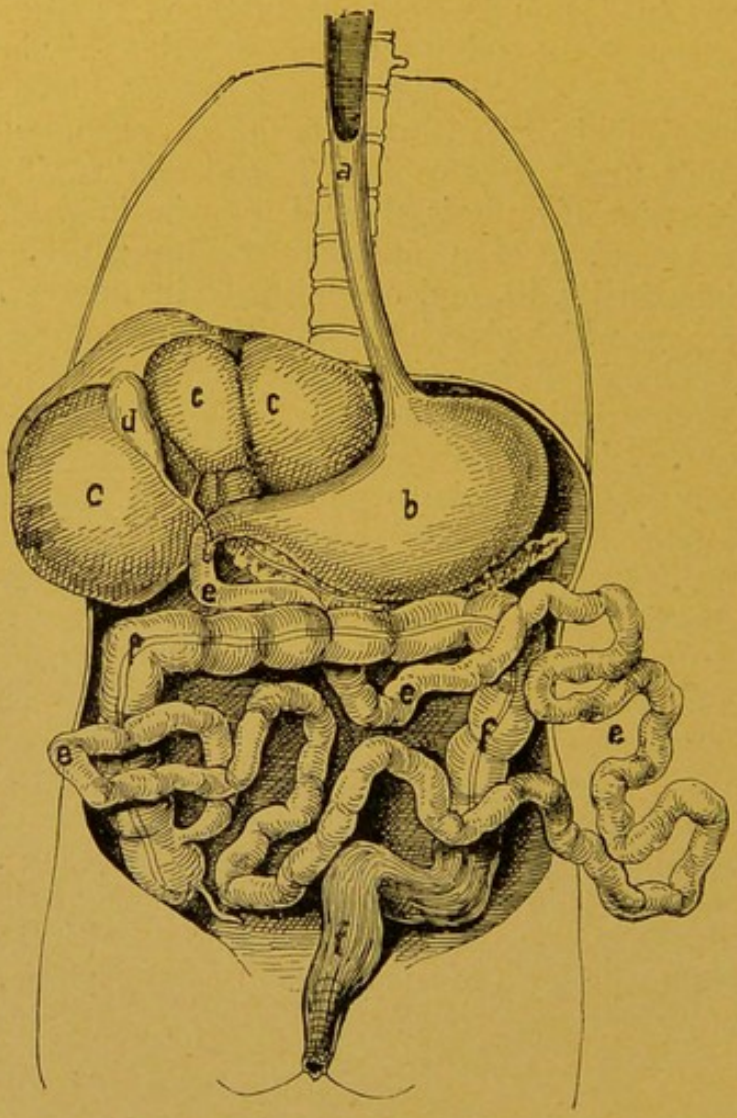
3. Peyers's glands. Strictly speaking, these groups of glands, which are practically perfect closed follicles, should not be reckoned as glands of the small intestine. They are sometimes found alone, sometimes in great crowds in the course of the whole small intestine. But they have scarcely anything to do with the secretion of a digestive fluid, and seem to be storage places for lymph.

B. The Large Intestine.

The small and large intestine can be separated from each other by a valve formed of mucous membrane. At the point where the small intestine ceases, the whole tube becomes larger and stronger. The large intestine is also divided into three sections, name respectively, coecum, colon, and rectum.

1. The coecum can scarcely be rightly called an actual section of the large intestine, as it is nothing more than a backwards production of the beginning of the colon. The coecum lies on the right side of the abdominal cavity, and occupies approximately the middle of an

imaginary line, drawn from the navel to the upper front point of the anterior superior spine of the ileum. The coecum has a small twisted appendage about two-and-a-half inches long, and about as thick as a lead pencil called the vermiform appendage, whose extremity is closed. This appendage plays a very important part in inflammation of the coecum (of which we shall have presently to speak), as foreign bodies, such, for example as cherry stones and hard morsles of fæces easily become plugged in this locality.



a, Oesophagus; b, stomach; c c, lobes of liver, turned up d, gall bladder; e, small intestine; f, large intestine.

2. The colon forms a direct continuation of the coecum. It is an important tube, consisting of three parts definitely distinguished from one another. The first part, the ascending colon passes upwards from the right groin to the liver; the second, the transverse colon crosses from the right to the left side; and the third, the descending colon descends on the left side, to pass by an S shaped curve into the rectum.

3. The rectum, which, in carniverous animals, leads directly to the anus, and has less to do with the digestion than with the forming and evacuation of the fæces, is in man a strongly muscular, twice curved tube, which ends in the anus, as the lower evacuating organ of the digestive canal.

The large intestine consists also of the three layers, which we

observed in the stomach and small intestine, the peritoneum, the muscular layer, and the mucous membrane.

A perfect peritoneal covering exists, however, only in the first part of the large intestine, and as far as the vermiform appendage of the cœcum. In the other parts of the large intestine a part of the hinder surface is without peritoneal covering, and is fastened by a fixed connective tissue to the neighbouring portions of the wall of the abdomen, or of the pelvis. Below the third sacral vertebra the large intestine is completely without peritoneal covering.

The muscular stratum of the large intestine contracts its longitudinal fibres into three band-like stripes. By the action of these the propulsion of the contents of the intestine, from which all that is useful has been extracted, is assisted. In the rectum these bands become constantly wider, and finally enclose it in a circular system of contracting muscles. It has been already mentioned that the large intestine contrasts with the small by its much greater diameter, but it differs from it also in having a number of constrictions, which are visible on its upper surface, and correspond to an equal number of folds in the interior of the intestine. In these folds the masses of fæces are collected to have the moisture withdrawn from them, so that they become firmer, and are then passed on in this form into the rectum.

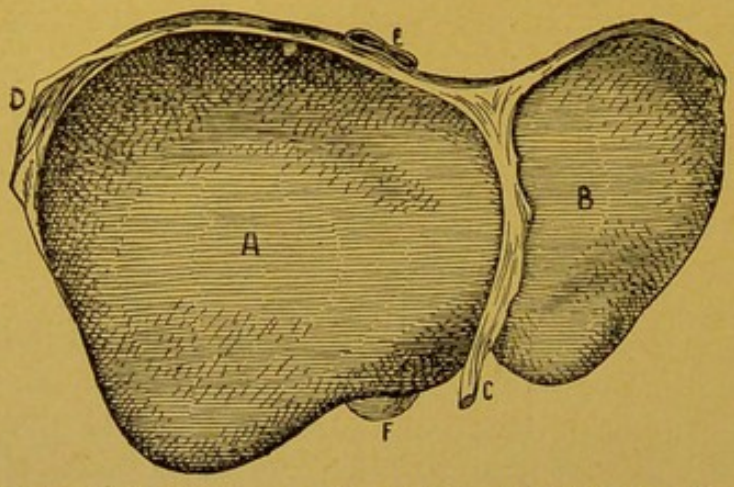
The mucous membrane of the large intestine shows us of all the glands of the small intestine only Lieberkühn's glands. But in addition to these we find numerous groups of Peyers's glands (found also in the small intestine), which, however, have nothing to do with the secretion of digestive juices.

The external orifice of evacuation has a circular sphincter muscle (throttling muscle), which is under the control of the will. About three inches above this external muscle for closing the intestine is another closing muscle of the rectum, independent of the will, which prevents the column of fæces from pressing directly upon the lower voluntary muscles, and so rests the anus.

Let us now turn our attention to the two great digestive glands which pour their secretions into the intestines; these are the liver and the pancreas.

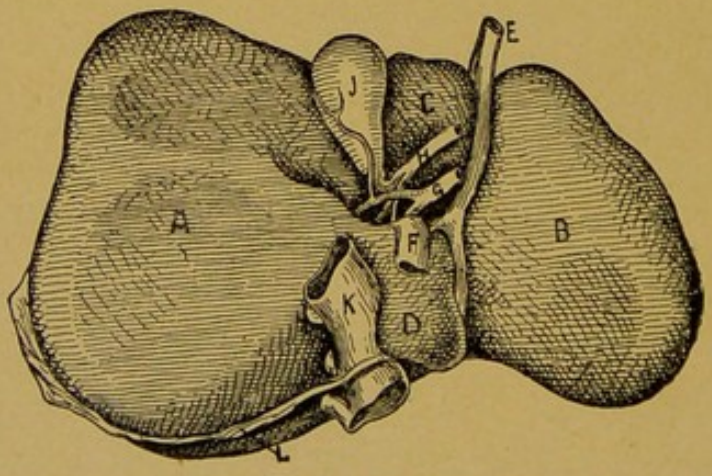
The liver is the largest and heaviest of the abdominal viscera. It differs from all the other glands of the body in this, that the gall is not formed out of good arterial blood alone, but also out of exhausted venal blood, which it draws through a special blood vessel, called the portal vein. The liver lies on the right side of the abdominal cavity, but extends its left side towards the left, and covers the portion of the

stomach nearer it from the portal to the base of the stomach, the greater part of which it leaves free. The shape of the liver is that of an elongated four-sided figure; but the corners are rounded off. Its front lower edge, which projects below the right ribs, is sharp. The blunt back edge stands somewhat higher than the front one; so that the liver has a position slightly sloped forward. It is maintained



Front view of the liver. A. Right lobe. B. Left lobe. C. The circular attaching ligament. D. Liver capsule. E. Vena cava. F. Gall bladder.

in this position by supporting ligaments. The right edge of the liver is also blunt, and the left sharp edge distinctly shorter, so that the whole liver becomes distinctly smaller on the left side.



Posterior view of lower side of liver turned upwards. A. Right lobe. B. Left lobe. C. Rectangular lobe. D. Spiegel's lobe. E. The circular attacking ligament. F. Portal vein. G. Liver arteries. H. Gall duct. I. Gall bladder. K. Ascending vena cava.

We distinguish in the liver an upper surface, directed a little forward, and an under surface inclined a little backwards. The upper convex surface lies near the corresponding hollow of the diaphragm, and is attached to it by a strong ligament, which extends over the whole upper surface, and separates it into a larger right-hand and smaller left-hand lobe.

The under surface of the liver is partly in contact with the upper end of the right kidney. It covers the end of the ascending colon, and the first part of the transverse colon, and a considerable portion of the stomach. Hyrtl remarks that the lower surface of the liver might be represented as divided into four parts by three H-shaped furrows. The three furrows are called the right longitudinal furrow, the left longitudinal furrow, and the cross furrow or orifice of the liver. All that lies on the right of the right longitudinal furrow is the right under-lobe of the liver. All that lies on the left of the left longitudinal furrow is the left under-lobe of the liver. Before the cross furrow lies what is called the rectangular lower lobe, and behind it lies Spiegel's lobe, so named from the anatomist who first described it.

The cross furrow divides the right and left longitudinal furrows into two nearly equal parts. In the anterior section of the right longitudinal furrow we find the gall bladder. In the posterior section of the same is the ascending vena cava, into which the veins of the liver discharge. In the anterior section of the left longitudinal furrow lies the perished circular umbilical cord, which formerly, when the child was in the womb, performed an important function as a nourishing blood vessel. The cross furrow, or orifice of the liver, serves for the entrance and exit of the nerves and vessels.

The gall bladder is simply a receptacle for the gall, of which the small intestine has need during digestion. The gall bladder has the shape of a pear, whose smaller end is behind, and gradually contracts into a slightly twisted neck. The base of the gall bladder projects a little below the anterior edge of the liver. It has been already mentioned that the gall bladder discharges the gall into the duodenum.

The liver, however, does not prepare only the gall, of which the small intestine has need, but also a peculiar kind of sugar, and is in particular a blood-preparing organ. This sugar is not passed with the gall into the intestine, but goes directly through the veins of the liver into the blood to be there utilised.

The pancreas is a long gland, consisting, like the salivary glands of the mouth, of many extremely small glands. It lies behind the stomach. With its left smaller end, called the tail of the pancreas, it borders on the spleen. With its right larger end, called the head, it

approaches the open side of the horse-shoe curved duodenum. The whole gland is pierced throughout by a duct into which the several bunched glands discharge their secretion. This duct joins with the gall duct in a common discharging duct, which pours into the duodenum both the gall and the secretions of the pancreas.

The spleen. Whether the spleen is one of the digestive glands, or whether, as many experts are disposed to believe, it assists in the formation of the blood, has not yet been made clear. The circumstance that the spleen has no discharging duct is striking, and disfavours the idea of its having any connection with digestion. We must assume that it communicates its secretions to the rest of the body through the blood vessels. The spleen lies much concealed and covered by the convolutions of the intestines, close behind and near the fundus of the stomach, in the left posterior part of the abdominal cavity. It is about the size of a man's closed fist, and somewhat in the form of a coffee bean. Its exterior convex surface clings to the diaphragm.

The pancreas. A. Head. B. Tail. C. Duct of glands.

The anterior edge is sharper than the posterior, and towards the extremity so sharply notched that a smaller portion of the spleen has the appearance of being completely separated from the main gland.

The spleen is completely covered by the peritoneum. Underneath it, and closely attached to the surface of the spleen itself, is an envelope of connecting tissue, which penetrates in the form of a sheath into the body of the spleen, entering with the blood vessels into the interior of the gland where it forms a frame-work, full of interstices, in the shape of many branched passages. In the meshes of this frame-work lies the peculiar reddish-brown spleen-tissue, which consists of a very fine fibrous stroma, connected both with the frame-work already mentioned, and with very small roundish bodies, named the spleen corpuscules. These spleen corpuscules are of the greatest importance in the functions of the spleen. Sometimes they appear to rest directly upon the ramifications of the vasicular system. But a complete explanation of these corpuscules of the spleen has not yet been discovered.

Food and Drink.

We have now surveyed the digestive canal from beginning to end, together with the various digestive glands which pour their secretions into it; and may next turn our attention to the most important articles of diet, partly with a view to discover their various values as foods, and partly with a view to understanding in what manner the digestive canal transforms them and makes them, by digestion, useful to the body.

We shall here have to enter upon the subject of metabolic changes (changes of one substance into another) which is closely connected with the phenomena of nutrition and digestion.

Exactly as the prudent master of a household is careful that his income and expenses are at least balanced; as he becomes impoverished if his expenses exceed his income, and gathers savings if he receives more than he spends; so a kind of debtor and creditor account is perpetually going on in the body, although we cannot see it.

A man's whole organism is continually in motion. Even the smallest particles of which it is constructed, particles that appear always to lie at rest close to one another, are always undergoing changes and moving their positions. Motion means expenditure of heat and force. This heat and force the organism generates in itself by burning, with the assistance of the oxygen which it inhales, fat and albuminous substances. It also, by exhalation, and in the forms of perspiration, urine, and fæces, is constantly evacuating matter. It is evident that the body would very soon be impoverished, and ultimately collapse, if it was not furnished with continuous supplies to replace the expenditure involved in the activity of existence.

The body gets these supplies out of the food by means of digestion.

When speaking of the diet of the suckling, I pointed out that the human body needs for its growth and sustenance, in addition to water and certain salts, principally three substances, both in certain quantities and in certain proportions. And I said that the mother's milk formed the most perfect diet, because it contained these substances exactly in the proportion which the suckling required. Now, human milk contains:

Albumen	1 per cent.
Fat	3·8 ,,
Hydrocarbon (sugar)	7 ,,
Water	88 ,,
Dissolved salts	0·2 ,,

Thus, then, albumen, fat, hydrocarbons, water, and salts are the food which man, by the operations of digestion, extracts from what he eats

and drinks; and these he gradually transforms into their elements, carbon, nitrogen, hydrogen, and oxygen, of which they are all composed.

1. Albumen.

Albuminous matter, of which several kinds exist, belongs to the compounds of nitrogen, and forms an important part of most human tissues; for example, of the nerves and muscles, also of the blood, and of all cells out of which bodies are built up. Albumen is a compound of about 50 per cent. carbon, 8 per cent. hydrogen, 16 per cent. nitrogen, 25 per cent. oxygen, and 1 per cent. sulphur.

Albuminous materials are contained in animal and vegetable foods, and are introduced into the human body ready compounded. But, as they cannot be utilised by the organism in the form in which they are introduced into the digestive canal, without further changes, they are, before being introduced into the blood (in the formation of which they have an important part), altered into a substance called peptone. Finally they are decomposed into similar compounds, and leave the body partly in nitrogenous forms of what is called urea, but partly also as carbonic acid and water.

The most important function of albuminous materials is the continual renewal of the human tissues.

2. Fat.

Fat differs from albuminous substances principally by the absence of nitrogen.

Fats also are contained both in animal and vegetable food, but in far larger quantities in the former. They occur chiefly in butter, suet, milk, cheese, in fat meat, and in oils, obtained by pressing either from parts of animals (cod-liver oil), or of plants (ordinary olive oil).

Fats appear in all human fluids (with the exception of the urine) partly resolved, partly very freely divided (as in milk), but also partly in the fatty tissues, in which they are stored as fat. They are useful to the body principally in maintaining the animal warmth, the abundance of carbon which they contain being burned into carbon-oxides.

The fats stored in the fatty tissues are a sort of reserve which the body lays by out of the super-abundance of fatty foods. The anterior part of the abdomen is the principal locality in which this store of superfluous and reserve fat is laid up. It is stored, that the organism may be able to draw upon it for fuel at any time, when the food supply

happens to be insufficient.

Fat and albumen stand in certain relations to each other. They are, in a degree, interchangeable, and can for a time replace each other. Albuminous substances can be converted into fat by a separation of the nitrogen; and on the other hand the organism can use its superabundant fat to economise its natural albumen.

3. Hydrocarbons.

The hydrocarbons are also free from nitrogen, and consist of carbon, hydrogen, and oxygen. These also are found both in animal and vegetable food stuffs, but more abundantly in the latter.

The hydrocarbon food substances are identical with starch, flour, and sugar; consequently they are principally found in different sorts of grain, in leguminous fruits, in potatoes, and in the well known different kinds of sugar, of which I may mention cane sugar, beet sugar, and milk sugar. Starch flour is a source of sugar, and must be converted by the digestion into sugar, in order to be soluble and available.

The hydrocarbons serve like the fats for generating force and heat. By the assistance of the oxygen which is inhaled, they are changed first into alcohol and carbonic acid, and finally into carbonic acid and water.

4. Water.

Water is a chief factor in nutrition. It consist of oxygen and hydrogen and constitutes 70 per cent. of the whole body, being abundantly present in all tissues and fluids.

Water is supplied to the human body both in solid food and in drink, and in the latter case either as pure water, or in the form of tea, coffee, beer, wine, &c.

The human body is not bound to receive a certain fixed quantity of water each day, but after any lengthy abstention from all liquids, a need of them ensues, which we call thirst, which indicates that the tissues which have been losing fluids continuously by perspiration, and respiration, and in the urine and fæces, are in need of an addition of liquid in order to sustain their living elasticity. (We learned from cholera nostras and cholera the danger of too great a loss of water from the tissues).

As water contains neither fat nor albumen nor hydrocarbons, it cannot strictly be called food; but it has very great importance

because it holds in solution all the substances that exist free in the body, and in this manner makes the metabolic change possible.

The purest water (excepting distilled water) is rain water. The next purest is certainly spring water. Well water, unless it is drawn from a great depth, may contain all sorts of admixtures.

Good water must be clear, colourless, and without smell, if it is to be fit for drinking water. If water contains a great deal of salts of lime it is called hard water. This water is bad for cooking and washing, but may be drunk without danger. Rain water is the softest water, but has a flat taste; from which we may conclude that a certain proportion of salts in water improve its taste.

5. Salts.

Salts occur, although in small quantities in almost all kinds of food, and either in solution, or in a solid form, as in bones. They do not indeed serve purposes so important as fat, albumen, and hydrocarbons, but they appear to be absolutely necessary to the healthy nurture of all tissues both animal and vegetable, as they support and maintain the living elasticity.

The most important salt is cooking salt (sodium chloride), which is introduced into the human organism principally in meat, and leaves it again in urine and perspiration.

In addition to this sodium chloride, I may mention potassium chloride, carbonates, phosphates, as well as traces of iron, which are taken partly in animal and partly in vegetable food.

These salts, however, are not strictly digested. They are all ultimately evacuated in their original form.

Now that we know that only albumen, fat, and hydrocarbons serve for the construction and maintenance of the body (although water and salts play an important part), we can regard as nourishing only those edible or drinkable substances which contain these three nutritive elements in a considerable quantity.

Everything else that we eat or drink, such as pepper, mustard, tea, coffee, or spirits, are not nutritive, but only condiments.

We distinguish animal and vegetable foods.

It is true that a man can choose and procure the necessary nutrition from either an exclusively animal, or exclusively vegetable diet. But either plan would be as mistaken as if he were to resolve to feed himself always only on albumens and fat, or only on hydrocarbons and fat.

As usual common sense lies in a middle course, and as nature

supplies us with food both out of the animal and out of the vegetable kingdom, I have no hesitation, in spite of all vegetarians, in recommending mixed diet.

How much then, and in what proportions, should our food be selected, in order to supply the body with the proper quantity of nutritive matter?

Nature supplies us with a certain guide, in the form of feelings of hunger and of satiety. But these feelings are very differently developed in different individuals, as any one will grant who compares the appetites of a plough-boy and of a young lady.

To arrive at an average measure of necessary food—that is to say to determine the amounts of albumen, fat, and hydrocarbons—which a man ought to take to make up for the waste of the body, one must take a number of individuals, some engaged in physical labour, some leading a life of leisure. These must be fed for a number of weeks according to a regular scheme, and duly measured by weighing. We thus discover that, on the average, a daily measure of 2½ ozs. of fat, 5 ozs. of albumen, and 12½ ozs. of hydrocarbons, are necessary and sufficient to keep a man occupied in ordinary work at the same weight.

As, has been already remarked, the three different elements of diet can, at any rate for a time, take each other's places without any harm ensuing. But for a long period the organism can neither endure the withdrawal of one of the three nutritive substances, nor subsist upon a diminished quantity of all three together without a loss of flesh, or of strength; exactly as a long continued excessive supply must terminate either in disease or in a steady increase in weight.

On this principle are based all cures which aim at fattening the body, or reducing its fat. In the former case a large quantity of fats and albumens are given in addition to the necessary measure of food, so that an excess of fat may be stored in the body. In the latter case either fats or hydrocarbons are given in quantities considerably below the average,so that the body may be compelled to use up its reserves of fat.

But neither of these treatments are without danger. A long-continued one-sided diet may weaken the body considerably. And the "cure" generally only lasts so long as the particular treatment is followed.

In my opinion the best way to remedy excessive fatness is the following:—

1. Regular and plentiful bodily exercise, in the form of physical labour, walking, and gymnastic exercises.
2. Moderate, but sufficient nourishment.

3. Avoidance, or at least limitation of drink, and especially alcoholic drink during eating.

4. Water treatment.

It remains for us now to analyse some of the most important every-day articles of diet according to their value. From this we shall be able to calculate, at least to some extent, what is necessary to diet a family properly. We will first examine some vegetable articles of diet; and begin with comparing the most commonly-used grains, out of which meal, bread, and cakes are made. These contain—

	Albumen. %.	Fat. %.	Hydro-carbon. %.	Water. %.	Salts. %.
Oats	9·05	4·00	73·50	10·88	2·57
Rye	10·85	2·20	61·60	13·85	1·50
Barley	12·25	2·65	68·00	14·50	2·60
Wheat	13·55	1·85	69·58	13·02	2·00

The first glance at this table shows us that all these kinds of grain and their products contain all three nutritive substances; but that they are very rich in hydrocarbons, and that on an average a pound of them would suffice to supply the daily measure of hydrocarbons, which we found to be 12½ oz.

The case is somewhat different with what are called leguminous fruits, peas, beans, *etc.;* of which the most frequently used may be tabulated thus—

	Albumen. %.	Fat. %.	Hydro-carbon. %.	Water. %.	Salts and Extractives. %.
Peas	22·25	1·95	58·40	14·50	2·90
Lentils.. ..	27·50	2·50	55·00	13·13	1·87
Beans	23·00	1·65	57·50	13·85	4·00

In these nutriments the great quantity of hydrocarbons appears to be very valuable; whilst the large proportion of vegetable albumen makes them a very useful food to those whose means are straightened. But a small portion of meat should be added to supply the wanting

fat, and to raise the albumen to the proper percentage.

It will be interesting to mention that the potato contains about 1·4 per cent. albumen, 0·1 per cent. fat, 24·8 per cent. hydrocarbon, 72·7 per cent. water, and 1 per cent. of salts. From this we can see that the potato is an article of diet by far inferior to peas, beans, and lentils, or bread.

In many parts of Europe fungi are much eaten, and I may mention that they are, on account of the quantity of albumen which they contain, a valuable food, though I believe that they are often over-rated.

There are in England several edible fungi besides the familiar mushroom, but as many of the others develop distinctly poisonous effects, no one should venture upon gathering fungi for food, and not even mushrooms, who is not absolutely sure of being able to identify without a possibility of mistaken the edible species. No reliance should be placed upon the popular rules based upon brilliance of colour, a slimy surface, and so forth. All such rough methods of distinction are deceptive.

The subject of poisonous fungi, and the measures taken in case of poisoning will be found in a subsequent portion of the book.

Animal diet may next claim our attention. Under this head we include meat, milk, and eggs, and various preparations of them.

Meat as we purchase it in a raw state for the kitchen consists of *muscles*, *fat*, *connective tissue*, *tendons*, *nerves*, *&c.*, not to mention (to the regret of many housewives) bones. Meat is a food of the highest importance, principally on account of the large proportion of albumen which it contains.

It is not possible to make so exact a tabular representation of the contents of various kinds of meat, as we have given above of certain vegetables. The contents will differ much according to the breed of the animal from which the meat is taken; and the condition even of beasts fed for slaughter is very various. But on the whole we shall not be far wrong in considering that the meat which we obtain from the butcher contains on an average 15—20 per cent. albumen, 15—25 per cent. fat, 50—60 per cent. water, and 2—3 per cent. salts and extractives—the last give what is called "high" meat its agreeable taste. The quantity of fat is very variable. It depends principally upon the character of the fodder with which the animal has been fed.

The flesh of game contains more albumen and less fat than that of animals reared for the butcher. In fatted poultry, on the contrary, we find the albumen diminished in the same ratio as the fat is increased.

Fish are universally rich in fat and albumen, of which they contain

from 15—20 per cent., for which reason fish ought to be highly esteemed as a popular diet.

That *milk* contains along with fat and albumen also hydrocarbons has been already stated. On account of the variety of its contents, it is not only the most valuable of all foods for sucklings, but is also priceless in the sick room, as it can quench both hunger and thirst.

The most important preparations of milk are butter and cheese.

Butter is prepared from cream in which the fat of the milk floats up, if the milk is allowed to stand for a period. With suet it best supplies our daily need of fat, which we have stated at 2½ oz. Naturally only well-to-do families can afford to take all the fat they need in the form of butter, on account of its price. The less wealthy can use without any disadvantage, bacon, mutton suet, beef suet, or the compound known as margarine.

Cheese is also a product of milk, and a very valuable food on account of its large proportion of albumen. It is hardly possible to imagine anything more nutritious than bread and butter and cheese, which contain in their three components all the nutritious substances in high proportions. The quantity of fat in different cheeses depends upon the fat contained in the milk from which the cheese is prepared; so that a great distinction must be drawn between a "poor" cheese and a cream cheese.

Eggs are important on account of the albumen which they contain. The edible part of a hen's egg, consisting of the white and the yolk, contains (in a middle-sized egg weighing about 1½ oz.) about 1 oz. of white and ½ oz. of yolk. The white of the hen's egg consists almost entirely of water and albumen dissolved in water. The yolk, on the other hand, contains besides albumen, fat, sugar, water, and salts. It is this combination that makes egg diet so very nutritious.

Eggs are most easily digested when boiled "soft"—that is for about three minutes. Hard-boiled eggs are distinctly more difficult to digest. This difficulty of digestion—an important consideration in the case of children and invalids—can be partly overcome by chopping up the white (after the shell has been removed) very fine. Eggs are most difficult to digest in the raw form; a fact that has been proved by scientific experiments. To compare the nutritive qualities of egg diet with those of a diet of milk and meat, we may mention that a middle-sized hen's egg contains the equivalent of about one-third of a pint of milk, or of one-tenth of a pound of cooked meat. The housewife will be able to judge from the local prices of meat, milk, and eggs with what degree of economy she may substitute one for the other.

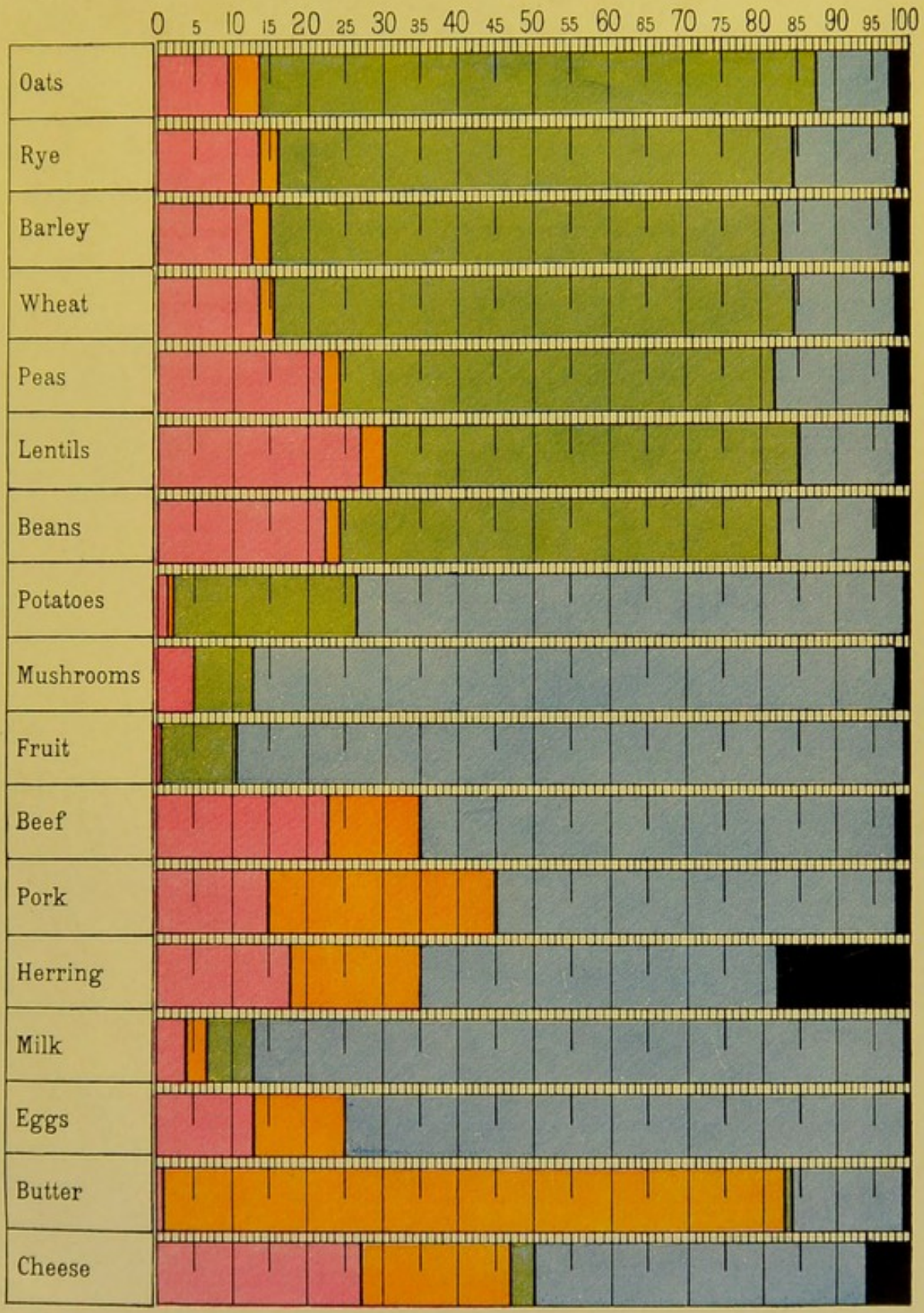


Table showing the nutritive qualities of the commonest articles of diet.

We must not quit this subject of food without saying a word about tea and coffee. A few lines shall be added respecting alcoholic drinks.

The simplest, cheapest, and most wholesome drink is clean water. It appears too tasteless to most men, in consequence of which it has been customary from times immemorial to give it a pleasant taste by making some addition; and there will be few of our readers who on a cold winter day do not prefer a cup of tea or coffee to a cup of warm water.

Tea and coffee are aromatic infusions, and not nutritive at all. They are merely stimulants that act upon the nervous system. In their preparation the extracts contained in the tea and coffee (called theine and caffeïne) are drawn out by the warm water. Both have a remarkable effect upon the action of the heart and upon the nervous system, if they are used in moderate quantities, and not too strong. For excitable persons, for those who suffer from weakness of the heart, and for invalids, strong tea and coffee as a daily drink are to be strictly forbidden. They can both produce palpitation of the heart, faintness, and vomiting, and may act as poisons affecting the heart.

Alcoholic drinks are also direct stimulants. If anyone asserts that on the contrary beer is a nutritive drink containing hydrocarbons and albumen, I will allow that assertion to pass, and observe only that a man would have to drink daily 23 pints of beer in order to get the amount of hydrocarbon his body requires, and 30 pints to get the necessary quantity of albumen.

The commonest alcoholic drinks are beer and spirits.

Beer, wine, and spirits are prepared by processes in which starch or sugar are subjected to alcoholic fermentation. Thus wine is procured by an alcoholic fermentation of grape-sugar; beer by an alcoholic fermentation of malt; and brandy out of the starch of potatoes or corn; rum from a similar fermentation of the sugar cane; and so forth.

The greater the quantity of alcohol in the preparation the greater the stimulating power. The alcohol contained in all these drinks has an animating warming and strengthening effect, if they are used moderately. When taken in quantities they act as poisons upon the heart and the nerves. The latter may become so seriously affected that the man, who has drunk too much, loses his senses and becomes intoxicated.

Habitual excessive use of alcoholic drinks has unhappily become a serious evil in all ranks. I say advisedly in all ranks. The poor man imagines that he cannot work unless he has every day taken his allowance of beer or gin; the middle class man frequents his

favourite bar; and the wealthy man takes at his own table or his club more expensive drinks of which he has no need. Millions are annually spent on spirituous liquors, and it is scarcely possible to express to what a degree the health of the population is undermined. It is small comfort to reflect that other nations are in no better case than ourselves.

Those who are interested to know the alcoholic contents of various spirituous liquors may be informed that brandy and rum contain about 60 per cent. of alcohol. Southern and Hungarian wines (port, sherry, Madeira, &c.) contain from 15—20 per cent; French red and white, and sparkling wines, 10 per cent.; German Rhine wines and Moselle, 8—10 per cent.

Of beers, the English ale and porter are the strongest and contain 6 per cent. of alcohol; Bavarian beer, 4 per cent.; Lager beer, the mildest of all 2 per cent.

We may now return from this long discussion of the most important articles of diet to the question of the construction and functions of the human digestive organs, in order to learn how the different nutriments are broken up in the digestive canal and used for the building up and maintenance of the human organism. We may limit ourselves to one practical example. I have already said that bread and butter and cheese contains all the elements of nutrition in rich proportions. We will see what is done with them.

After we have bitten off a portion with the front (incisor) teeth, we set the lower jaw in motion in order to chew the portion. The tongue assists in this by pressing the substance between the teeth. As soon as chewing begins, the salivary glands are prompted by the pressure of the muscles engaged in moving the jaws to pour the saliva into the oral cavity. The saliva is mixed with the food and makes it slippery, so that it can be more easily swallowed. But already in the mouth the food begins to be subjected to digestion, inasmuch as the hydrocarbons of the bread begin to change into sugar under the action of a ferment contained in the saliva and called ptyalin. Finally the mouthful, having been sufficiently chewed is voluntarily passed down through the pharynx by the muscular action of swallowing, and descends by the œsophagus into the stomach. As soon as the food reaches the mucous membrane of the stomach, this organ at once undertakes its further digestion. By the movements of its longitudinal and cross muscles, the stomach brings the morsel into contact with as large a portion as possible of its mucous membrane, and at the same time stimulates the mucous membrane to exude a plentiful supply of the gastric juice from its peptic glands. In

consequence of this, the mass, previously shaped like a ball, is converted into a shapeless "chyme."

Digestion in the Stomach consists chiefly in this, that the juice of the stomach changes all the albumens into an easily soluble form which is called peptone. The juice of the stomach effects this change by means of the peptine, a stomatic juice containing a ferment, and with the help of the hydrocloric acid, which in every healthy stomach forms ·2 per cent. of the gastric juice. The fats and hydrocarbons remain unaltered in the stomach. The digestion of the albumen in the stomach is completed in about three hours. The chyme now advances through the outlet (which opens itself) into the small intestine. Here the intestinal fluid the gall, and the secretions of the pancreas undertake the further transformation of the food.

The intestinal fluid contains two ferments. One of these is like the pepsine of the gastric juice, capable of converting albuminous bodies into soluble peptone. The other, acting like the ferment of the saliva, changes starch into sugar.

The gall acts principally upon the fat in the chyme, dividing it into small portions, and making it soluble and capable of absorption. It also acts antiseptically. This has been proved by the fact that dogs, whose gall has been affected, have an extraordinarily putrid smell. Finally the gall seems to be able (in some manner not yet explained) to stimulate the movements of the intestines during digestion. This has the advantage of bringing the chyme into contact with large portions of the mucous membrane, and of making it move slowly onwards towards the large intestine.

The juice of the pancreas contains three ferments. The first has the same effect as the gastric juice and the intestinal fluid, changing albumen into peptone. The second acts like the gall upon the digestion of fat; and the third converts hydrocarbons into sugar.

In addition to this, in consequence of the action of septic germs, the chyme assumes, even in the lower part of the small intestine, in spite of the antiseptic action of the gall, a fetid smell like that of the fæces; and this becomes stronger the longer the chyme remains in the small intestine. This smell is caused by ammoniac, sulphuretted hydrogen gas, and certain septic products of albumen, of which the best known are indol and skatol.

The matter now passes into the large intestine. Here any real digestion hardly takes place, although the glands of the upper portion of the large intestine (which are called Lieberkühn's follicles) yield a secretion similar to thin intestinal fluid. The sepsis which began in the small intestine proceeds in the large intestine, foul gases and acids

(fermenting lactic acid and other) are formed. The masses, as the liquid parts are more and more drawn off, become more and more dense in the folds of the great intestines; and the fæces are thus formed which represent the useless remains of the food, and are evacuated.

CHAPTER VII.

Disorders of the Organs of Digestion.

Oral Cavity and Pharynx.

Inflammations of the mucous membrane of the mouth, which are common both in sucklings and in older children, can affect the lips, the gums, the tongue, and the inner surface of the cheeks. They show themselves by a bright reddening of the parts affected, which appear distinctly swollen, and in advanced cases shows symptoms of ulcerative degeneration.

A copious secretion of saliva is almost always observed in cases of inflammation in the mouth. The painfulness of the inflamed portions, the difficulty of eating, the heightened sensitivity to both heat and cold, and especially the increase of temperature common in the evening, taken altogether constitute a very uncomfortable state of things for the patient. But if he is in a healthy state nothing serious is threatened.

Inflammation of the mucous membrane of the mouth is commonest in the case of quite young children at the first teething. But they occur also in older children both independently as a consequence of injuries occasioned by sharp corners of the teeth, by tartar on the teeth, or by burning occasioned by too hot food or drink; also in consequence of infectious disorders, of which I have already mentioned measles, scarlet fever, and whooping-cough as the commonest.

Thrush often develops itself upon the mucous membrane of the mouth, particularly among children of the more indigent classes. We have already studied this as a complaint of sucklings. But it may occur also in older children, and even among adults, in the course of severe disorders—for example during typhoid.

Simple catarrhal inflammations of the mucous membrane of the mouth are not of themselves of much importance, and generally are successfully cured in a few days by the treatment which we shall presently describe. But ulcerations invariably denote a higher degree of inflammation, and have a tendency to spread more deeply into the tissues. These ulcerated places, which always commence on the

edges of the gums, or on the inner sides of the cheeks, show a greasy yellow coating, which consists of decayed dead mucous membrane. If an attempt is made to scrape the coating off with the handle of a spoon the spots almost always bleed. A foul smell from the mouth, thickly-coated tongue, loss of appetite, and a distinct rise of temperature, particularly in the evening, point distinctly to an invasion of bacteria and its effects—a conclusion which the microscope will prove to be correct.

One form of inflammation of the mucous membrane of the mouth deserves to be particularly mentioned. This seems to affect the upper surface of the tongue alone, and may be observed, not seldom, both in very young children and in those that are older. The tongue shows a number of insular, dirty grey patches, which are distributed over the whole surface, and give it a peculiar dappled appearance. The malady causes the patient scarcely any disturbance either of a local or general nature, and the spots (which represent superficial loss of mucous membrane) may be touched with the handle of a spoon without any pain being felt. It is most curious that these spots frequently disappear without any treatment, and afterwards quickly appear again.

Ulceration of the frænum linguæ also may be here briefly mentioned. This sometimes develops itself underneath the tongue, on the frænum ("string" of the tongue) in cases of whooping-cough, continued nasal catarrh, or as an accompaniment of teething. It is no doubt occasioned by mechanical irritation of the lower incisors, and is of little importance, as it may be cured by attention to cleansing the mouth without any further treatment.

Treatment of disorders of the mucous membrane of the mouth. The fact that the forms of inflammation of the mucous membrane of the mouth which have been already mentioned, as well as thrush, occur generally in children of whose mouths sufficient care has not been taken, shows us that cleanliness of the mouth is the best means of preventing as well as of curing the evil. In fact simple catarrhal irritation (such as we observe for example in teething) requires no treatment other than the washing, several times a day, of the mouth with a weak solution of permanganate of potash. Care should at the same time be bestowed upon general attention to health. The irritation always vanishes with the appearance of the tooth. Ulcerated inflammations, on the contrary, always demand a somewhat drastic treatment, as they invariably show a disposition to spread. Older children, who can gargle, should thoroughly cleanse the whole of the mouth thrice daily (morning, afternoon, and evening) with a solution

of boric acid—a tea-spoonful of powdered boric acid should be well disolved in a coffee cup of luke-warm water. The mouths of younger children should be carefully opened, and the several affected spots thoroughly washed with the solution of boric acid. This may be most conveniently done with a rag wrapped around the end of a small wooden rod. If rapid improvement does not ensue, the ulcerated parts must be treated with freely diluted carbolic acid, 2 per cent., or cauterised by a medical man. This will almost always effect a cure within eight days.

Disorders of the teeth. Whilst the often repeated remark that it is easier to avoid a malady than to cure it, may be applicable to a certain number only of all the disorders that are possible; the observation is absolutely true of all disorders of the teeth. These may be almost invariably avoided by proper precautions. The majority of people seem to have no idea how closely the general health of the body is connected with the possession of good teeth. As soon as the teeth begin to decay, they attempt to preserve them by all kinds of tooth powders, without having the least suspicion that the remedy which they are adopting is calculated (in consequence of the injurious substances contained in the tooth powders) to make matters worse.

If we pay any attention to the work and functions of the teeth we shall see that they serve so to break up, by chewing, the portion of food taken into the mouth, that this portion after it has been well mixed with saliva can comfortably pass into the pharynx and gullet. As it is of supreme importance that the food, on its arrival in the stomach, should have been previously thoroughly chewed (in this case the gastric juice can work by far more quickly and effectively than when half-chewed masses arrive in the stomach), every man should accustom himself and his children to chew carefully all kinds of solid food. Regular care of the mouth and teeth goes a long way towards keeping the teeth capable of performing this important labour of chewing. Both children and adults do wisely if they wash out the mouth in the evening before going to bed; and in the morning clean the teeth with a soft tooth-brush and clean water, which should have a temperature between 60° and 94° Fahrenheit (15°—35° Centigrade). Each child should be taught to use only its own brush.

Another practical rule for the preservation of the teeth is to avoid all articles of diet that are either excessively hot or cold. The teeth can be easily injured by excessive heat (exceeding 103° Fahrenheit, 40° Centigrade) or by moderate cold (below 50° Fahrenheit, 10° Centigrade). Ices, of which so many ladies are extremely fond, are directly poisonous for the teeth—which any dental surgeon will

confirm.

A warning must also be given against acids, which, in the form of acid sauces, &c., enter more or less frequently into our mouths and come into contact with the teeth. They do not need to remain long in the mouth to attack the external enamel of the teeth, and so to give the first impulse towards decay. For the same reason, the strongest warning must be entered against all those preparations for "preserving" and beautifying the teeth which contain an acid—generally salicylic acid. At the moment they do certainly assist to give the teeth a beautiful appearance, but the evil consequences invariably follow.

Excessive use of sugar also cannot be recommended if the teeth are to be kept sound. Sugar is, undoubtedly, extraordinarily nutritive, and may be given to children without hesitation—if care is taken that they do not keep it too long in their mouths. But it is a very common mistake to give children "goodies" to suck. The acids which they produce in the mouth, imperceptibly but invariably attack the outside of the teeth.

If, however, anyone cannot be satisfied with pure water for the teeth or mouth, nor with the solution of permanganate of potash which I have frequently mentioned, but wishes to have something that has an agreeable scent, I can recommend the use of the tincture of myrrh, sold by the druggists with directions for use.

Proceeding now to mention some of the most important disorders of the jaws and teeth, I shall begin with the commonest, generally known as decayed teeth, or caries of the teeth. In young children, whose teeth are often found in an incredibly rotten and decayed condition, rickets have much to do with this decay of the teeth. (This disease practically consists in an insufficient proportion of calcium phosphate in the substance of the bones). But even in this case so miserable an appearance would not be presented by the whole jaw (often without a single sound tooth) if proper precautions had been taken from the outset. It must be understood that decay of the teeth and the destruction of the substance of the teeth which accompanies it are results of the action of very small bacteria. This explains how it is that one tooth very soon infects another, until a whole row of originally sound teeth have been destroyed.

Before the change of teeth, the best way to arrest the progress of caries of the teeth is to remove the decayed tooth. Older children and adults, on the contrary, should retain every tooth as long as possible. The art of providing artificial teeth has, it is true, arrived at such perfection, that both single teeth and whole sets of teeth can

be replaced by the closest imitation of nature. But it is only then time to resort to this expedient when nothing else is possible; and there may be, besides, some difference between a man's chewing his food with his own teeth and with artificial ones.

It is true that toothache in a hollow tooth is a torturing pain, and sometimes nothing else remains possible but to remove the cause of the suffering, especially as "killing the nerve" can be undertaken only by a practised hand, and such assistance may not be procurable.

I am unwilling here to omit a prescription for acute toothache, proceeding from a hollow tooth, which has often been found of good effect. The mouth should first be washed out with water as hot as the patient is able to bear it; and then a small wad that has been steeped in rum, brandy, oil of cloves, or chloroform should be tightly plugged in the hollow.

An excellent means of preserving a carious tooth from further decay is "stopping." This consists in tightly filling the hole in the tooth with a hard mass, after the tooth has been previously carefully cleansed from all germs. For the plugging either a cement is used or gold. These stoppings, when well effected, are so durable, that a man may keep for a number of years a tooth that has been thus treated.

Of course, thus filling a hole is possible only when there is a hole to fill. That is to say a man must make up his mind to have something done in time, and not wait until the whole crown of the tooth is wasted away, and the root also affected. In this case nothing can avail but extraction. And this is strongly to be recommended, in order that the other teeth may not be infected.

It is hardly necessary to say that the extraction of a tooth is an operation that should be performed only by a professional hand.

In addition to caries, practically the most serious malady, the teeth are, of course, exposed to other diseases. Of these may be mentioned one that is common—inflammation of the covering of the root. This arises generally in consequence of some bacillus which occasions suppuration penetrating the covering of the root in consequence of the tooth having somehow become loosened. These inflammations lead often to deeply penetrating inflammatory consequences which can be treated only by a professional practitioner.

Another common form of disease of the gums called *gum-boil* may be here mentioned. It is accompanied by a swelling of the face, and is due, like the above, to an invasion of bacilli that produce suppuration. These have entered originally through the lower parts of the diseased tooth, and thence proceeded to the inflamed portion of the gum. Accompanied by a swelling of the whole cheek, which

often assumes large proportions, a formation of pus takes place at some depth and must be evacuated. The suppuration may be assisted by damp, if possible warm poultices, of which the most practical are those of crushed linseed, or crushed potatoes used tolerably hot. After the pus has at last discharged itself, it is advisable for some time to wash the mouth with antiseptic waters several times a day. The simplest and cheapest is the solution of permanganate of potash, which I have so often recommended.

Acute catarrh of the pharynx, which is common both among children and adults, and is generally occasioned by infectious germs having found their way into the mucous membrane of the pharynx (which is always very susceptible to inflammation), is a well defined disease with a regular course. Many individuals, and indeed whole families, show a particular proclivity to this complaint; and individuals exist who have a pharyngeal catarrh yearly about the same time, generally in the spring.

Fever and difficulty in swallowing almost always appear at the beginning; and general debility and loss of appetite are nearly invariable concomitants of inflammation. This inflammation may extend itself to the eustachian tubes of the ear, and the organ of hearing itself, with acute pains in the parts affected.

If the oral cavity and the pharynx of the patient are examined (the tongue should be carefully held down with the handle of a spoon whilst the patient utters a protracted "Ah"), in most cases only a general inflammatory redness of the mucous membrane of the pharynx will be observed, a much furred tongue, and a swelling of the uvula and tonsils.

Treatment of acute pharyngeal catarrh consists in applying to the throat a luke-warm poultice, to be changed every two hours, and in gargling with a weak solution of boric acid and permanganate of potash, by which the bacilli will be rendered innocuous to the pharyngeal cavity. In the case of higher fever, which is rare in cases of simple pharangeal catarrh, and almost always connected with simultaneous disorder of some other organ, a cool bath of 85° Fahrenheit (30° Centigrade) will do good.

On account of the difficulty of swallowing, the diet must be a liquid one, and light. It will be best limited to milk and thin meat broth.

As the appetite is very small, and the patient's foul breath and furred tongue imply a disordered condition of the stomach, I have often found good results from giving these patients thrice a day eight drops of diluted muriatic acid.

Chronic pharyngeal catarrh is not—as people generally suppose—a

disease of adults alone. It is also fairly common among older children, and more common among those who live in large towns than among those who live in the country. The air of large towns, polluted with dust and soot from factories, here supplies the favouring cause; although a poor physical development resulting from scrofula, poorness of blood, and rickets, may bring about a chronic pharyngeal catarrh.

Chronic pharyngeal catarrh is extremely common in the latter part of life, and especially among men. It is generally a result of excessive smoking and habitual indulgence in alcoholic drinks. Another form of the same disease is called "clergyman's throat," which results from very frequent lengthy public speaking. The disease takes almost the same form in young and old. The patient generally complains of a feeling of great dryness and of a tickling in the throat, which compels him to cough and swallow frequently, and to clear the throat by a repeated "Hem, hem."

More definite signs of inflammation are generally absent, if the throat is inspected. But sometimes, in adult patients, many small protuberances, like small knots, and about the size of a pin's head, may be found upon the posterior wall of the pharynx. In children a chronic enlargement of the tonsils is also frequent. And this may to some extent have occasioned the chronic catarrh, because such children generally keep their mouths half open both night and day, in consequence of which the larynx is both dried up, and also exposed to injuries.

The treatment of chronic pharyngeal catarrh must be first of all directed towards removal of the principal cause. Of course, in the case of a scrofulous child, or one whose blood is poor, circumstances will seldom permit us to prevent the mischief by providing change of air and life in the country, or still better by the sea-side. But if a requisite amount of patience on the child's part is forthcoming a good deal may be done by strengthening diet, by warding off secondary maladies likely to increase the complaint, by operations on the infected palate and tonsils, and by the reiterated injunction that breathing must be not through the mouth but through the nose.

Regular gargling with slightly warm water, to which just a trace of rock-salt has been added, may also be recommended.

Inflammation of the Tonsils.

Purulent inflammation of the tonsils occurs in two different forms. One is called follicular. In this form the purulation is of a super-

ficial character, and is limited to the mucous membrane, which dips in many places into the actual tissue of the tonsil as if into little pockets, and thus forms indentations or follicles. The second form of the disease is called phlegmonous. This implies a purulation of the tissue of the tonsil itself with a consequent loss of tissue.

Follicular inflammation of the tonsils. (Also called follicular angina). This is by far the milder of the two forms of inflammation. Its first appearance closely resembles that of acuter pharyngeal catarrh, and often joins with this as a single malady. The follicular inflammation presents externally the following appearance. Both tonsils are inflamed and distinctly swollen. At first one or two, afterwards more and more numerous little yellow spots, about the size of the head of a pin appear upon then. These are the heads of cores of pus, which occupy the small pockets (follicles) previously mentioned in the mucous membrane, out of which they can be pressed.

The malady appears to remain at the same height for three or four days, with a considerable disturbance of the general health, slight fever, headache, and often distinct difficulty in swallowing. The tonsils then begin to diminish, the pus cores loosen in their cavities, from whence they subsequently fall out, and with a daily improvement the patient after a few days again finds himself in perfect health.

It may happen that several of these originally separate cores of pus may coalesce into a single focus of suppuration; and then present such an appearance as may alarm the parents with a suspicion that they have before them a case of diphtheria. I will admit, also, that it is not always easy for the medical man (particularly at first) to determine certainly which disorder he has before him, particularly as follicular inflammation of the tonsils often commences with symptoms so severe, and with fever so high that it is only natural to imagine that the case is one of incipient scarlet fever or diphtheria. It is an agreeable surprise a few hours afterwards to see the pus cores above mentioned make their appearance. I have myself, in such doubtful cases (when I did not know whether I had before me a real diphtheria or merely pus cores of a follicular inflammation of the tonsils, that had coalesced into a single focus of suppuration) tried to remove a morsel from the yellow focus with a rod. If this was possible, and especially if without any bleeding of the substratum, this was certainly merely a harmless follicular inflammation. The coating of diphtheria can at first be removed only with difficulty and with bleeding.—In diphtheria, the coating is also more of a dirty grey, with a tinge of green. In follicular inflammation the colour is a pure yellow.

The treatment is identical with that of acute catarrh of the pharynx which has already been sufficiently described.

Phlegmonous purulent inflammation of the tonsils (or phlegmonous angina) means for the patient whom it attacks, be he young or old, some very wretched days. This will be immediately understood when we remember that we have here an invasion by bacteria (by which suppuration is set up in the tissues of the tonsil itself) of an organ consisting of a collection of very small follicular glands. Here, in addition to the severe disturbance of the general health (with which we have by this time become familiar in cases of infectious disease), such great difficulties of swallowing and breathing exist that the patient is often for days unable to take any food, and at the same time is troubled with severe attacks of suffocation, the enormously swollen glands almost completely obstructing the entrance of air to the wind-pipe.

The whole condition becomes most burdensome when, as unhappily generally happens, the inflammation attacks both tonsils at the same time.

After four, but sometimes only after five or six days, the patient generally states that he feels a continuous beating and throbbing in the inflamed pharynx. From this it may be concluded that the suppuration of the whole focus of the complaint is far advanced; and after this suddenly, generally during the night, the purulent matter discharges into the mouth, upon which all the annoyances subside.

Treatment. In the case of older children, and of adults, it is possible to guard against the purulent fusion of the tissue of the tonsils, or as we generally say the formation of an abscess, by the application of cold in the form of cold compresses around the neck, or frequent gargling with cold water. If no results are obtained in this way, and the suppuration continues, it will be necessary to submit to the inevitable, and to attempt to hasten the discharge of the pus into the mouth.

It is best to put the patient to bed, to envelope the neck with warm damp compresses, and to let him gargle frequently with decoctions of mallows and sage tea. If after a few days the place where the pus is gathered can be seen on the prominent parts of the tonsils, it can be made to discharge most simply by a small and absolutely painless incision on the place. Both parents and patient will otherwise still have to wait a few days before the pus makes its own way through. Only liquid diet is possible. The simplest and best diet is milk. In cases when swallowing is impossible it must be conducted into the stomach by a tube placed in the nose.

Proliferation of the Tonsils of the Palate and Pharynx.

It has been already mentioned that there are families of which one child after another suffers from chronic swelling of the tonsils of the palate, and proliferation of those of the pharynx. These swellings are a disagreeable heritage which the patient has received either from father or mother; as experience proves that such children may easily be attacked by other infectious disorders, such as diphtheria, whooping-cough, influenza, or others, which are closely connected with the mucous membrane of the mouth.

These swellings of the tonsils of the palate, and proliferation of the tonsils of the pharynx (which lie concealed in the post-nasal cavity) indicate a distinct disadvantage at which the children who suffer from them are placed; for the patients have almost always a remarkable proclivity to scrofula and anæmia, and to a general poorly developed physical condition. If we enquire into the reasons of these symptoms, it is evident that this lies principally in a superficial breathing and a consequent insufficient inhalation of oxygen—a gas indispensable for the stimulation and renewal of the blood.

The swelling of the tonsils of the palate is visible the instant they are inspected. But that of the tonsils of the pharynx can be discovered only when the finger is introduced under the uvula into the post-nasal cavity.

Apparent symptoms are, however, a nasal speech, snoring, and sleeping with an open mouth.

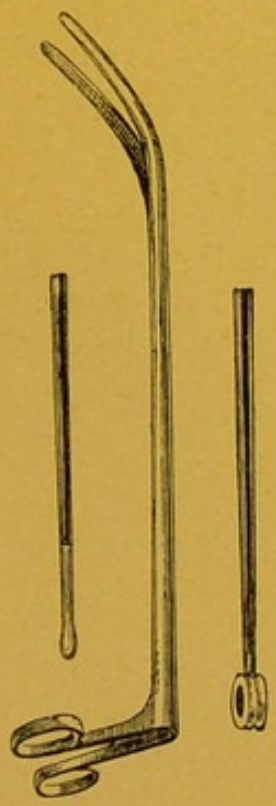
The Treatment. The only remedy that can be recommended, which involves also no danger, is the partial removal of the affected glands. Painting with iodine-glycerine may be attempted to dry up the proliferation; but I have only in the rarest cases seen this produce a good effect; whereas the operation, which is very simple, never fails. At present, the whole tonsil is not removed as formerly, but only about a half of it. I have myself succeeded in effecting an atrophy of the tonsils of the palate that lasted for many years, by merely splitting them lengthways with a sickle-shaped lancet, and leaving them so in the mouth. The operation takes but a few seconds, and can be performed almost without pain, if the patient immediately before gargles well with a solution of cocaine that renders the tonsils temporarily insensible.

Proliferation of the tonsils of the pharynx must be either removed by a properly constructed knife, or scraped off with the finger nail.

Disorders of the Œsophagus and the Stomach.

Disorders of the œsophagus (gullet) are in general rare. The

organ is well protected from external injury and of a very simple form. In adults, cancer and other malignant growths are the maladies by which the œsophagus is most usually attacked. Among children, cauterisations and the presence of foreign bodies occasion the majority of difficulties. The cauterisations result from burning or scalding with hot meats and drinks; and particularly from mistakes made in consequence of leaving caustic acids about. The foreign bodies are mostly coins, buttons, pins, and similar things, which are put into the mouth for play, and then often involuntarily swallowed, which results in their becoming fixed in the œsophagus. It is best in all these cases to attempt nothing, but to send for a medical man who will be able with the assistance of some very simple instruments, to remove the foreign body (fish-bone, button, coin, or whatsoever else it may be) either by extraction, or by forcing it down into the stomach. It is of importance daily to watch the fæces of the patient who has swallowed the foreign body. This can be most simply done by diluting the fæces with a considerable quantity of water. So long as the foreign body does not appear, the child should be given a mucilaginous diet, and in particular abundance of vegetable food. This will best protect the intestine from being injured by the object swallowed and will assist its evacuation.



Instruments for the removal of foreign bodies.

Distension and contraction of the œsophagus occur both among children and adults. They are, however, of no practical importance for the present work, which deals only with common disorders.

Diseases of the stomach. I remarked in the sections dealing with digestive disorders of infancy that it is only after infancy that a clear distinction can be made between the disorders of the stomach and those of the intestines. The stomach of the infant, both in form and function, is nothing more than an upper part of the intestine; so that one cannot be conceived of as being affected without the participation of the other.

The diseases of the stomach in the cases of the child and of the adult are very similar both in their origin, their symptoms, and their treatment. But in the child acute disturbances of the stomach (that is those that appear quickly and vanish quickly) are commoner, whereas in later life chronic affections are more generally observed.

Disorders of the stomach appear either independently or as secondary symptoms of some other disorder—as, for instance, we have seen in a whole series of infectious diseases, from a complete loss of appetite, a furry tongue, and the badness of the breath, that the stomach has been affected; and that its formation of muriatic acid (which is so important for digestion) appears to be very quickly interfered with by fever.

The commonest disorders of the stomach are acute and chronic catarrh of the stomach, varying according to the degree and the frequency of the irritating injuries.

Acute catarrh of the stomach is almost always a consequence of preceding gross offences against rules of diet. It immediately follows the dietary indiscretion; and it makes no difference whether the too great quantity or the bad quality of the food occasions the disorder. Vomiting, as a natural effort of relief, always marks the beginning of the disorder of the irritated stomach. At the same time the temperature generally rises rapidly, and as it is only in the rarest cases (particularly when the patient is a child) that any information can be got about the previous offence against rules of diet, the parents are often anxious lest the case should prove one of some infectious disorder, many of which begin with vomiting. The reader will remember that whilst speaking of typhoid I pointed out the similarity of its commencement with that of acute catarrh of the stomach, formerly called "gastric fever." This will enable anyone to understand that even the experienced practitioner may be wise in not expressing an opinion until a couple of days have elapsed. If the fever and vomiting subside after forty-eight hours in bed on a reduced diet the case is undoubtedly one of acute catarrh of the stomach. On the other hand, if the fever is persistent some other disorder must be suspected. In the case of catarrh of the stomach the mouth often "breaks out"—that is to say, small pustules appear at the corners of the mouth.

The simplest treatment of an acute catarrh of the stomach—both for children and adults—is hunger. Sometimes the patient (who generally "does not want to eat anything") may be placed upon a very small and light diet. When the vomiting is so copious that a complete emptying out of the stomach may be concluded, it is better not to irritate it by giving fresh food, as the organ requires time to recover itself. If the vomiting is not very abundant an emetic should be given. Salt and water is the simplest. If costiveness appears a spoonful of castor oil, or a luke-warm intestinal injection, may be recommended. A somewhat persistent diarrhœa requires no treatment. It is an effort of the organism to relieve itself, and will subside after a few days.

In adults the symptoms and treatment of the disease are precisely the same. Care should be taken to relieve the stomach of the food that irritates it; and the organ should be allowed time to recover itself under a strict diet. Eight drops of dilute muriatic acid taken thrice daily in water, beginning on the third day of the disorder, will aid recovery and rapidly restore the lost appetite.

Chronic catarrh of the stomach can be generally detected from the appearance of the patient's face. It always develops itself gradually as a consequence of frequently repeated offences against sound rules of diet. Proportionally it is met with most frequently in the wealthiest and poorest classes. The middle class, on the whole, possess sounder digestive organs. How can that be explained? Very simply. The upper classes live "too well." From earliest childhood they are accustomed to eat all kinds of dainties. They eat indigestible and highly-spiced dishes long before the tender stomach of the child can deal with them; and a condition of chronic irritation of the stomach necessarily ensues. On the other hand the indigent man lives "too poorly." He tries with bread and potatoes to make up for the lack of more expensive diet which is rich in fat and albumen. But as he begins this régime too soon it inevitably follows that irritation and fatigue of the sensitive mucous membrane of the stomach gradually produces a state of torpor, and in some cases even a dilatation of the stomach. The case of the middle class is different. A good housewife takes care that regular and wholesome meals are placed upon the table; whilst a variety of dishes insures the family against taking a diet of one sort only, and provides that the various elements of albumen, fat, and hydrocarbon should be duly combined.

I have said that patients suffering from chronic catarrh of the stomach show it in their faces. They are invariably pale (the usual symptom of anæmia), and have an irritable expression. The expression is almost invariably accompanied by a peevish, irritable temperament.

To proceed to chronic catarrh of the stomach in children. If the patient be undressed the body may present the appearance of being well fed. But if the muscles are felt it will be found that they are not formed of sound firm flesh, but consist merely of weak flabby tissue. Other symptoms are small appetite, a furry tongue, foul breath, a burdensome sense of repletion directly after meals—which sometimes causes vomiting—sour, rancid evacuations, and irregular action of the bowels, sometimes showing itself in great costiveness, sometimes in diarrhœa that continues for several days. In some cases a slight increase of temperature in the evening may be observed in childhood; but in general chronic catarrh of the stomach, both in children and

adults, is a disorder unaccompanied by fever. If a regularly appearing increase of temperature is observed, careful examination should be made to ascertain whether some other malady is present, possibly in an early stage of development. Lurking tuberculosis is the thing most likely to be present.

The Treatment. If anyone who has been long suffering from a chronic weak and irritated condition of the stomach (and that is chronic catarrh of the stomach), hopes to recover his health by some simple remedy, in a few days, and after that to be able to live without his stomach giving him any more trouble—he is very much mistaken. A cure, or even a considerable improvement, is possible only when the patient, whether young or old, sets energetically about the regulation of his diet, and gives up all the mistakes which—perhaps partly without his knowledge—have occasioned the disorder of his stomach.

Chronic disorders—this is true of all chronic disorders, and particularly true of those of women—can be cured only slowly, and require much patience and determination on the part of the patient. Unhappily, a great many patients expect to see the most wonderful results a week after their treatment has begun, and, when those results do not appear, are immediately dissatisfied with the treatment. For these patients, a cure is really impossible. They may as well spare themselves the expense of taking advice, if they have not sufficient patience to do what the treatment of their malady requires.

A preliminary regulation of diet is the base and beginning of every treatment of chronic catarrh of the stomach. It must consist in this:—*that the patient provides the stomach with the necessary nourishment, in regular but small meals of easily digested but varied food.* In the case of children, upon whose obedience and self restraint in matters of eating and drinking much reliance cannot be placed, those about them should be strictly forbidden to give them in secret, dainties, fruits, chocolate, or other things of the same kind. Strictly speaking, persons suffering from chronic catarrh of the stomach, should be dieted upon a fixed régime. But as this is practically possible only in hospitals, or in the houses of well-to-do people, I shall limit myself to saying that all foods that are difficult to digest, or windy, or that lie long in the stomach, must be avoided for months. Such foods are flour dumplings, potatoes, fat meat, rich acid sauces, &c. The patient should try to satisfy his appetite with boiled milk, stale bread, soft boiled eggs, sweetbreads, thin soups, poultry, veal, and other articles of diet that are easy of digestion.

Children should avoid all alcoholic drinks and strong coffee, as well as strong tea, and drink only milk.

Stewed fruit acts beneficially upon the constitpation which frequently accompanies chronic catarrh of the stomach. If this specific does not have the desired effect, I prefer injections of warm water to the use of drugs, of which castor oil, rhubarb, and senna leaves are the most to be recommended and the least irritating.

If it be asked what is the value of water treatment in chronic catarrh of the stomach, we may say that it is in several ways an assistance that must not be under-estimated. Regular washing of the whole body with water, or baths, stimulate the general health, the appetite, and the digestion. And these are three points demanding special attention, particularly in the case of irritable patients. But the locality itself of the malady may be favourably influenced by warm damp compresses, which are best kept on all night. (Care should be taken on rising that the whole body may be rubbed quite dry). These compresses on the chest not only produce quiet sleep, but also diminish the sense of pressure of which patients suffering from chronic catarrh of the stomach frequently complain.

The medical treatment of the disease is somewhat different for children and adults.

In the case of children, one almost always has occasion to deal with certain other maladies (results of insufficient nourishment, such as scrofula, general weakness, and anæmia, to name the commonest) in addition to the actual disorder of the stomach. This will make it perfectly clear why I recommend that the medicines chosen for these children should be such as will exercise a beneficial influence upon the whole organism.

Respecting the multitude of remedies advertised as cures for disorders of the stomach, I shall merely repeat what I have said before on a similar subject—that it is necessary to cure not the disease, but the patients whose different constitutions cannot possibly be all treated by one rule.

The simplest and best drugs which we have at our disposal for chronic catarrh of the stomach in children, are muriatic acid, pepsine, and the various tonics, of which quinine, and gentian may be named. These medicines may be given to the patient several times a day, in various combinations, or together with other drugs—in cases of anæmia especially with iron; which should be given in any particular case, must naturally depend upon the consideration of all the circumstances. Age, bodily condition, and the whole aggregate of the symptoms of the particular attack will make a great diversity in the various prescriptions.

For adults suffering from chronic catarrh of the stomach the same

rules respecting diet are to be observed as are given above for children: excepting that I do not here apply the same strict rule of complete abstinence from alcoholic drinks, tea, and coffee.

I know that wine, beer, and spirits, and tea and coffee, too, cannot be banished from the world: also that a great many men would rather die than give up their favourite drinks. But I shall also say plainly, for anyone to read that may, that by far the larger number of men with disordered stomachs are made ill by the chemical irritation of the stomach by various drinks, and principally by alcohol, and that if they wish to recover their health, and to remain in health, they must restrain themselves in this particular to the utmost of their power.

Particular mention should also be made of this fact respecting the treatment of chronic catarrh of the stomach that, in the case of adults there frequently exists, instead of the diminished formation of muriatic acid above mentioned, the exact contrary—an excess of acid which has to be met with suitable remedies. The best are our well-known mineral waters, which are best taken *before* food. It is not at all necessary to drink them at the respective watering-places. The best of these mineral waters are those of Carlsbad, Ems, Neuenahr, and Kissingen. There are, however, numerous other alkaline mineral waters which are of great service in cases of chronic catarrh of the stomach.

Circular Gastric Ulcer.

It is a singular fact, and one for which no reason has been able to be assigned, that what is called gastric ulcer occurs almost exclusively amongst girls and young women from the ages of about 16 to 26. It is true that at autopsies scars of ulcers have been occasionally found in the stomachs of men and boys; but chlorosis, this exclusively feminine complaint, is so undoubtedly connected with gastric ulcer that one is perfectly justified in describing gastric ulcer as a feminine complaint.

According to the present general opinion the origin of gastric ulcer is always the result of the mucous membrane of the stomach digesting a portion of itself under the favouring influence of a disturbance of the circulation caused by anæmia.

The form of the gastric ulcer is circular and of increasing size. The decay of the tissue (for that is what takes place) in mild cases may affect only the innermost of the three layers of the stomach. But in advanced cases it attacks also the muscular layer of the

stomach, in consequence of which the ulcer assumes a form resembling that of a crater. In the most severe cases it breaks completely through the wall of the stomach, after which in a very short time a fatal inflammation of the peritoneum frequently ensues.

Ulceration of the stomach must certainly be a very common complaint, but one which by no means always occasions serious symptoms. The proof of this is that at autopsies, well healed cicatrices of old ulcerations are frequently found in the stomachs of women and girls who are certainly known never in their lives to have complained of any symptoms of disorder of the stomach.

The four principal indications by which an ulceration of the stomach may be known are :—*the age of the patient, contiuuous anæmia, vomiting of blood, and the characteristic pains.* That anæmic girls and women between 16 and 26 are almost always attacked by ulceration of the stomach is, of course, only so far of value as an evidence of the existence of the disease as it supports its probability. But, vomiting blood, and the pains in the stomach point directly to the nature of the complaint.

It is often the vomiting of blood that first puts us on the right track after the pains have existed for months, and the malady on account of its other symptoms has been declared to be a chronic gastric catarrh. The vomiting is sudden, often in the middle of the night, often also after a meal. It results from the destruction of a blood vessel in the wall of the stomach, and is often so serious that the patient after having brought up a quart of blood or even more sinks in a faint. The blood is always dark and clotted, which distinguishes it from blood lost from bleeding of the lungs, which is bright red and frothy. (A black tar-like appearance of the next motion, confirms the bleeding in the stomach). The frequency of the blood vomiting is very various. Months or even years may pass between two such bleedings. But they often follow quickly after each other, and then bring the patient very low. Excessive weakness and loss of flesh are natural consequences of such losses of blood.

Respecting the pains it must be remarked, that if we ask ten different patients about them, we receive pretty nearly as many different replies, which, taken altogether, represent an apparent complete confusion. If, however, we sift out these different statements, we get as a general result (apart from the particular situation of the pain, dependant of course upon the situation of the ulcer), that the *pains are sudden ones and almost always start from some given point of the stomach*, and then seem to extend either to the sacral region, or to the liver, or to the head.

Though many cases of gastric ulceration, as I have already said, cure themselves without any further consequences (which may be in consequence of the position of the ulcer being fortunately one subject to little irritation), in other cases there is direct danger for life in three different ways. First the ulcer may be on the pyloric outlet and cicatrise so unfavourably as to produce symptoms of choking at the exit of the stomach, and consequence dilatation of the stomach. Secondly the bleedings may be so copious as to occasion death, either suddenly, or gradually, in consequence of bleeding to death or exhaustion. Thirdly, the ulcer may break completely through the wall of the stomach, and be followed by fatal inflammation of the peritoneum.

All three possibilities point to the gastric ulcer as an evil to be regarded seriously, and to be treated as soon as ever it is discovered.

The Treatment of the Ulcer of the Stomach must be first directed to removing the permanent chlorosis, so as to avoid, if possible, a reappearance of the complaint. It must, in the second place, take into consideration, the pains and blood vomiting. Finally, it has to heal the ulcer itself.

Respecting the treatment of chlorosis, I must refer the reader to what is said on that subject in a separate section.

The first thing to be done to relieve the pains, which are often excessive, is to insist upon rest in bed before everything else, and the removal of all articles of clothing which press upon the stomach. The whole region of the stomach should next be covered with hot poultices, or fomentations. These remedies almost always diminish the pains, so that it is only in the rarest cases that it is necessary to prescribe any other anodyne.

The blood-vomiting makes imperative complete repose in bed for several days. If the loss of blood is very considerable, and if in consequence of it fainting, a small pulse, dizziness, singing in the ears, and pains in the heart ensue, an attempt should be made to give the patient an intestinal injection of luke-warm water in which a little salt has been dissolved. The effect of the warm water injection (of which scarcely anything will be returned) will be soon seen in a re-awakening from the faint, and the return of a steady pulse. After this cold milk should be given the patient, and cold compresses laid upon the stomach. The patient's digestive canal can also with advantage be kept quiet by a small dose of tincture of laudanum—about fifteen drops twice a day.

It is best that the treatment of the ulcer itself should be purely dietetic. The patient should, if possible, remain for some weeks in

bed, as this is not only the position in which the poultice will have by far the best effect; but also because during rest in bed the patient's stomach can heal most easily.

During this period the diet should be exclusively fluid. To avoid all mechanical fatigue of the walls of the stomach the best diet will be milk, thin fish broth, and very light mucilaginous soups. After about ten days the diet may be strengthened with sago, sweet-breads, finely-minced chicken, or finely-grated beef. The diet must be advanced only in this way, step by step, towards more solid food; and in about three weeks a cure and the cicatrization of the wound may be effected.

Spasm of the Stomach.

Cramp of the stomach is, like all cramp, to be referred to a disturbance of the nerves. In this case we may have either a direct injury of the nerves of the stomach, which, having been irritated (for example by either too hot or too cold food), respond to this irritation with a cramp of the portion of the mucous membrane under their charge; or the cramp of the stomach may be a consequence of some emotion, and so be brought about by transmission.

To mention some other occasional causes which now and then produce cramp of the stomach, I may name the coalescence of gastric ulcers involving very small nerve branches, severe chills, pregnancy, menstruation, pressure of the corset, and so forth. Females appear to be much more exposed to this very painful malady than males.

Spasms of the stomach occur both in children and adults. But a disordered condition of the stomach, or a general weakness of the nerves, seems always to heighten the tendency to cramps; and hysteria appears to have a direct connection with them.

The principal symptom of cramp of the stomach is a sudden, very severe crushing pain. We may take crushing almost in the literal sense of the word, as the patients seem to try to relieve their sufferings by crushing themselves up, often at the same time instinctively putting both hands upon the part affected. A cold sticky perspiration almost always covers the painfully-contracted face, until after some ten minutes the cramp appears to relax with a general diminution of the pain.

The Treatment should first attack the cause of the malady, which is not always easy. The patient himself can give the best hints, at least if he has observed that the cramps generally occur after definite mistakes of dieting, or in connection with any other definite circum-

stances. But the patient himself is often unable to give any guidance in the right direction.

In that case attention must first be paid to the patient's general nervous condition. A cold water treatment, undertaken by way of experiment, often leads to a complete cessation of the cramp. (See the sections on nervous debility and hysteria.)

Great importance attaches to a very light but appropriate diet, that is to say sufficient, but moderate amount of food that is not of an irritating character, also regular meals and a good digestion of them.

When the attack comes the first things necessary are rest in bed and relief of the stomach from the pressure of the corset and other restrictions. A warm poultice of boiled linseed should be placed over the region of the stomach. Massage of the stomach, which consists in a strong kneading of the whole of the left side, often gives immediate relief, as in the case of cramp in the calf of the leg. But the patients generally refuse to allow this; and will permit no one to touch them.

Diseases of the Intestines.

The severest form of catarrh of the intestines, called cholera nostras, or summer cholera, on account of its similarity to real cholera, has already been discussed amongst the disorders of infants. Under the influence of the same infectious causes, it occurs, however, often, and with the same symptoms amongst adults. The treatment is also the same, and the reader is referred to what has been said above.

Next we will turn our attention rather to those disorders of the intestines which simultaneously affect the stomach also; and so begin with acute and chronic catarrh of the intestines.

Acute catarrh of the intestines develops itself, like acute catarrh of the stomach, always as a rapid consequence of severe irritation of the mucous membrane. The mischief may be occasioned by a sudden chill of the abdomen in cold damp weather; but it may also be caused by grave mistakes of diet, by chemical irritants, caused by poisons or by cauterisation, or by foreign bodies which have mechanically irritated the intestine.

To all these provocations the intestine replies with a catarrh, that is to say with an increased secretion on the part of the glands of the mucous membrane. This leads to an inordinate liquefaction of the excretions from the bowels, producing what we call diarrhœa. This catarrhal diarrhœa, then, is a characteristic of the acute catarrh of the intestine. We may say briefly that it consists in a sudden diarrhœa.

This, like acute catarrh of the stomach, is accompanied almost always by rapidly rising fever, vomiting, and general debility. The liquefied contents of the intestine are sometimes evacuated with such violence that not only children but adults are unable to control the motions. Rumbling in the intestines generally precedes the evacuations, whose number at the beginning of the disorder may be very great. Their appearance has nothing particularly characteristic. Sometimes they are yellow, sometimes more greenish, but the motion always contains, more or less, undigested matter. If mucous globular masses are discerned among them this proves that the large intestine is also affected; but generally only the small intestine appears to be concerned. After eight or ten hours the form of the disorder is altered to this extent that the number of motions appears to increase, though it might have been assumed that the intestine must by this time be empty. If the motions are now examined it will be found that their character is altered. The quantity of actual fæces is small, and they consist chiefly of a little blood coloured mucous. This is occasioned by a strain of the anus, an excessive irritation of the lowest part of the intestine, accompanied by sharp pains, and cannot be strictly called an evacuation of the intestines.

The disorder, particularly in the case of delicate children, but also in the case of adults, is evidently not one to be lightly regarded. The great quantity of water evacuated involves danger for the heart and its functions.

The Treatment of acute catarrh of the intestines. To begin with saying what should *not* be done. It is a grave mistake to attempt to check the diarrhœa at its beginning. This is on no account to be done in the case of a diarrhœa accompanied by fever; as it amounts to allowing the contents of the intestines to ferment and decompose under the influence of the fever where they are retained, and can produce a still more serious general condition. The first step towards a cure is, on the contrary (howsoever strange it may appear to the majority of our readers), to assist the diarrhœa with purging remedies, so as to effect a complete emptying of the whole digestive canal. I, therefore, strongly advise that in every case of acute catarrh of the intestines a beginning should be made either with an enema or with a dose of castor oil (suited to the age of the patient), according to the severity of the attack, and other circumstances.

Calomel is also a valuable remedy, particularly when the dose is accurately measured.

The second condition of rapid cure is a careful regulation of diet. Appetite is almost always completely absent during the first two days.

During this period it will be quite sufficient to give the patient pretty frequently a spoonful of cool water (that has been boiled) in which an egg has been beaten up. Thin tea with a little red wine added, or in the case of very weak patients a little brandy may also be tried. The thirst is generally excessive. But no surprise must be felt if the first attempts to give the patient anything are resultless; as, in consequence of violent vomiting, anything that is taken is often returned. At least during the first four days milk must be avoided.

At the time of commencing recovery great caution is necessary to guard against a relapse. A return to solid food must be made very gradually. In the period of convalescence thin meat broth should be first given, made of calves' bones (that have been cooked at least three hours), soups of sago, oatmeal, and then a gradual return, after rice, groats, bread soup, *etc.*, to the ordinary diet.

As the patient is best in bed, the abdomen should be wrapped in damp warm cloths, or a warm fomentation (to be changed every hour) applied, which appears to diminish the often severe pains in the abdomen.

Colic.

By colic we mean pains in the abdomen near the region of the navel, generally severe, coming on in paroxysms. The pains may be sometimes described as of a spasmodic kind, and constricting, at other times as dragging, cutting, or aching, according to the cause.

The causes of colic may be very different. A local irritation may occasion it—costiveness, wind, worms, chill of the lower abdomen, *etc.* On the other hand we may have to do with a reflex irritation. The latter cases are generally grouped together as "nervous" colic. Acute poisoning (*e.g.*, by fungi) or chronic poisoning (*e.g.*, lead poisoning) may also be involved. Colic also plays an important part in the life of hysterical patients. In fact, it is so common, and may arise, particularly in the case of female patients, from causes so different, that we must say a few words about it.

Colic, like cramp in the stomach, comes on almost always suddenly and in paroxysms, attacking its victim in the midst of good health. In other cases, especially those of women who have had many children, and suffer from wind, it announces its approach by rumblings in the intestines, generally followed by evacuations. During the attack itself (which is generally accompanied by painful urination or tenesmus—a desire to go to stool, with great straining but no discharge—and comes on with tremor, anxiety, a feeling of

faintness, and cold perspiration) the part of the abdomen which is affected is either spasmodically constricted and hard, or excessively swollen by intestinal gases.

The Treatment. The first thing to be done is to lay the patient down flat, and to remove all pressure of the clothes. After this lay a compress (as warm as possible) over the whole abdomen, and change it every five minutes. An enema, containing oil, almost always affords relief. Peppermint tea, with a few drops of brandy, or tincture of valerian (twenty drops on a lump of sugar), taken internally, relieves the pain. After the paroxysm has passed it is advisable not to allow the patient to rise at once, as a second paroxysm frequently follows. Rather, at least, a half-hour's perspiration cure should be at once attempted. The simplest method is to envelop the patient in damp wraps, and to administer a few cups of warm tea; the whole body being, in conclusion, well rubbed dry with a woollen towel.

But, in addition to this, I must recommend most particularly that the cause of the colic should be sought, in order that it may be removed if possible, and the extremely painful attacks prevented. An investigation of the cause of the colic is of particular importance in cases where a chronic poisoning may be suspected. The lead poisoning of painters, plumbers, and compositors often shows itself first in an attack of colic.

Flatulence.

Flatulence is nothing more than an excessive development or retention in the intestines of gases. It is by no means so painful as colic; but, as it is generally chronic, it is a wearisome and very uncomfortable complaint. It attacks women much more frequently than men.

If it be asked how it happens that on the one hand too large quantities of gas (carbonic-acid, hydrogen, nitrogen, sulphurated hydrogen, and others) are formed in the intestines, and, on the other hand, these gases are evacuated in too small quantities, a mistaken diet, and a chronic weakness of the bowels (involving ill-regulated digestion) will be found to be the causes of both. If the matter is thoroughly investigated it will be almost always discovered that chronic constipation, debility of the bowels, chronic diarrhœa, or other similar connected disorders of the intestines exist. This is particularly the case with women of the upper classes; or else we shall find that the patient who complains of flatulency is a great eater of greens, leguminous vegetables, potatoes, and so forth. Why

women of the upper classes are frequently sufferers I shall beg to explain straightforwardly. They are frequently too negligent of the regular action of the bowels, not reflecting upon how the intestines must be strained by being burdened with useless matter. In reality they should be more careful in this respect than men (who very often become positive hypochondriacs the moment their motions begin to be irregular), because their bowels are more delicate, and are exposed to pressures from the womb, especially during pregnancy. A certain delicacy, too, sometimes makes them hesitate to speak quite plainly to their medical advisers about constipation. A mistaken delicacy, for "to the pure all things are pure," and neglect of perfect honesty with the medical attendant may mean untold suffering, not only to themselves, but to those also whom they would least wish to pain.

Treatment. The principal point has been already indicated, a digestion that works regularly, with a daily evacuation of the bowels. This must be ensured by a careful diet. Flatulent vegetables, especially greens, potatoes, and leguminous vegetables (those which produce their fruit in pods, peas, beans, *etc.*) should be avoided. Exercise should be regular. Gymnastic exercises, massage, and regular baths, as well as compresses on the abdomen at night, are to be recommended. When the constipation is obstinate, enemas, or opening medicine, should be used. Disorders of the digestive canal, pains in the womb, *etc.*, are also to be taken into consideration, so as to prevent the formation of gases in the obstructed contents of the intestines. Gases already formed should be removed by carminatives, of which I may particularly mention camomile, anise, peppermint, valerian, and, for children, fennel. All these remedies may be most conveniently taken (thrice a day) in the form of teas, that is in infusions.

Catarrhal Jaundice.

If the first portion of the intestine, the duodenum is by chance involved in some disorder of the digestive canal, it can, in consequence of an inflammatory swelling of the mucous membrane, produce a stoppage of the outlet of gall bladder and the pancreas, which discharge into this part of the intestine.

The consequence of this is a stoppage of the bile, and the absorption of the colouring matter of the bile into the blood. This produces a yellowish hue of the skin and of the mucous membrane of the whole body—precisely similar to that which we see in the jaundice of newly born children.

This jaundice is of little importance, and after a few days gradually disappears. The accompanying symptoms of the disorder are not caused by the jaundice, but by the simultaneous catarrh of the intestine. The motions have a very foul smell, and are of a light colour, in consequence of the imperfect digestion of fat.

The treatment is the same as that of catarrh of the stomach or intestine, but I recommend free use of warm poultices.

Gall Stones and Gall Stone Colic.

If the natural flow of the bile is stopped, and if in consequence of the decomposition of the gallic-acid salts, certain normally liquefied substances (colestearine and gall-pigment) are thrown down in the form of crystals, it is possible for certain more or less hard, and differently coloured calculi, known as gall-stones to be formed, which often give rise to great and painful difficulties.

That cases of this malady are three times as common among women as among men may be due to the pressure of tight corsets, close fitting gowns, and often also to pregnancy and to tumours in the abdomen. All these things seem calculated to produce injurious pressure on the lower surface of the liver, and upon the gall bladder. The fact that gall stones are peculiar also to riper years, and almost always occur only after the age of forty, points also to the slower secretion and flow of the bile in later life—which would favour the formation of calculi.

The size of gall stones is various; we have sometimes to deal only with what is called gall gravel in small grains. At other times they are hard masses as large as a pigeon's egg, which naturally cannot of themselves pass through the narrow gall duct, and often fill the whole gall bladder, or break their way through into other parts of the body, and even make their way through the abdominal wall.

When small stones try to take the natural outlet from the gall bladder through the duct into the duodenum, they cause excessively acute paroxysms of pain by their pressure upon highly sensitive nerves—these pains are described as gall stone colic. This colic generally occurs suddenly, and is accompanied almost invariably by fever, shivering fits and vomiting, whilst a cold perspiration breaks out on the forehead of the patient who often is beside himself with pain. In milder cases, the attack subsides some hours after the passage of the stones; but in the case of larger calculi, a whole series of attacks may occur during a number of days. The general jaundice that covers the whole skin, and the pale colour of the fæces assist us

much to identify the malady. In any severe case, the patient's fæces diluted with water should be examined, to make sure that the stone has reached the intestines and has been evacuated.

Unfortunately, it is very seldom that only a single stone is formed and evacuated. Generally new gall stones form from time to time, and I remember a case which I myself attended on an elderly lady, of whom I, at her own request, made an autopsy after her death, in whose gall bladder, nearly as large as a man's fist, I found more than eighty very dark flattish gall stones ground against one another, which I have kept as curiosities.

The formation of gall stones can be directly dangerous to life in the happily rare cases when the stone breaks through the gall bladder into the abdominal cavity. This may easily lead to a severe peritonitis, and in peritonitis at least eighty per cent. of the cases are fatal.

The Treatment. The frequently excessive pain of a well developed gall stone colic makes a dose of morphia in many cases absolutely necessary, as it works promptly, and even in small doses diminishes the pain considerably. Next are to be recommended (exactly as in cases of cramp in the stomach) hot compresses over the whole region of the liver, and if the patient can bear it, gentle massage and stroking of the lower right arch of the ribs, after smearing the whole hand with warm oil. Whether large doses of olive oil taken internally can shorten the attack, I will not undertake to say; but I gladly mention this remedy, as it can certainly do no harm.

I have myself often in protracted cases recommended a warm bath, after it a pack of the whole body in damp warm wraps, and have frequently met with good results. A glass of warm black coffee is also to be recommended when the attack comes on. This stimulates the heart and protects the patient from fainting.

In order as far as possible to avoid the repeated formation of gall stones, I recommend a simple, frugal rule of diet (not too much fat or meat), careful attention to the digestive canal, exercise, and care of the skin (regular baths). In addition to this, an abundant supply of liquid to the body, by frequent drinking of alkaline waters is to be strongly recommended.

Chronic Catarrh of the Intestines.

Whilst acute catarrh of the intestines in most cases affects the upper section of the digestive canal, chronic catarrh, both in children and adults, is situated principally in the large intestine. Chronic

intestinal catarrh, like chronic gastric catarrh, is invariably caused by repeated mistakes of diet. As the malady by no means always begins with any severe general disturbance of health, nor with fever, it frequently long escapes the attention of parents (particularly when the patients are older children), until a steady loss of flesh, physical and intellectual sluggishness, and weariness of the child after the least exertion, at last attract attention.

There can be no doubt that in the great majority of cases the mischief, at least at the beginning, has been a catarrh occasioned by engorgement, a consequence of matter remaining for a long time in the intestinal tube, and producing a mechanical irritation in the mucous membrane. We find catarrh of this kind in weak nervously disposed children, in which the movements of the intestine during the process of digestion may be too feeble. But we meet with it also in people who purposely, from idleness, or other causes, neglect to obey the natural prompting to relieve the intestine.

Chronic catarrh of the bowels need not be always accompanied by diarrhœa. On the contrary, periods of violent diarrhœa, alternate with periods of costiveness lasting several days. But the patient always complains of a sense of repletion, of want of appetite, and of being satiated with but little food, even after considerable physical exertion.

The Treatment of Chronic Intestinal Catarrh. We must first of all take into consideration a fitting regulation of diet and mode of life, a rule that applies to all chronic disorders of the digestive canal. It is only if all the grave errors, which have induced the malady, have been completely renounced that it is possible to reckon upon a slow disappearance of the symptoms of disorder. It is also not necessary to be so very particular about the choice of food as in a case of catarrh of the stomach, as we know that the great intestine which is the principal locality of the disorder, is by no means so much engaged in the work of digestion as the upper portions of the digestive canal. The chief aim will be to provide a good diet of easily digested foods which will not produce a large amount of fæces.

In the case of constipation warm enemas, with a very mild solution of common salt, should be given. Plenty of walking and active labour, implying movement in the fresh air, are remedies that assist much to a cure.

Chronic Constipation.

We meet with constipation so obstinate in young sucking infants,

and even in the newly-born, that the fæces when at last evacuated have the appearance of stone, and even give a sound like a piece of falling wood if dropped upon the floor. We have already treated above of this chronic constipation in infancy, and have now to turn our attention to the same symptoms which may be constantly observed in older children and adults, and particularly among women.

Respecting constipation in childhood it must be observed that it is particularly common among poorly-developed or scrofulous children, who are very probably backward both in physical development and intellectual powers in consequence of the disorders through which they have passed. But there are certainly cases in which it is the consequence of such mistakes as inattention to, or neglect of the natural prompting, to relieve the bowels (through unwillingness to quit some amusement), and idleness. In older girls, commencing hysteria may also lead first of all to a catarrh of the intestines occasioned by constipation, and after that to a habitual sluggishness of the bowels.

Another source of chronic constipation is the mistake made by many mothers of giving their children foods prepared from all kinds of preparations of meal before they are old enough to digest them. This diet produces a constant mechanical irritation of the child's intestine by too heavy food, and gradually makes the intestine torpid.

Later in life women suffer frequently from passing several days without a motion—which in the interests of health should take place at least daily. Men, too, suffer in the same way, and more particularly those who lead sedentary lives, or are afflicted with the nervous weakness that at present is unhappily so common.

Women on the whole appear to pay less attention to a regular action of the bowels than men.

The Treatment of Chronic Constipation. As in many other disorders the first object of the treatment must be to remove the thing that is causing or favouring the malady—so far as that may be possible.

In the case of children they should be before everything else taught to habituate themselves to a regular motion at a fixed hour. Obedience must be insisted on. The completely satisfactory nature of result, in a very short time, is surprising.

This habit of regular motions at fixed times is also of equal importance for adults.

Respecting particular difficulties which may affect women, especially during pregnancy, I shall speak in a subsequent section.

There can be scarcely any other disorder for which medicines are so constantly taken as for habitual constipation, which with the advance

of time demands ever stronger and stronger remedies. The number of opening medicines is correspondingly large. I shall here take the trouble to enumerate a series of the most ordinary remedies, beginning with the mildest and advancing to what are known as drastic ones.

1. *Dietetic purges.* Stewed fruit, sour milk, whey, honey, ginger bread.

2. *Mild purges.* Tamarinds, manna, castor oil, magnesia, sulphur, licorice, rhubarb.

3. *Purging salts.* Glauber's salt, sulphate of magnesia, Karlsbad salts.

4. *Drastic purges.* Aloes, senna leaves, colocynth, jalap.

In general, I consider it possible, to cure a chronic constipation without any of these remedies, at least if it results merely from an habitual retardment of the fæces in the large intestine, whilst all the other organs of the body are in a healthy condition. Not that I wish in any way to dispute the value and efficacy of the medicines which I have named, they are of invaluable service to us in many severe disorders. But I mean that an inconsiderate use of all these remedies is to be blamed: because, whilst they do afford immediate relief for the moment, they really make matters worse by a new irritation of the mucous membrane of the intestine.

"Have we then any better remedies?" Some one may ask. Certainly we have:—

1. Regular exercise (walking, fencing, physical labour).

2. Regulation of diet, both as regards time of meals and choice of food.

3. Gymnastics and massage.

4. Water-treatment (in addition to cold baths and douches, luke-warm injections).

Any one who tries to cure children of an obstinate constipation by these remedies will certainly arrive at a better result than those who give them one drug after another, to be taken internally, in increasing doses. They will find also that the remedies which I advise will not only remove the constipation, but remove the cause of it, by increasing the general, bodily, and intellectual activity, and so, in a word, restore perfect health.

Invagination of the Intestine. Intussusception.

Apart from a partial or complete closure of the intestine, in consequence of malformation of the anus, it is possible, both in children and adults, for a stationery condition of the intestine to occur.

This is invariably very dangerous, as the choked intestines, after a certain time, putrefy, and, in consequence of absorption of the decomposed materials, a severe, and invariably fatal, general poisoning ensues.

In childhood this immobility of the intestines generally occurs in the form called intussusception: that is to say, one part of the intestine slips into another. Generally the coecum slips into the ascending colon, as at this point the anatomical formation, and a long moveable mesentery allows the intestine a relative freedom of movement.

The children almost always sicken suddenly with severe pains, at first limited to one portion of the abdomen, almost always on the right side, where the coecum is situated. The severe pain renders walking impossible; and they generally crouch doubled up, either of the floor or in bed, holding their hands to the part of the abdomen which is affected—in the way we have already mentioned in cramp in the stomach. Eructations and vomiting follow; and evacuation of the fæces from the portion of the intestine below the obstruction of not uncommon. After this the general symptoms of a severe malady multiply rapidly. The whole abdomen is excessively sensitive, and seems to be slightly puffed up. The knees are painfully drawn up to the abdomen. The face, which wears a plainly distressed expression, is covered with cold sticky perspiration. If the intussusception can be freed, or falls back of itself, all may end well. If not, death rapidly ensues, unless the freeing of the intussusception is affected by an operation in which the abdomen is opened. The eructations gradually assume an odour of fæces; the pulse becomes faint; and death ensues from failure of the heart—a release for the patient's friends, and, most of all, for himself.

In adults the form of the malady is somewhat different. There also we meet with invagination; but, in later years, this is not so often in consequence of intussusception of the intestine as through constriction, in consequence of hernia, or also in consequence of cancer, or of twisting of an intestinal loop.

The Treatment must aim first of all at keeping the intestines in a position of repose, for which purpose laudanum may best be given, in drops, according to the age of the patient. *Massage of the abdomen, or giving opening medicine, are on no account to be attempted.* Cold enemas, under high pressure, often succeed in loosening intussusception, or twisting of the intestine. In cases of constriction, resulting from hernia, little can be hoped from them. An operation is the most likely method of relief. It should not be too long postponed, as

gangrene of the obstructed loop may ensue from delay.

Inflammations of the Coecum.

I have already, in my description of the organs of digestion, mentioned that the coecum, with its vermiform appendix, is not strictly an independent section of the intestines, but only the first portion, or a kind of vestibule, of the large intestine. This point of transition from the small intestine to the large is, both in childhood and in advanced years, the site of more or less serious inflammations, which are generally known as inflammations of the coecum, though in many cases we have to deal, not with an inflammation of the coecum itself, but of the vermiform appendix.

It can easily be understood that very small portions of fæces, on their way from the small intestine to the large, can easily get into the vermiform appendix, and remain there for a considerable time, until they at last, in consequence of their decomposition, begin to set up an inflammation in the parts around them. This may especially happen if any occasional determining cause exist; which, considering the constant offences against rational rules of diet, is seldom wanting.

The beginning of the inflammation, which seldom remains limited to the vermiform appendix, but generally also affects the peritoneum, is often rapid, but occasionally develops itself gradually. In the former case the disease begins with fever, painful pressure in the region of the coecum, sickness, constipation, and eructations. In the cases that develop more slowly, loss of appetite and a dull pressure in the whole right half of the abdomen first indicate the beginning of a malady. It is often taken for a catarrh of the stomach, as constipation does not always exist, but at times also diarrhœa.

But, even in these slow cases also, all the symptoms of the disease gradually appear, and the temperature rises to that of moderate fever, between 102° and 104° Fahrenheit (39° and 40° Centigrade) The patient's condition now remains, generally for some fourteen days, about the same, and without any great difference in the symptoms, until, under fitting care, the pains gradually diminish, and the patient enters upon a period of convalescence; a time when great attention to diet is necessary, as the coecum is peculiarly prone to relapses.

The Treatment of Inflammation of the Cœcum. As the occasion of the inflammation is almost always a checking and densification of masses of fæces, it might be supposed that the first care should be to remove these masses by loosening and evacuating remedies. This, however, applies only to those cases which are but just developing,

and in which it can be concluded that the inflammation has not yet affected the peritoneum. Under these circumstances a plentiful enema, or a spoonful of castor oil may suffice to move the arrested masses forward. *But any purging remedy is absolutely wrong in all cases in which extended pain and temperature of about* 100° *Fahrenheit (*40° *Centigrade) plainly indicate that the inflammation has passed to the peritoneum.* In these cases complete repose of the intestines is to be procured by drops of laudanum. The abdomen must be kept warm and moist with fomentations, which are to be changed every hour.

The diet must be entirely of a fluid kind, and milk is the best.

Prolapse of the Rectum.

Before concluding the subject of the disorders of the digestive canal, I desire to say a few words about prolapse of the rectum, a practically important malady because it is common in children.

This prolapse mostly attacks weakly children, under the age of five. Afterwards it is much more rare. In this peculiar malady a portion of the rectum, about two inches long is protruded, the interior red mucous membrane appearing to spring from the anus. The cause of the prolapse may be either a congenital weakness of the intestine, or may be a consequence of previous disease—chiefly whooping-cough or chronic constipation.

The aim of the treatment must be a rapid restoration of the rectum to its proper site; but the cause of the malady must also be investigated and removed.

The restoration of the rectum to its place is almost always easy. The child should be laid either on his side or his stomach, and with the point of the first finger of the right hand (which should have been well oiled) the portion which has protruded should be gradually pushed back (coming over the finger like a glove) through the anus into the child's body. Care should be taken to withdraw the finger very slowly, turning it round and round.

Prolapse of the rectum is generally of long duration, and drags on for several months.

Care should be taken to provide the patient with a strengthening diet; and that the motions may be regular and easy. Salt water baths are recommended. Hints about them will be given in a later section.*

* In order to avoid repetitions, I here pass over the origin and treatment of cancer and tuberculosis in the digestive organs. These two diseases can affect both the digestive canal itself, and the peritoneum, as well as the digestive glands. For the sake of bringing everything concerning these diseases together, I reserve the whole description of them and their treatment for a special chapter.

Parasites.

By the parasites of man we mean those vegetable or animal creatures, mostly of low organism, which quarter themselves partly in the outer skin, partly in the digestive canal or other organs of man, and live there at his expense; and frequently occasion in their unwilling host considerable if not even dangerous disorders.

Some of the diseases which they cause, ringworm, for instance, itch, and others, we shall study appropriately when I come to speak of the principal diseases of the skin. But here, at the conclusion of my remarks on the diseases of the digestive organs, I shall treat of the most important and most deserving of study of those animal parasites which live either in the human intestines, or pass from the intestines of man into the tissues.

Tape-worms. To begin with the tape-worms, of which we know three different species. These are parasites of the small intestine; and not only produce nausea and vomiting in their "host" (the organism in which they live) by the mechanical irritation caused by their movements, but can also induce great emaciation and general weakness. This will be easily understood when we remember that the worm, which has a life of at least eight years, all this time helps to eat the most nutritious part of the host's food.

These worms have the appearance of tape-like white strips, often many yards long; and consist of a small head and a great number of segments (even a thousand), slightly-joined members, hanging to one another like a chain. These members contain the sexual organs, and when they are ripe break off singly or in large segments, and are evacuated with the fæces.

The development of tape-worms is interesting. They do not enter as fully-developed worms into the human digestive canal. Their eggs enter first into the stomach of some previous host (called an intermediate host), swine, ox, or pike. Here after the loosening of the shell of the egg, the embryoes after passing through the wall of the intestines enter into the muscular tissue of the respective animals, where they become incapsulated as what are known as bladder-worms or cysticerci. They give the meat what is called a "measley" appearance. When such meat is eaten raw, or imperfectly cooked, the bladder-worm enters the human stomach. Here the bladder is dissolved by the digestive fluids, and then at length, after passing into the small intestine, the true tape-worm is developed in the space of from eight to ten weeks, a smaller or larger number of sections developing themselves below the small head, hardly larger than the head of a pin, which is the parent of the rest of the worm.

It happens in rare cases that the fructified eggs of the tape-worm enter the human stomach, and that bladder-worms consequently develop in the human organism, generally in the brain or the eye. This produces a very serious malady, which can be dealt with only surgically.

We may now study the three commonest tape-worms.

(1) Taenia solium, a fairly common parasite of the small intestine, has a length of about three yards. The head, about the size of that of a pin, and club-shaped, is fixed upon a small delicate neck. It has four suckers by which the worm feeds, and a crown of 26 hooks, by which the worm attaches itself to the mucous membrane of the intestine. Below the neck are attached the sections (proglottides) which become gradually larger and wider as they grow older, and are farther removed from the head. This worm passes into man almost exclusively from eating uncooked measley pork.

(2) Taenia medio-cannellata. This tape-worm differs from the former one in not having a crown of hooks, and by a canal that passes through the whole length of the worm. It is of the same length as taenia solium, but the several sections are wider and thicker. It passes into man not from eating pork, but beef, the bladder worm of this species existing in the ox.

(3) Bothriocephalus Latus. This by far the largest, but also the least common worm. Its length may attain eight yards. The club shaped head has no crown of hooks, but only two cavities on the sides. The ripe sections are wider than they are long, and, generally in spring and autumn, are evacuated with the fæces in sections, several feet long. It occurs chiefly in regions that abound in rivers, and fish, and enters man in insufficiently cooked pike, or directly in drinking water.

The treatment. As the tape-worm occasions in all cases injury to the health of the host, either by producing gradual emaciation, or by causing a permanent indisposition, inclination to vomit, palpitation of the heart, or general atony, its removal is always to be advised as soon as there is certain evidence of its presence. *But, before any cure is undertaken, ripe sections must have been evacuated.* This is the only certain evidence that the many annoyances of which the patient complains are to be referred to the presence of the worm, and that we have not to deal with the lamentations of some neurasthenic or hysterical patient suffering from difficulties of digestion.

The tape-worm is removed by what is called a vermifuge. But the cure consists in two processes. The former of these consists in a diet calculated to cleanse the intestine, and to weaken the worm, and the

actual ejection of the worm by means of an appropriate medicine (vermifuge). A number of vermifuges exist, of different strengths, and also suited to different constitutions. One must be chosen according to the age and strength of the patient. Kousso flowers and pomegranate rind are the most trustworthy. They may be best taken in a liquid form with mild castor oil, and should be mixed by the chemist. It is true that none of the remedies have a pleasant taste, but they are perfectly harmless if rightly used, and invariably effect the desired end, the evacuation of the worm.

I shall here describe a cure which I have used for many years, and have never found ineffectual.

The patient should prepare himself for three days by taking light and simple food, which will produce but little fæces. Stewed fruit should be eaten every day to produce easy motions. On Saturday evening (if the patient's occupations make Sunday the only day in the week which he has at his own disposal) the patient should eat two pickled herrings, or a very acid fish salad, with white bread. On Sunday morning he takes, on an empty stomach, and best directly after rising, one half of the prescription—I give adults 45 grains of chloroform, 60 grains of polypody extract, and 3 oz. of castor oil, in the form of an emulsion—and, immediately afterwards, a cup of hot black coffee, which takes the disagreeable taste out of the mouth, and diminishes the tendency to vomit. Half-an-hour afterwards the patient takes the rest of the prescription, with another draught of black coffee. Frequently repeated motions will shortly follow; but the patient will do best to remain in his bed chamber. If the patient believes the worm to have been evacuated he should allow the motion to stand for a few minutes, and then gradually wash away the motion with water, until the worm alone remains in the vessel. The worm should be carefully examined to make certain that the head of dark colour, about the size of the head of a pin, and easily recognisable with the naked eye, has been evacuated.

Should the head not have been evacuated, the cure must be repeated after about four months, when new sections will have been developed. It is possible for the head to escape observation, but in this case there will be no need to repeat the cure, seeing that, as I have already observed, the evacuation of ripe sections must always precede it.

Round worm (ascaris lumbricoides) are commonest in children, but are found also in adults, and more particularly in imbeciles and amongst persons of the lower classes. They are about eleven inches long, round, of a pale red colour, and about the thickness of a lead pencil. These are parasites of the small intestine, and, like the tape

worm, occasion inclination to vomit, emaciation, and general weakness; sometimes also symptoms of nervous irritation and convulsions.

Whilst this is generally found solitary in the human intestine, thread worms are almost always present in numbers, and are from time to time evacuated. Their passage occasions itching in the lower section of the intestine, and occasions a reflex feeling of tickling in the nose and burning in the eyes.

Their removal is easy. After the patient has been kept for a few days on a light diet, either some calomel powders are given (for children not more than 1½ grains) or an electuary of santonine seed, or santonine drops; and then a plentiful clyster with luke-warm water; which always produces the desired result.

Mead-worm.

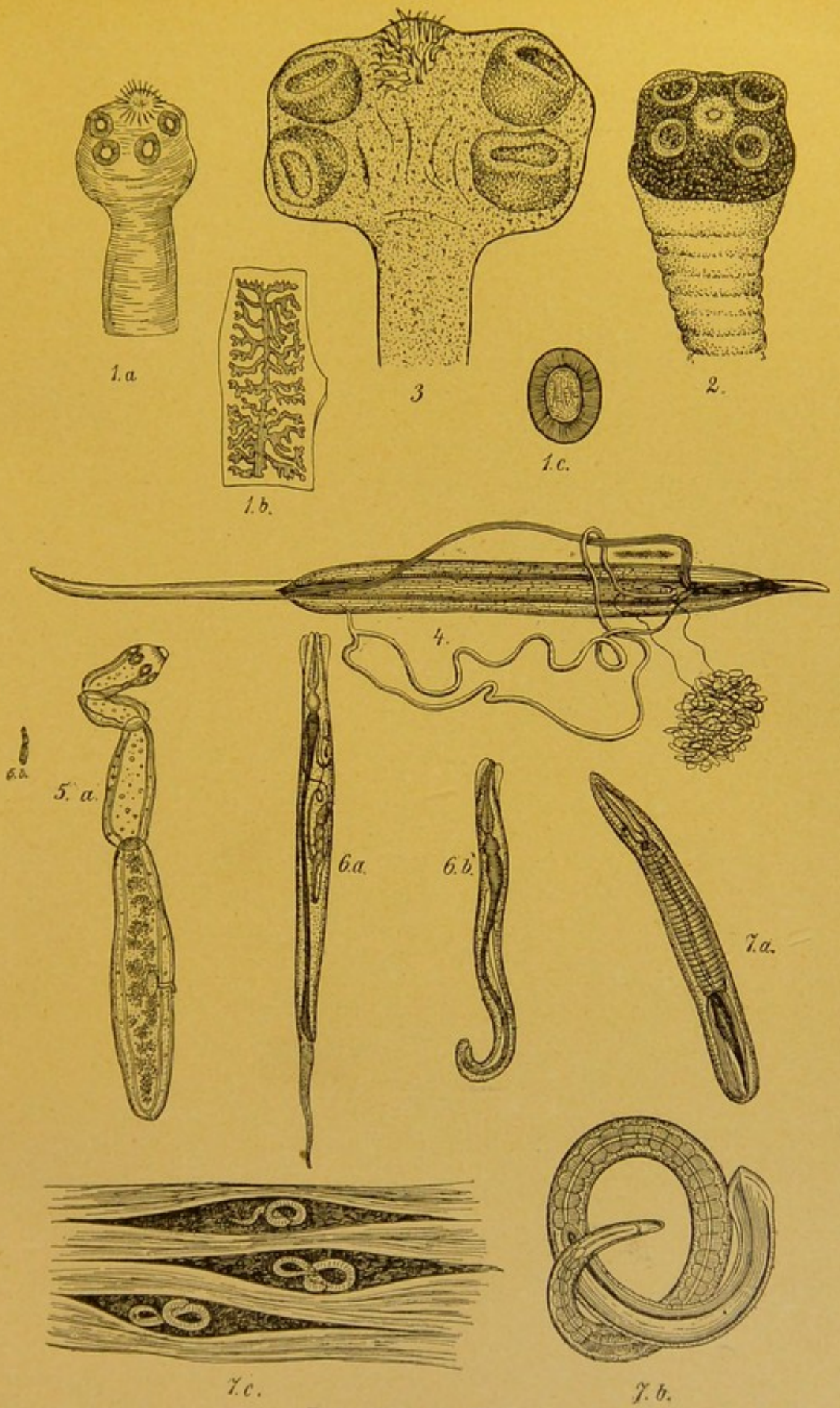
Oxyuris vermicularis is a small white round worm, of which the male is about one-fifth, and the female two-fifths of an inch long. They develop themselves in the small intestine and in the first portion of the large intestine. The pregnant female descends into the anus and lays her eggs there. They are commonest in childhood, and so numerous that the fæces swarm with them. They are not dangerous, but they occasion an itching of the anus, and disturb children in their sleep.

They can be removed in the same way as round worms; most simply with a mild calomel powder, or a purgative electuary given with a plentiful enema. The remedy is best repeated several times after an interval of a few days, as some worms may remain in the folds of the intestines after the first measures.

Injections of salt and water, or better, infusion of Quassia chips, after the bowel has been emptied, will generally remove these worms.

The *trichina*, was first more accurately described by English learned men in the third decade of the last century, but it was in Germany in the sixth decade in consequence of a severe epidemic of trichinosis that the worm was first carefully studied, and its development and conditions of existence ascertained. The worm occurs in a developed sexual condition as the trichina of the intestines, and in an undeveloped sexless condition as the trichina of the muscles both in men, pigs, rabbits, and rats, as well as in many other mammals.

The trichina (in the intestine) is a small, white, thread-like worm. The female is about three-twenty-fifths of an inch long, the male only



PARASITES IN MEN.

1a. Head of Tænia Solium. 1b. Ripe Section of the same. 1c. Egg of same. 2. Tænia Mediocannelata. 3. Head of Bladder Worm (cysticercus) in Brain. (From Heller). 4. Interior of Female Ascaris Lumbricoides. 5a. Magnified Tape Worm of Dog. 5b. Ditto, natural size. 6a. Female Thread-worm. Oxyuris Vermicularis (Female). 6b. Ditto (Male). 7a. Trichina (in intestines). 7b. Ditto in the Muscles the capsule removed). 7c. Position of Trichina in the Muscles.

half that size. Both male and female have an anterior pointed end which represents the mouth of the worm, and a blunt posteria end which contains the organs of reproduction. The female has also a cavity in which the young are formed. The young are produced viviparously through an orifice near the mouth.

In the muscles the trichina is smaller than in the intestines, and in fact in a younger stage. It lies rolled up in the muscular fibre, and forms itself a little capsule in which it can remain for many years without losing its life. If raw, or insufficiently cooked pork containing trichinæ of the muscles is eaten, the capsules in which the trichinæ are contained are dissolved by the gastric juices. The previously sexless trichinæ now develop in the course of a week into males and females. These breed, and in a week the females produce the young worms to the number of about 1500 each. These now bore through the walls of the intestines and enter into the muscles. Trichinosis ensues, by which we mean the deluging of the muscles with the young trichinæ.

Trichinosis may be an unimportant, or extremely painful, or even dangerous complaint, according to the number of trichinæ which reach the intestine. The malady usually begins with general lassitude, violent intestinal catarrh with thin fæces, shivering fits, and headache. At the outset it may be easily mistaken for typhoid. In mild cases nothing further may ensue, and many mild cases are no doubt never recognised as trichinosis. But if the number of trichinæ which have entered the intestines is large, thousands, and thousands of thousands of young trichinæ are produced, which in consequence of their entrance into the muscles occasion excruciating pain, as well as paralysis; and in at least one-third of the cases cause death.

The treatment. Trichinosis is rare in England; more common in the United States of America, and common in Germany—probably in consequence of the custom of eating uncooked smoked ham—though the State inspection of meat is stringent. Up to the present no cure is known, as it is impossible to render the worms, after they have entered the body, harmless, and there is no means of destroying the parasites after they have reached the muscles. Rest and luke-warm baths are the best protections against the pain. Enveloping the whole body in wet wraps, and stimulation of the skin to slight perspiration seem to exercise beneficial effects. It should be remembered that even infected meat is rendered innocuous by thorough cooking.

CHAPTER VIII.

Diseases of the Organs of Respiration.

The Structure and Functions of the Organs of Respiration.

I have already mentioned, whilst speaking of the organs of digestion, that a perpetual combustion is going on in our bodies. The digestive organs prepare the materials for combustion. But the organs of respiration also take an important part in this process. In fact they make it possible. For they procure the oxygen necessary for combustion, and remove from the body a part of the results of the combustion, the injurious carbonic acid.

We have already had various examples of how necessary the continuous supply of oxygen is, and how necessary the removal of carbonic acid. I may remind the reader of the piteous appearance of a child suffering from severe diphtheria of the pharynx—its desperate struggles to satisfy its hunger for air, that is to breathe—and its collapse in consequence of carbonic acid poisoning: unless something is done to enable the air to enter its lungs.

The organs of respiration, whose construction and composition we will study before we discuss their importance and their functions, are composed, like the digestive organs, of a single system, lined with mucous membrane. The great part of them are situated in what we call the thoracic cavity, in which the heart, the centre of the circulation system, is also placed.

The thoracic cavity is bounded below and separated from the abdominal cavity by a membrane, obliquely placed, partly muscular and partly tendinous, called the diaphragm. On the sides and above it is bounded by the ribs and the clavicle (collar bone), before by the breast bone, and behind by the vertebral column. The vertebral column, by its connection with the ribs, the bony walls of the thoracic cavity, gives the chest support.

In the space contained between these, then, and the diaphragm are situated the principal organs: the *lungs*, to which the atmospheric air is brought through the *nose*, the *larynx*, and the *trachea*, which must be reckoned among the organs of respiration.

The nose and the nostrils which it protects are external visible

organs. The external nose is composed of an upper fixed part, which is shaped by the nasal bones, and an anterior moveable part, which consists of the two outer sides of the nostrils, and the separating wall, situated in the middle, which divides the nasal cavity into two symmetrical parts. The nasal cavity is separated from the oral cavity by the hard palate. At the rear it is connected by the naso pharyngeal space, both with the larynx and with the pharynx. In the interior of the nasal cavity are three nasal shell like bones on each side. These are three ledge-like bony projections, lying one above another, of which the two superior ones belong to the ethmoid bone, the lower one is an independent bone. Between the hollow bones of the nose are the nasal passages, which lead like tubes from the front to the back.

The nasal cavity is on all sides lined with a mucous membrane, more or less richly furnished with glands, amongst which the olfactory nerves are finely branched. The olfactory nerves are spread over the posterior part of the nasal cavity alone, so that this must be considered the site of the sense of smell.

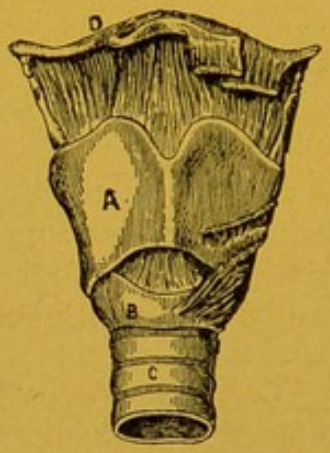
The larynx occupies the middle anterior portion of the neck, where it can be plainly seen and felt as the "Adam's apple." We shall presently see that it has hardly anything to do with respiration, and is practically placed in the respiratory canal only because, as a vocal organ, it needs a direct stream of air to set its vocal chords in vibration. It consists of a hollow organ, composed of moveable cartilages, clothed throughout with mucous membrane. Above, it is connected with the nasal cavity; below, the trachea is directly connected with it.

The connection of the trachea with the lower part of the larynx is made by means of a ring-like cartilage, which also forms the base of the larynx, upon which the other cartilages rest. The anterior and side walls of the larynx are formed of the thyroid cartilages (shield-ike cartilages, which do not correspond in pairs). On the posterior broad end of the ring-like cartilage are the two triangular very moveable aretenoid cartilages. As the last parts of the larynx cartilages I shall mention the part called the epiglottis, a small tongue-shaped cartilage, which is affixed close behind the base of the tongue, and at every act of swallowing so covers the entrance of the larynx that the mouthful passes over it into the gullet.

These various cartilages that I have mentioned are connected together by a whole series of ligaments and muscles, and also are connected with the parts next to them. (To explain their exact connection with one another is very difficult, and they are best studied in a model, as even a figure gives but a very imperfect notion of them).

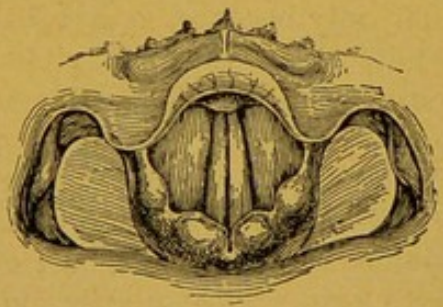
The most important ligaments, those which serve for the production of the human voice, are inside the larynx. These are named the vocal cords. They are two narrow fibrous strings covered with mucous membrane, which cross the larynx from back to front and bind the arytenoid cartilage to the anterior wall of the larynx. They leave a small channel free between them, which can be narrowed or enlarged according to the position of the arytenoid cartilage, and according to the consequent greater or smaller tension of the cords.

Close below the vocal cords are another pair of similar ligaments, which include between them the false glottis. They have nothing to do with the production of the voice, and appear from the number of small mucous glands with which they are furnished to serve for moistening the vocal cords.

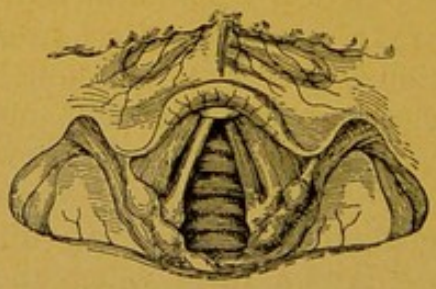


Front view of larynx. A. Thyroid gland. B. Circular cartilage. C. Trachea. D. Hyoid bone.

Forms of the larynx in various positions.

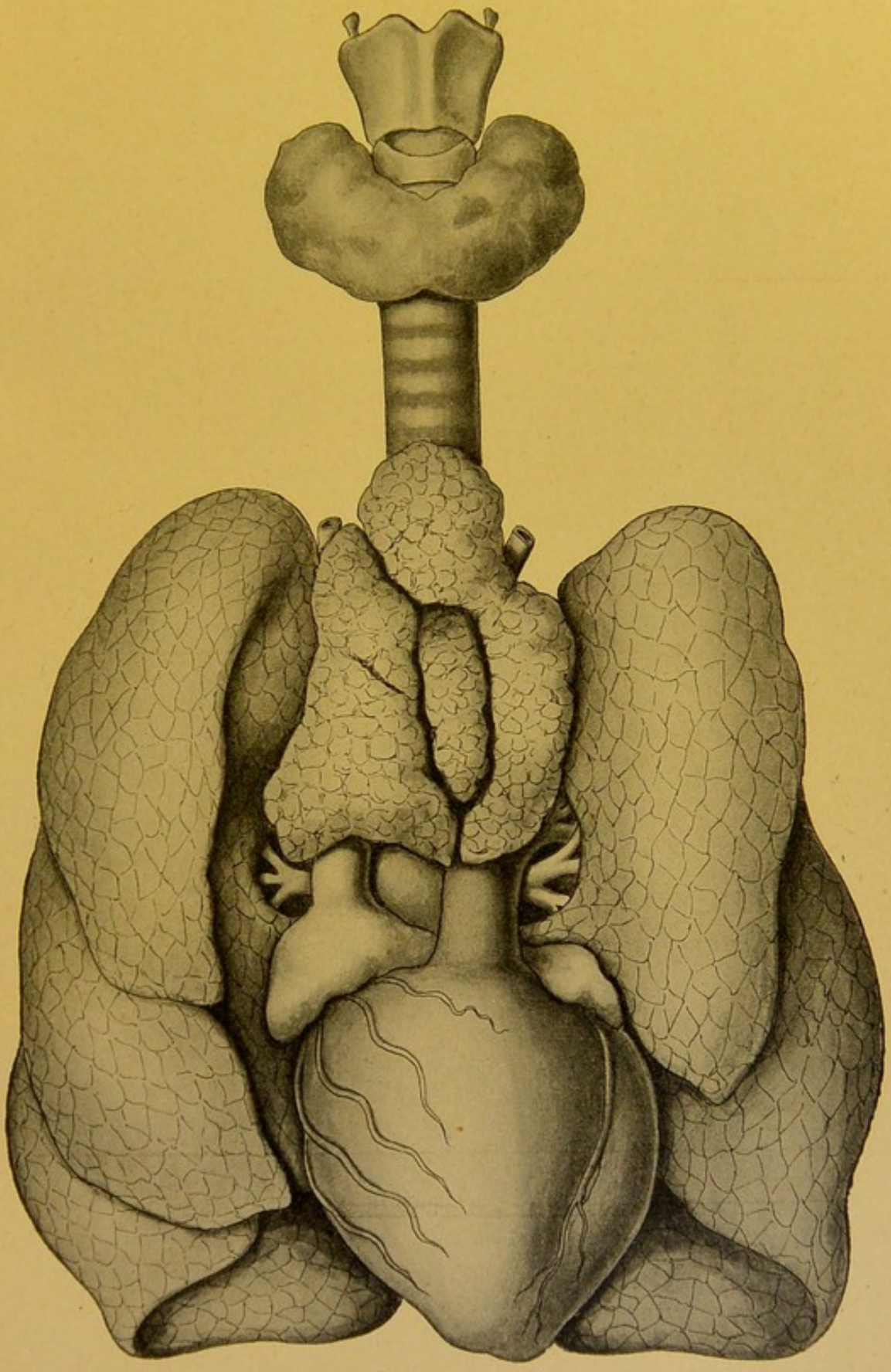


Forming an initial sound.



In ordinary breathing.

The trachea (which might be described as a kind of flue for the combustion that goes on in the lungs) connects the nasal cavity with the lungs just as the œsophagus connects the mouth with the stomach; the nose being the ante-chamber of respiration, as the mouth is of nutrition. The trachea is a stout but elastic tube, whose flat posterior wall (which lies against the œsophagus) is skinny, whilst its anterior free wall is protected by some twenty transverse crescent-shaped layers of cartilage, so that it cannot be compressed by air-pressure. About the height of the third or fourth thoracic vertebra it divides into two branches, of which one leads to the right and the other to the left towards their respectives lobes of the lungs. The



GENERAL VIEW OF THE POSITION OF THE ORGANS OF RESPIRATION OF A CHILD.
Right and left the Lobes of the Lungs; in the middle below, the Heart; above the Thymus Gland.

length of the trachea down to the point of parting is about four-and-a-half inches; the diameter about three-quarters-of-an-inch. The branches of the trachea, called bronchi, are also strengthened by layers of cartilage. The right bronchus (the shorter but wider of the two), having some eight imbedded layers of cartilage, divides itself upon entering the right lung into three branches. The left, longer, but a little narrower, passing under the arch of the aorta, enters with two branches into both lobes of the left lung. Inside the lungs the bronchi, gradually losing the imbedded cartilages, divide into ever smaller and smaller, and at last delicate tiny air-passages, around whose final ramifications the vesicles of the lungs group themselves in grape-like bunches. In these the exchange of gases (in which breathing practically consists) takes place.

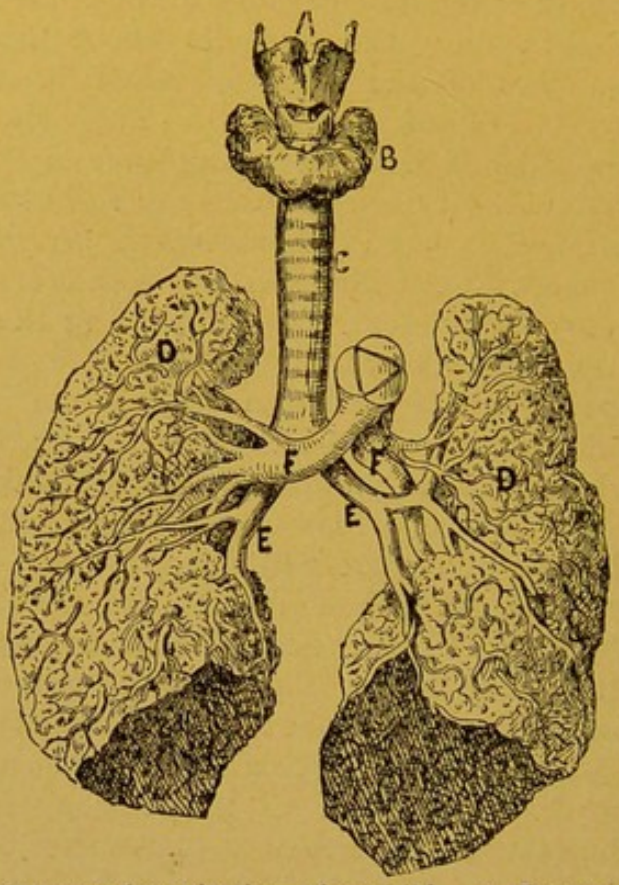
The lungs, of which one fills the right and the other the left of the thoracic cavity, are two delicate elastic organs which fill themselves with air as a sponge fills with water. Their outer portions lie close to the walls of the chest. Their inner surfaces, turned to each other, enclose the heart. Their shape is that of an obtuse cone. The lower broad part of the cone rests immediately upon the diaphragm, which separates the thoracic cavity from the abdominal cavity, and, according to the degree of its tension, supports the expansion and contraction of the chest as a powerful breathing muscle. The point of the cone, or upper section of the lung, reaches to above the collar bone, and lies behind the first rib of the lower side of the neck. The right lung is divided by two transverse divisions into three lobes, the left by one division into two lobes.

On the inner surfaces of both lungs, which are turned towards each other, are found what are called the roots of the lungs, the entrance places of the great vessels, the nerves, and the bronchi.

The tissue of the lungs is soft and spongy, and consists principally of innumerable vesicles, which may be regarded as the last branches of the smallest bronchus, and are grouped together something like a bunch of grapes. These vesicles are connected with each other, as well as with the most delicate of the bronchial tubes, and enveloped with a capillary network of lung arteries, whose office is to bring into the lungs the used up venous blood, overloaded with carbonic acid, that it may here be purified and refreshed by a chemical purification.

We are thus brought to the chemical process of respiration—that is the chemical alteration of the blood that takes place in the lungs. This is practically as follows:—from the vesicles of the lungs, which I have mentioned above, the oxygen of the air which

they have inhaled is passed into the capillary network, and the carbonic acid is taken away by them from the capillary network, and breathed out in the next expiration. The blood, which has now become rich in oxygen, streams away from the capillaries, of a brilliant red colour, through the arteries of the lungs into the left auricle of the heart, in order that, after the completion of its renovation (which takes place in what is called the lesser or pulmonic circulation), it may proceed into the greater or systemic circulation.



Organs of respiration of a child. A. Larynx. B. Thyroid gland. C. Trachea. DD. Lobes of the lungs. E. Bronchial tubes. F. Pulmonary artery.

But in addition to the chemistry of respiration, we must study its mechanism. This is as follows. The chest, whose important part in respiration, we have already hinted at, is periodically distended and compressed by the respiratory muscular action. The more powerful this muscular action, and the larger and more elastic the chest, so much the better the breathing, and the constant renovation of the blood. Presently we shall have more than one occasion to remark how different disorders are favoured hy a weak respiratory action.

The enlargement of the chest in the act of drawing in the breath, in the case of a healthy man, amounts to about twenty cubic inches.

Broad shouldered muscular men with deep chests have a distinctly larger index of respiration than delicately built men with flat chests. The latter are able to breathe only superficially, and, in consequence of the weak development of their respiratory organs, are much more disposed to all kinds of disorders, and especially to tuberculosis of he lungs.

Breathing consists of two processes, inhalation and exhalation. The former is effected when the elastic chest, and with it the thoracic

cavity, is distended by the action of the muscles of the chest, and also by the levelling down of the diaphragm. In consequence of this the exterior air flows freely into the lungs. Exhalation is effected by the chest and thoracic cavity becoming compressed, in consequence of the relaxation of the muscles of the chest, and the swelling up of the diaphragm. This effects a distinct pressure upon the lungs charged with air, and under this pressure a part of the air is expelled, whilst a part, the reserved air, remains still in the lungs. The respiratory muscles of the lungs are, it is true, voluntary muscles, but the process of respiration goes on automatically during sleep; and an adult breathes from sixteen to twenty-four times in a minute, on the average, and a new-born child 40 times. Under the stimulation, produced by physical exertion (running, riding, athletics), and still more in feverish states, the number of respirations a minute is much increased. The number is, therefore, a valuable index of the condition of patients who are seriously ill. With the approach of age the number of respirations diminishes slowly and continuously.

But not only are the number of respirations different. At different ages and in the opposite sexes the manner of breathing differs. Whilst men in repose, and particularly at night, breathe principally by the rise and fall of the diaphragm—the muscles of the chest apparently taking little part in the action; we observe that in women and children the rise and fall of the chest is the principle mechanism at play. It seems that this compels the number of respirations in a minute of women and children to be distinctly greater than that of healthy men who breathe vigorously.

Diseases of the Nasal Cavity.

In addition to exterior injuries of the nose, which, on account of its prominent position are common (fracture of the nasal bones is one of the commonest fractures), many other injuries of the nose occur—particularly in childhood. Foreign bodies, coins, beans, buttons, and all sorts of playthings are first of all very commonly thrust by children into their noses, and then drawn up by an unintentional inhalation. Frequently it is alike difficult to find them, and afterwards to extract them. The simplest expedient is, in any case, to rinse out the nostrils with water. If this does not effect the desired result, time should not be wasted. Many of these foreign bodies, for example, beans and maize, swell under the action of the moisture of the nose, and so become more tightly fixed, whilst a medical man can often immediately remove them with tweezers. Leaving the foreign

body for a length of time in its position involves danger of an inflammatory swelling, which will completely hide the body from the eye (even when the nose is carefully examined with appropriate instruments), and much increase the difficulty of its removal. It is possible for a foreign body to remain in the nostril for some time without occasioning the child any very serious inconvenience, because he breathes through the other nostril. In consequence of this the parents may imagine the body to be no longer in the nostril, but very probably to have "come out of itself whilst the child was asleep." The event generally proves that they have deceived themselves. A foul smelling nasal catarrh gradually sets in, and then they send for a medical man; who succeeds in discovering and removing the cause of the malady in the shape of a button, or something else of that sort.

Coming next to inflammation of the mucous membrane of the nose, we may distinguish an acute and a chronic form of this injurious irritation, according to its duration or frequent recurrence.

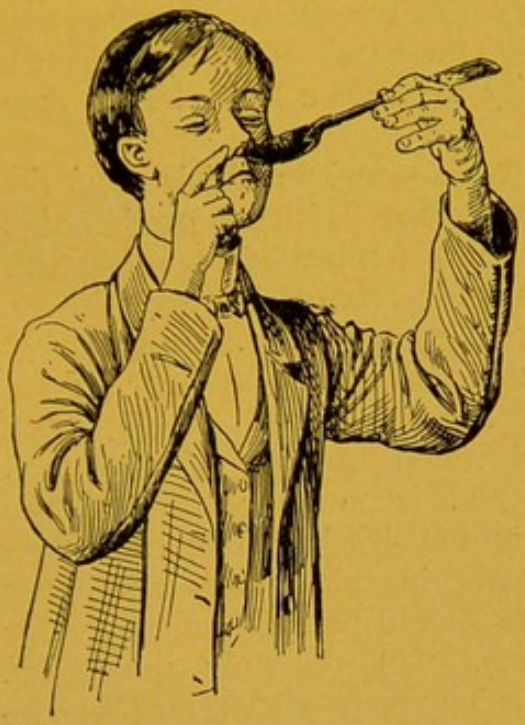
Acute Nasal Catarrh.

This is what is commonly called "a cold." It can be the consequence of all kinds of irritations of the mucous membrane of the nose, and is a quite harmless malady. Sometimes it is a consequence of a sudden chill, sometimes the consequence of a mechanical irritation, produced by inhaling quantities of dust. There are also men who are unable to inhale certain substances (for example, iodoform, which is placed on wounds) without an abundant secretion on the part of the nasal glands immediately ensuing.

The tiresome "running of the nose"—that is to say the superabundant secretion of the mucous of the nasal glands which has just been mentioned—is generally the most disagreeable symptom of a cold. But it must be added that occasionally epidemics of "cold" appear, whose concomitants, slight fever, headache and lassitude raise a suspicion that they are caused by the entrance of bacilli into the nose. Particularly in the case of children, we see colds of this kind assume almost the form of a mild influenza. They pass from one individual to another, conveyed by the infection of the mucous of the nose, and are also accompanied by disorders of the middle ear, which exclude all doubt of their being due to the action of bacilli—for we are compelled to assume that the bacilli have wandered from the nose through the eustachian tube into the ear.

The treatment. Many people who have a sensitive mucous mem

brane, are particularly liable to nasal catarrh, and feel certain of catching a tiresome if harmless "cold" with every change of the weather. Such persons are strongly to be advised to take measures for hardening the nasal mucous membrane. The simplest way of doing this is every morning to inhale a small quantity of cold water into the nostrils. The water may be taken up in the hand, or a nose douche may be purchased. This is a glass, the pointed beak of which is placed immediately under the opening of the nostril, so as to draw the water up into the nose. The other nostril must be held closed. The water falls into the mouth from whence it is then ejected. There is no other method of protection against cold more simple or more easy; and anyone who has once tried this simple expedient will certainly continue to make daily use of it.



Simple nose douche with a spoon.

Little children, especially if liable to feverishness during colds are best kept in bed. They may be protected against secondary complications by warm moist poultices on the breast and frequent drinking of elder tea which will produce a slight perspiration. Fresh air is the best cure for adults even though it snows, freezes or rains. In any case, a person who, during a slight nasal catarrh goes about his ordinary business, and, at the most, meanwhile takes a perspiration-cure (see the sections on water treatment) will certainly get rid of the nuisance more quickly and more thoroughly than one who remains anxiously over the fire in a warm room.

Chronic Nasal Catarrh.

We have seen that in various disorders of the stomach (for example in gastric catarrh and pharyngeal catarrh) an acute form of the malady may, in consequence of frequently repeated injurious irritation, pass into a chronic form. Personally, however, I do not believe that ordinary nasal catarrh can pass into a chronic catarrh. In almost

all cases the mucous membrane of the nasal cavity must have been brought into a swollen condition by severe mechanical irritation before it is affected by the atrophy, which is often so severe that even the integuments of the bones of the nasal cavity are affected, with the consequence that the cavity assumes a form larger than that which is seen in healthy men.

Chronic nasal catarrh is frequently observed in children of the poorer classes. It is almost always to be referred either to proliferation of the tonsils of the pharynx, which lie hidden behind the soft palate and above the uvula, or to the presence of some foreign body in the nose; or to a proliferation of the mucous membrane itself (called nasal polypus), or to something else of the same kind. When a nasal catarrh has existed for a long time, whether in child or adult, the patient has a most disagreeable smell, which proceeds from the nose. This is called ozaena, fœtid nose, and is to be referred to the decomposition of bacilli contained in the dried-up mucous. This same bad smell of the nose occurs also in tuberculosis and other diseases of the bones; and this alone should be sufficient reason for consulting a competent medical man. Unfortunately among the poorer classes this step is postponed as long as possible; and here we no doubt have the reason why chronic ozaena, in consequence of a protracted nasal catarrh, is rare among the upper classes. In patients suffering from chronic nasal catarrh the sense of smell is almost always more or less lost, in consequence of the atrophy of the mucous membrane, in which the olfactory nerves are distributed in the upper part of the nose.

The treatment. Every long-continued excessive excretion of mucous from the nose demands an accurate investigation both of the nasal cavity and of the naso-pharyngeal cavity, in order that we may know certainly whether the increased formation of mucus is due or not to a foreign body, or to a proliferation caused by mechanical pressure and inflammatory irritation. The removal of the foreign body, if it be present, must be our first aim. With medical assistance, not necessarily that of a specialist, this is always easy.

In addition attention must be bestowed upon giving the patient a nourishing diet, which may be supplemented with cod liver oil and brine baths. Protracted douches of mild alum solution, or douches of boric acid solution, or of solution of permanganate of potash, are also to be recommended to soften the dried scabs of the nose. These serve also to stimulate the mucous membrane, to destroy the purulent bacteria that cling to it, and to remove the fœtid odour mentioned

Bleeding of the Nose.

Children and adults often exhibit a great proclivity to bleeding in the nasal cavity. The only cause of this can be that larger or smaller blood-vessels burst and pour out their contents into the nasal cavity, whence it is discharged through the nostrils.

This habitual bleeding from the nose is not to be confounded with bleeding from the nose which occurs sometimes at the beginning of infectious disorders, diphtheria for example, or typhoid.

It is difficult to state a cause for these often tiresome frequent bleedings from the nose; but we must assume a high degree of full bloodedness, and a certain congenital weakness of the mucous membrane. In any case, frequent considerable losses of blood can considerably weaken the organism, and lessen the general powers of resistance.

If we exclude those cases when bleeding at the nose arises from infectious disorders (in which cases the bleeding should not be checked), the treatment of bleeding at the nose requires a staunching of the vessel that has burst. This is generally effected by the blood itself. But there are cases in which the bleeding is so frequent and violent, that it seems imperatively desirable to discover some remedy that will check the bleeding. The patient should lean his head back somewhat, and then an attempt should be made to insert cotton wool plugs, well soaked with vinegar water, deep in the nostril. The patient should not speak, and should keep himself as quiet as possible. It is also beneficial to wrap the whole head and neck in wet cold cloths, and to lead the blood downwards by a warm footbath. If the bleeding still does not cease, what is called posterior plugging must be resorted to—that is to say a plugging of the nasal hollow from the pharyngeal nasal cavity. As this can be done only by a professional hand I need say no more about it.

People subjected to habitual bleeding from the nose should on no account neglect regular washing of the nasal cavity, to harden and strengthen the mucous membrane.

Acute Catarrh of the Larynx.

The same irritations which can produce a catarrh of the nose, may, if they affect the more deeply situated mucous membrane of the larynx, produce also in that region an acute condition of irritation; and it is by no means a rare thing to see both disorders arise simultaneously, as the effect of one and the same cause. There can be no doubt that in many catarrhs of the larynx infectious germs also play

an important part. We find catarrh of the larynx, which can arise from no other cause, both in measles and influenza.

The patient generally sickens rapidly; and always with the symptom of more or less hoarseness. This must be referred to the swelling of the vocal cords, and may be so great as to render the voices completely toneless, in fact, a mere whisper. A severe tickling in the larynx is also almost always felt, and compels constant coughing, although the expectoration of mucus need not be by any means considerable; which gives the cough a dry, tormenting character.

Difficulties of breathing are rare in adults. But they do occur, and can be referred only to excessive swelling of the mucous membrane in the interior of the larynx. This often occasions the patient real attacks of choking. But he always succeeds in making a way for his breath, even if with difficulty, and with expectoration of a mixed mucus.

The same symptom in children will be treated of in the next section—as "false diphtheria" has now established its right to be regarded as a distinct disorder, although it is nothing more than an inflammatory catarrh of the larynx.

Many cases are unaccompanied by fever. In others, especially those which must be referred to an invasion of infectious germs, we find definite increase of temperature, lassitude, headache, and loss of appetite; symptoms which we so frequently encounter where infectious germs are at work.

Sometimes the loss of voice lasts for several weeks, particularly when the patient does not take the proper measures which should, without fail, cure the disorder in a more or less brief period.

The treatment of Inflammatory Catarrh of the Larynx demands above everything rest, and that the organ should be spared as much as possible. For these reasons, the patient should be advised to speak as little as possible, and during the malady to abstain entirely from smoking; as otherwise the larynx will be constantly subject to fresh irritations. If there is any fever, absolute rest in bed is to be advised (as a preservative from other maladies); in addition to which a water treatment of acute catarrh of the larynx, which I am about to describe can be much better carried out when the patient lies still than when he is sometimes walking about the room and at other times reposing in a chair or on a sofa.

The water treatment (which is peculiarly beneficial in catarrhs of the larynx, and can be recommended to everyone) must first of all influence the site itself of the malady, that is the neck. This is most simply effected by compresses, which, if fever exists, may be renewed

half-hourly or hourly. But a complete envelopment of the chest is also often very beneficial, as it not only relieves the cough (which is often painfully noticeable), but also calms the patient, and, by a slight excitation, brings the skin into a beneficial perspiration. This inclination may be seconded by frequent draughts of well known teas, with which, however, men are not willing to have much to do. A drink that may be recommended to such patients is warm, slightly sweetened milk with an addition of soda water. In inflammatory forms of catarrhal swellings in the larynx, I must confess that I have seen but small results from the often recommended inhalation of steam; but they seem to be beneficial in cases of chronic inflammation.

Those who desire to take internal remedies, especially when the inclination to cough is very troublesome, may procure themselves some remedy that will relieve the cough, and need not stand upon using no other remedy than the water cure—water cure does not imply the rejection of all medicine, as if it were some poison. Among remedies for relieving cough there are many that produce wonderful effects, and without any bad results. Among them the first place must be assigned to codeine.

False Diphtheria of the Larynx.

As I have already remarked whilst treating of catarrh of the larynx in adults, this same disease in children has, on account of the frequency of cases that develop themselves suddenly, become regarded as an independent malady. It has been called false diphtheria, although it is practically nothing more than a rapidly developed swelling of the mucous membrane of the larynx, accompanied by symptoms of choking.

Children always sicken suddenly, and generally in the middle of the night, with symptoms of a severe diphtheria of the larynx—whence the malady has its name. The children now lie still with signs of a great feeling of alarm, and now toss themselves about restlessly in this direction and that, with an effusion of cold perspiration and with a raw cough. They put their hands to their necks, and attempt, with a strain of all the muscles of respiration to satisfy their need of air with deep and jerky efforts at inhalation.

After a duration of greater or less length, these symptoms of an attack of suffocation (for this is what this false diphtheria amounts to), subside, and give place to perfect health. The latter may continue for some days, until the same alarming symptoms suddenly reappear

in the midst of the most reposeful sleep.

It is difficult to say under what influences the swelling of the mucous membrane of the larynx, and the consequent mechanical hindrance of the respiration can so suddenly arise. It is probable that these are children who have an essentially weak and narrow larynx. This view is supported by the fact that with the growth of the larynx, as children grow older, the malady becomes rarer.

The treatment has to take into consideration those same points which I have already mentioned in the previous section—at anyrate when a general catarrh accompanies the false diphtheria. When the sudden suffocation fits occur an emetic may be given with good effect. The best is the simplest, a teaspoonful of ipecacuanha wine. If there is pressing need of help, vomiting may be assisted by tickling the pharynx of the child with a feather, or by putting the finger into the throat. In the last case care must be taken that no injury is done by the nail.

Chronic Catarrh of the Larynx.

Chronic catarrh of the larynx is rather a disorder of adults than of children, and by far more frequently attacks the male sex. This will be easily understood when I add that chronic catarrh of the larynx, like chronic catarrh of the pharynx, is a frequent consequence of excessive smoking, of constant indulgence in alcoholic drinks, and of frequently repeated strain of the vocal cords. From the latter fact the complaint is often spoken of as " clergyman's throat."

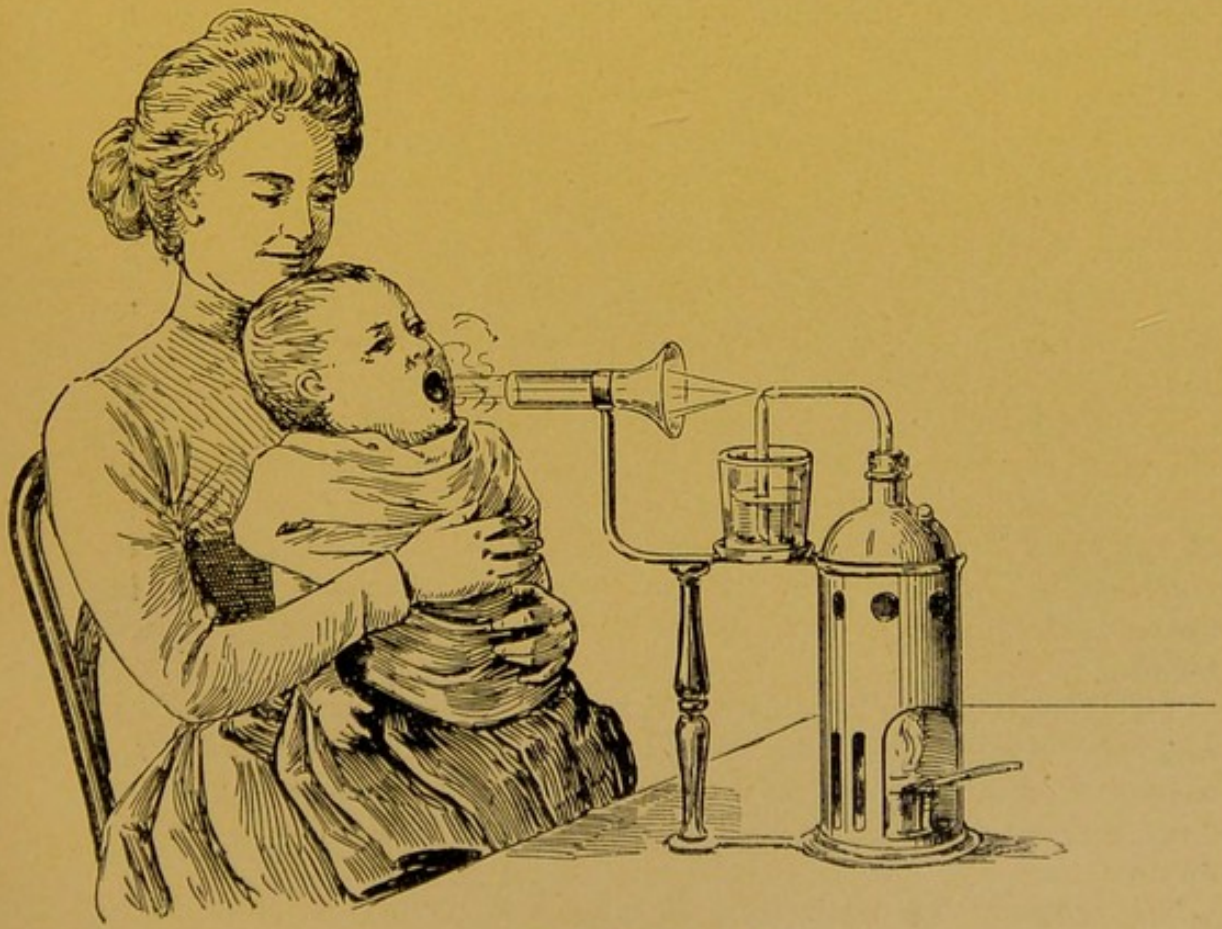
The principal symptom of the malady is a more or less hoarse sounding voice. The patient almost always complains of a feeling of tickling, an irritation that prompts coughing, and great dryness of the throat. The expectoration is small, and consists of white glutinous thread-like mucus, sometimes a little mixed with blood, but without pus.

The Treatment is extremely fatiguing, and advances only very slowly, particularly in the case of adult male patients, who often, even when they wish it, cannot avoid the injuries which occasioned the mischief, and so are constantly repeating the irritation of the inflamed mucous membrane. It is useless to inform a teacher that he must not speak, or a workman who has to do work that makes a great deal of dust, that he must avoid work. And—forbidding smoking and drinking alcoholic liquids! One need not have been a medical practitioner for years to know in how few cases that advice will be followed. After a few days of weak resolution the average patient can hold out no

longer, and prefers his beer and pipe with the catarrh to being rid of the latter at the price of giving up the former. Of course, there are honourable exceptions. I freely admit that.

The result comes to this, that one may hope more from the treatment of the malady than from counselling the removal of the evils that occasion it. Here a water treatment, in different forms, is again of service to us—in the shape of inhalations, of the use of mineral waters, and of cold hardening baths.

Respecting the inhalations, I may remark that it is advisable not to inhale pure water, but a two per cent. solution of sal ammoniac, or a one per cent. solution of alum or tanin; as these generally exercise a particularly beneficial effect upon the malady. The inhalations should take place twice daily, and last for a few minutes. The apparatus, of which I here give a figure, should be used. It can be obtained of any chemist, and is accompanied by directions for use. Anyone who wishes to go about the process in a simpler and less expensive way may place an ordinary paper cornet over a jug in which the inhalation



Inhalation Machine.

solution has been placed, make a hole in the point of the cornet, and inhale through the mouth the steam that comes out of the hole.

Turpentine steam is also good for these inhalations, turpentine being particularly to be recommended as a good remedy for the lungs.

Breathing as much as possible in the fresh air; general strengthening of the body by a good diet; hardening it by regular cold baths; and stimulation of the organs of respiration by exercise, whether walking, or fencing, or gymnastic exercises—all these are to be advised. For it must never be forgotten that the larynx is not far from the lungs, and that the lungs are in danger of becoming affected, when the larynx is continuously in a state of inflammation.

Spasm of the Glottis.

As its name indicates, this malady consists in a sudden spasm of the vocal cords, in consequence of which the glottis is subject to a contraction, similar to that which, in true and false diphtheria, causes want of breath, with paroxysms of choking. The disorder occurs almost exclusively in childhood, or in persons suffering from hysteria.

Cramp of the glottis is almost always only a symptom accompanying general cramp; and it has been remarked that in the vast majority of cases ricketts are involved. How it comes about that boys suffer more frequently from this malady than girls is not clear. Such, however, is the case.

Generally children sicken suddenly, and without any premonitory symptoms, with a deep and scarcely audible inhalation, which hardly any exhalation follows, as the cramp appears always to set in at this moment, and to hinder the exit of the breath from the lungs. Of necessity, symptoms of the beginning of an overcharging of the blood with carbonic acid ensue, the same that we have already seen in true diphtheria. It must be particularly mentioned that the children are not rendered insensible by the cramp, but toss themselves about in distress, and make every possible effort to recover their impeded breath.

The cramp seldom lasts longer than a minute and a half. It then suddenly ceases, and the children almost invariably immediately recover themselves. But I have, on several occasions, seen sudden death ensue as a consequence of cramp of the glottis, if this continues for any time.

The treatment has two aims. It must first remove the condition, which is directly dangerous to life; and secondly, it should attempt to

prevent recurrence.—Respecting the treatment of the children during the attack itself, immediate cold douches of the whole body should be given, and the front of the neck, the site of the externally visible larynx, should be gently rubbed. This often has immediate effect, as in cramp of the calves and stomach. No other remedies should be attempted. The case is one that must rectify itself, if at all, in a few minutes, and happily it generally does do so.

As rickets are almost always the cause of the malady, an energetic treatment for this malady should be begun as quickly as possible. This subject is fully treated elsewhere. At the same time the patient should be given a strengthening and appropriate diet.

In the case of older hysterical girls, amongst whom cramp of the glottis sometimes occurs, energetic cold water treatment is the best remedy. For the rest I must refer the reader to the section on hysteria.

I need only mention here, for the reader's guidance, that the frequent disorders of the larynx accompanying tuberculosis and cancer are treated in the sections devoted to these maladies.

Acute Bronchial Catarrh.

Acute bronchial catarrh (bronchitis) is simply an inflammation of the mucous membrane in the trachea itself or in its larger branches. It is one of the commonest disorders both among children and adults. It occurs both independently and in connection with other disorders—and principally with measles, influenza, and typhoid. The mere fact of its connection with the above-named maladies suggests a suspicion that this kind of bronchial catarrh must be referred to an infection like those forms of infectious colds or inflammations of the pharynx which we have already studied.

But on the other hand we often find acute bronchial catarrh as a result of all kinds of non-infectious irritations of the mucous membrane of the trachea. There are children and adults who invariably develop a bronchitis if exposed to any serious chill—from wet feet, or a cold north-east wind, or a draught in a railway-carriage, or from anything else. In addition inflammation of the trachea can, in many cases, be regarded as a malady occasioned by certain callings. In the case of millers, bakers, and stonemasons it is results from mechanical irritation caused by dust; in those of dyers, cigar-makers, and workers in chemical factories from chemical irritation. And many more examples might be added.

The principal symptom of an acute catarrh of the trachea is a more

or less severe cough, occasioned by the generally superabundant secretions of the glands of the mucous membrane. The expectorations of the patient are viscid, stringy, and purely mucous, without any mixture of purulent matter. Sometimes small speckles of blood are mixed with it, about which nothing need be said here. A feeling of pain and of excoriation is produced in the larynx by the constant coughing both in the larynx and in the bronchi; and patients when questioned generally assert the locality of their pain to be behind the breast-bone.

Fever and headache, particularly in the forehead above the eyes, are seldom absent; but the fever rises to high and alarming temperatures generally only in the case of children, and where some other infectious disease accompanies the bronchitis.

The appetite is always diminished, and is often very poor. One may say that in general the whole character of the disease depends upon the degree in which the smaller branches of the bronchi are affected. Particularly in children a great difference is perceptible between an inflammation of the larger and smaller branches of the bronchi, and I shall for this reason dedicate a special section to what is called capillary bronchial catarrh of children.

In cases of acute general inflammation of the bronchi it is often interesting to place the ear against the patient's breast and to listen. In cases of mild inflammation, one can at first hear nothing more than a sharpening of the normal soft sound of respiration. But in advanced cases one hears in every part of the lungs a humming and wheezing, and a small deep crepitation (something like the rustling of a silk dress), a ringing and chirping, that suggests an orchestra of mannikins preparing their instruments for a concert.

This state of things (particularly if proper attention is not paid to the case at its beginning) lasts for six to ten days, until, with diminution of the cough, a slow but complete cure ensues, except in the cases when a catarrhal inflammation of the lungs is developed, of which I shall speak below.

The treatment. Before passing to the actual treatment of a catarrh of the bronchi, I must say to every one, great or small, man or woman, who in consequence of "a cold" has to remain indoors, a few words about this expression "a cold." One hears the word every day, and, in reality it means—nothing at all. Anything that any one is unable to explain seems to be called "a cold." It is really incredible how many maladies, direct consequences of the carelessness of the patients themselves, or of their parents, are disguised under this term "a cold." For instance, if a child has a catarrh of

the stomach in consequence of wrong diet—he has "a cold in the stomach." The thing from which the child is really suffering is over-exertion of the stomach produced by improper food. But even a medical man is regarded as a brute if he will not believe in the cold.

In many cases we have to deal merely with an exaggerated susceptibility to any change of temperature, a consequence of insufficient life in the open air, which often results in a man's being visited with a catarrh the moment the wind comes from any quarter except the gentle south.

The real mistake lies in the completely mistaken view many people take of a proper care of the human body. So long as men wrap up their necks in thick woollen neck handkerchiefs, instead of leaving them uncovered, so long as every crack in the fittings of a window is hermetically sealed, instead of the fresh air being allowed free ingress through the open window—so long will there be men who on every possible occasion suffer from catarrh of the pharynx, the larynx, and the bronchi.

On the other hand the man hardens his mucous membrane, uses frequent cold baths, sleeps with the window open, and takes other similar measures to make himself insusceptible to the influences of the weather, will very soon find that "colds" are things with which he has nothing to do.

That does not, of course, apply to men who suffer from frequent bronchitis, occasioned by injurious influences connected with their trade. They must be left to decide for themselves whether their circumstances will permit them to exchange their calling for some more wholesome one in the open air.

In conclusion, I must add the warning that, out of an acute bronchitis, a chronic one can develop itself in the course of time; and that asthma, dilatation of the lungs, and, by no means last of all, even tuberculosis is frequently developed out of an, at first, harmless inflammation of the larynx.

I proceed now to speak of how the malady should be treated. Children should be kept in bed. Adults are also best in bed; or should at least remain for a few days in the house—if they can, without too great a sacrifice, absent themselves from their work. Medicine is necessary in those cases only when the phlegm seems to stick in the throat, and the tormenting cough produces an excessive pain and sense of excoriation in the trachea. In these cases the patient should take fennel-honey, malt-sugar, black currant lozenges, or decoctions of marsh mallow roots with honey of squills. Barley

water is a beneficial drink, or warm milk and seltzer water.

Wet packs are excellent as preventatives of subsequent fever. It is also good, especially in the case of children, to put a poultice on the chest from time to time, to prevent the inflammation from spreading to the smaller branches of the bronchi; poultices and sudorific teas may also be used, with the aim of preventing the skin from becoming dry, and so as always to make it feel slightlymoist.

Inflammation of the Smaller Bronchi (Capillary Bronchial Catarrh) and Catarrhal Inflammation of the Lungs.

The majority of my readers will probably be ignorant that we have to distinguish between two completely different forms of inflammation of the lungs. The former of these is called catarrhal inflammation of the lungs, and is developed in exactly the same way as the other catarrhs of the organs of respiration which I have already described. The second, called inflammation of the lungs, is an infectious disorder, whose bacterial irritants have been known for years.

It must be understood that catarrhal inflammation of the lungs *can* also be of an infectious nature. But it *need not* be infectious, but can develop itself out of the gradual progress of an acute catarrh from the larger to the smaller branches of the bronchi, until it at last reaches the vesicles of the lungs. But acute inflammation of the lungs is always to be referred directly to bacilli, which may attack man in perfect health.

A further distinction is this—catarrhal inflammation of the lungs is almost always limited to one lobe of the lungs, for which reason it has been called lobular inflammation; acute inflammation of the lungs, on the other hand, may attack one whole side of the lung.

It follows from what has been said that the inflammatory irritation of the smallest branches of the bronchi (bronchioles), which, on account of their minuteness, are called capillaries (hair-like tubes), and catarrhal inflammation of the lungs, in which the inflammation advances to the clusters of pulmonary vesicles, are closely connected with each other. In fact, particularly in childhood, the two disorders are so closely connected that it is impossible to draw a line between them. It is only from suddenly increasing fever, and the augmented number of respirations in a minute, and accelerated pulse, that we know that we have to deal with something more than an inflammation of the bronchi, in fact, with a real inflammation of the lungs.

The course of these forms of inflammation always lasts for several weeks. During the day the apparent state of the patient is not so

very abnormal, but in the evening a temperature of from 102° to 104° Fahrenheit (30° to 40° Centigrade) shows itself, accompanied by more rapid breathing (30 to 40 respirations per minute), heaving of the nostrils, and a hurried pulse. The phlegm expectorated by the patient is white and viscous, but affords little definite information. Children generally swallow it. But it is completely different from that of acute inflammation of the lungs, in which, as we shall presently see, the expectoration alone suffices to enable us immediately to identify the disorder.

As catarrhal inflammation of the lungs always lasts for several weeks, and on account of the constantly recurring fever, must necessarily produce a state of gradual loss of strength (which young children are ill able to bear), it is in childhood a serious malady. Amongst the lower classes the percentage of deaths is high. To this we must add that very often measles, whooping-cough, influenza, rickets, scrofula, and various congenital disorders, assist to make cure difficult.

The disease in its infectious form is very common; and is often complicated by all kinds of secondary diseases, commonest amongst which are purulent inflammation of the middle ear, pleurisy, and meningitis. In all these cases we have, no doubt, a migration of the infectious germs along the vascular system. In very many cases the bacilli of tuberculosis appear to be present. They can lie long dormant in the lymph glands of "scrofulous" children, and are set free by the catarrhal inflammation of the lungs to begin their destructive migration into the most different parts of the body.

If a fatal conclusion ensues its approach can generally be observed for some days in a general weakness, by which the heart appears to be particularly affected. One is often reminded of the appearance of consumption of the bowels, which has been described in a former part of this book. Towards the end a general emaciation generally sets in. The end is always easy. Failure of the heart's action generally liberates the child from its sufferings.

The treatment must first aim at keeping up the strength of the heart, and at a suitable diet. To begin with the latter, children should, according to their age, take plenty of milk, thin meat broth, soft-boiled eggs, bread and butter, soft-boiled rice, boiled veal minced small, and such-like easily digestible and nutritive foods. Small but frequent doses of alcohol should be given to keep up the heart's strength—the best brandy added to milk; a teaspoonful four times a day, best taken warm. Weak tea may also be given with brandy, it is to be recommended for children who suffer from acute thirst. I have

already had occasion to recommend this as a cordial for all children suffering from fever.

Of medical remedies, only those that serve to strengthen the heart and to relieve the cough need be considered. But I do not think that they avail much, unless energetically supported by a water treatment. I mention with pleasure that in recent years I have treated catarrhal inflammation of the lungs with water alone, and with the best results; and that I prescribed medicines for relieving the cough only now and then in their mildest form, rather with the aim of relieving parental anxiety than for the patient's need.

In these cases water should be used in the form of cool baths, to be followed by a water poultice on the chest, to be changed twice in the day, whilst during the night it may remain.

It is best to put nervous children into the bath, and to hold them by the hand. The water should be abundant, and at first above 94° Fahrenheit (34° Centigrade). Some one to help may stand behind the child, and pour more and more cold water into the bath, so that the temperature may be gradually reduced to 82° Fahrenheit (24° Centigrade). The bath should last five minutes. Before the patient quits it some plentiful cold douches of the bath water should be poured over his back from a can. The child generally shrinks from them, and involuntarily draws a long breath—which is exactly the reason for giving the douches. More than two baths daily are not to be recommended. The best times are ten in the morning and five in the afternoon.

The pack for the chest should be applied directly after the bath, and be of the same temperature. The greatest care should be taken to put an impermeable covering between the wet cloth laid on the chest, and the external cotton wool. (See the section on compresses and packs). The pack should be changed after about two hours.

Convalescence. In addition, in cases of considerable duration, if the weather is sunny, the patient may enjoy the benefits of fresh air and sunshine; only care should be taken that he does not remain too long out of doors, and to choose the warmest, the most agreeable, and the least windy hours of the day.

Chronic Catarrh of the Bronchi.

If the injuries which we have above described as the causes of inflammatory catarrh of the bronchi are frequently repeated, it is almost inevitable that in time a state of chronic irritation will develop itself out of the inflammatory catarrh. In point of fact, we may call

chronic catarrh of the bronchi a professional disease. It principally attacks men, and in later years, and is found frequently among those who work in mills, stone-cutters, bakers, workers in chemical factories and those who follow other callings in which the mucous membrane of the organs of respiration are exposed to continuous mechanical or chemical irritation.

But there is no doubt that among adults chronic catarrh of the bronchi in numerous cases proceeds from interior causes; that is to say, follows in consequence of some other previous disorder of the organs of respiration, of which tuberculosis of the lungs, asthma, and dilatation of the lungs are commonest; or is a consequence of disorders of the circulation, which are liable to produce what is called hyperæmic inflammation of the mucous membrane of the organs of respiration.

But in any case the malady is a wearying and distressing complaint, particularly if the patient does not at once take sufficient care of himself, and regulate his whole life suitably; and it frequently leads to other disorders, of which tuberculosis of the lungs, and emphysema of the lungs are the principal ones.

The chief symptom of chronic bronchial catarrh is a tormenting cough. It makes itself particularly noticeable at night whilst the patient is in bed, and towards the morning. During the day, and especially in sunny weather, it often seems to have entirely disappeared.

We distinguish a dry and moist bronchial catarrh according to the quantity of phlegm which the patient expectorates in coughing. In the dry catarrh the phlegm is generally viscid and thread-like. It is sometimes mixed with drops of blood. In the moist catarrh, on the contrary, the patient may at a single cough evacuate a great quantity of thin, fluid, frothy phlegm.

The anatomical base of the disorder is nearly the same as that of chronic nasal catarrh. We find at first the same inflammatory irritation and excessive secretion on the part of the mucous membrane of the bronchi. Afterwards the membrane is debased and shrivelled, which affords an opportunity for the invasion of all kinds of bacilli. The phlegm expectorated by patients who have for many years suffered from bronchial catarrh is also almost always viscously purulent, which is most easily perceived if the patient uses a spitting-glass. The blank heavy pus lies at the bottom of the glass, viscous purulent matter floats above it, whilst the topmost lightest stratum consists of greyish-white masses of mucous, in which are perhaps a few drops of blood.

If the ear is laid against the bare breast or back of the patient the

same murmurs are heard in every part of the lungs, which we observed in acute catarrh. They arise from the notes which the air-stream produces in the lungs by causing vibrations of the strings of phlegm that extend from one side to the other of the bronchial tubes.

The treatment of chronic bronchial catarrh. As we have seen that chronic bronchial catarrh can easily lead to the more serious disorders, the greatest attention should be bestowed upon its treatment from the outset.

Turpentine-pipe.

If the patient be a child (the disorder almost always attacks those who suffer from rickets, or have congenitally weak organs of respiration) the first thing is to try to combat the rickets in accordance with the directions that will be subsequently given. In any case, care should be bestowed upon a generally strengthening diet, and upon close attention to the patient, so that the proclivity to phithisis may not develop into actual phthisis. The best advice, and advice that cannot be too much insisted on, is regular gymnastic exercise, massage of the chest, plenty of fresh air, and regular bathing and swimming.

In the case of adults the cause of the malady should always be enquired into. Change of air often has excellent results. Patients who are in a position that enables them to live in a warm sunny climate, or in light mountain air, or in an invigorating forest air, may live a great many years without suffering any inconvenience in spite of their chronic catarrh.

Naturally patients of the working classes can only in the rarest cases procure this desirable change of air. But it is pleasant to be able to add that institutions exist where they may command at least a temporary change at moderate prices.

Adults should be particularly advised to use massage of the chest and gymnastic exercises, and to practice the habit of drawing full long breaths.

The diet should be nourishing but light. Spices, alcohol, or constant smoking must be forbidden.

Inhalations of brine or of spirits of turpentine also have a good result; but I must mention that the remedy must be used for many weeks if any result is to ensue. (The spirits of turpentine can be best inhaled with a turpentine pipe).

Iodide of potassism used as an internal medicine, must also be

Edible fungi.

1. Morchella. 2. Yellow agaric. 3. Mushroom. 4. Hydnum. 5. Boletus.

taken for some time, and is best taken in milk. It is particularly beneficial in cases of dry catarrh and troublesome cough, and has no injurious effects except a catarrh of the nose, which, in the case of many patients, it provokes at first.

In general, the use of cough-remedies is to be deprecated. The cough is, in the first place, necessary to remove the phlegm; and in advanced cases it becomes necessary to use constantly more powerful medicines (in the course of time injurious to health) in order to get relief.

In conclusion, water treatment deserves in all stages of chronic bronchial catarrh the fullest attention. It may be used in the ordinary way for strengthening, and also specially in the form of luke-warm fomentations of the neck and chest.

Diphtherial (fibrinous) Inflammation of the Lungs. Pneumonia.

This fibrinous inflammation of the lungs is a true acute infectious disease, with a characteristic beginning, course, and conclusion. It occurs principally in spring or autumn, and its irritant (Fränkel's or Friedland's diplococcus) seems to require a favourable base before it can develop its destructive effects.

The malady attacks young and old, men and women with equal frequency. It appears almost always suddenly, in the midst of good health. Sometimes it amounts to a small household epidemic. This is particularly the case where a number of individuals are living in close contact with one another, and under imperfectly hygienic circumstances.

The irritant of fibrinous inflammation of the lungs is no doubt at certain times very widely distributed, and can be found in a great many lungs. While the lungs are sound, however, it cannot attack them. It requires in the lungs some point whose power of resistance has been diminished; and consequently we see fibrinous inflammation of the lungs constantly occur not independently but as a complication during some other malady—as we have already said when treating of typhoid, whooping-cough, and influenza.

The nature of fibrinous inflammation of the lungs may be briefly described as follows:—As in diphtheria an albuminous coagulum (fibrin) is secreted from the blood, and so completely plugs the vesicles of the lungs and the smallest bronchial tubes of one side of the lung that the light, spongy organ becomes a hard liver-like mass,

absolutely useless for the purpose of breathing.

I shall next mention the three aspects of the disease, successive to one another in time, and distinguished by the condition of the lungs.

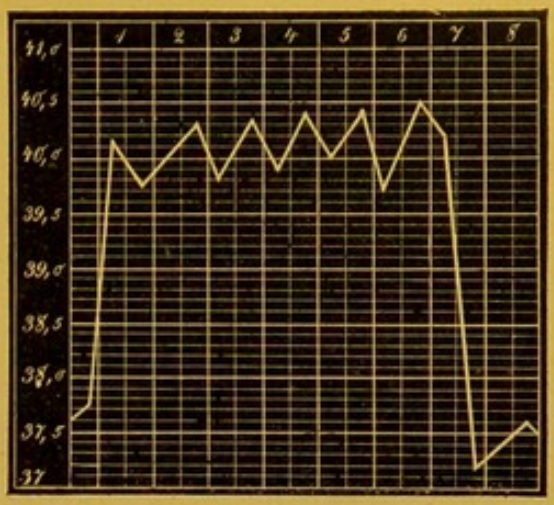
1. The stage of engorgement.
2. The stage of red hepatisation.
3. The stage of yellow hepatisation.

In the first stage, that of engorgement, which is the beginning of the malady, the lung is over-filled with blood. It is still soft, but it has lost a great deal of its aerial contents. In the second stage, that of red hepatisation, which represents the culmination of the disease, the whole lung is as hard as the liver, and contains no air. In the third stage, that of yellow hepatisation, which corresponds to a subsidence of the formation of fibrin, yellow mucous pus-like points are to be everywhere seen, which represent the liquefaction of the coagulum, and the end of the disease.

The malady is introduced almost always by a violent shivering fit. Children also often bleed from the nose. This, however, is soon followed by a feeling of excessive dry heat. Rapidly rising fever, dull headache, and a feeling of great fatigue and lassitude, in effect all the symptoms of an infectious disease, which we have so often mentioned, indicate the seriousness of the disorder. The state of affairs makes itself quite plain on the second day, for the patient at every inhalation, every cough, even at every movement of the bed, feels sharp pains in one half of his breast. This must be due to the sympathy of the pleura. But another symptom (to which great attention must be paid) shows that not alone the pleura, but also the corresponding half of the lungs is affected. This is the expectoration of the patient, which has a rusty appearance in consequence of the mixture of blood with it. (In the case of children and old people the expectoration is seldom seen, as they swallow it.) A further indication is a vesicular eruption about the mouth, similar to that which we have seen in acute catarrh of the stomach. If these three symptoms appear together there can be no doubt about what the malady is.

The course of the disease is always somewhat violent. The respiration is always distinctly impeded and hurried by the attack upon one half of the lung. It will be seen that the affected side of the chest drags after the other at every act of respiration, and rises and sinks but little. The irritation of the cough is painful; but is generally repressed by the patient to the best of his ability, as the shaking of the affected side by the cough (though the patient generally tries to spare that side) is excessively painful. Many patients from the first day lie upon the affected side (as they do inpleurisy), and persist in this

position for seven days; others throw themselves about from side to side. Patients who have been accustomed to take alcoholic drinks freely become delirious during the first day; try with all their might to escape from bed; and, completely deprived of their senses, would throw themselves out of the window were they not forcibly restrained. In all these cases we have an outbreak of real alcoholic delirium, which, apart from the danger that it implies for the heart, constitutes a grave addition to a previously serious disease.



Fever-curve of acute pneumonia.

The urine is always scanty, and of a dark colour. It shows, if allowed to stand for a time, a muddy deposit. If the vessel be shaken the whole is changed into milky turbid liquid. The motions are slow, and of dark colour.

I need say nothing about the physical signs given by the altered pulmonic sounds, and the altered sound of the breathing. They could be understood only by a medical practitioner.

The conclusion of the disorder is as sudden as its beginning. The fever-curve, which I give on account of its interest, shows plainly that fibrinous inflammation of the lungs is one of those diseases which run what is called a critical course, with the consequence that in a case running a classical course, the date of the conclusion can be foretold almost to a day if we have correct knowledge of the date of commencement, the critical day is almost always the seventh, seldom the fifth or ninth after sickening—in the latter cases we speak of an accelerated or postponed crisis. Generally we find that on the seventh day the patient's general condition is even worse than during the previous days. Then suddenly a heavy general perspiration ensues. The patient falls asleep, and when he awakes may be congratulated on his escape. The malady has taken a favourable turn, and the patient makes daily progress towards recovery, with a steady subsidence of all the symptoms.

Amongst complications and secondary disorders I must mention first the sympathy of the pleura, to which I have already alluded. This sympathy shows itself by stabbing pains on the affected side.

Pleurisy (a very serious and common malady) will be treated of in a separate section; but I must here mention at once that when it is connected with fibrinous inflammation of the lungs, it frequently "leaves something behind it," that is to say growths which form between the envelope of the lungs and the inner integument of the chest, known as *pleural adhesions*. These for a long time hinder the lungs from breathing freely and fully. It may follow from this that the lung, after getting through, a fibrinous inflammation, has not only a distinct proclivity towards a repetition of the disorder, but seems also to be able to offer less resistance to an invasion of the bacillus of tuberculosis. In old age fibrinous inflammation of the lungs is a frequent cause of death. In these cases its course is not so violent and characteristic, but has rather the appearance of a chronic inflammation, concluding with failure of the heart's action.

The treatment must regard the support of the heart as its greatest aim, so that the patient, when the day of the crisis arrives, may be equal to exigencies of his situation—which depends principally upon the heart. Unfortunately many patients succumb either before or during the crisis, simply because their hearts are exhausted. The patient's heart is most likely to hold out if from the very first it is spared as much as possible, and every care taken that the patient shall not wear himself out before the critical moment. He should sleep as much as possible, and be spared everything in the shape of excitement. Attention should be bestowed upon him quickly and in silence, and his breathing should be facilitated by the admission of fresh air into the sick room, and attentively changed wet chest and neck fomentations.

The diet should be supporting but light. From the first day milk should be given with a little brandy added, or if the patient cannot take this tea, with brandy. Wine may be given hourly without hesitation, about a tea-spoonful each time.

Those habituated to a frequent use of alcoholic drinks should, from the very first day, take a dessert-spoonful of brandy three times a day, to ward off, if possible, the delirium. For these patients, a proper, powerful, night watcher should be provided. The delirium frequently comes on at night, and almost always begins with a mania for wandering about, which will not suffer the patient to remain in bed.

Medicines in general are not required, or at the most only such narcotic remedies as may be used in case of a high degree of excitement in order to quiet the nervous system and so diminish the demands on the strength of the heart.

Personally, I also do not advise inhalations, baths, nor bleeding to

diminish the pain, as they often excite the patient to no purpose. As the simplest remedy against the pain, I apply one or two mustard plasters to the affected side, which may remain until sharp redness is affected.

The period of recovery should not be abridged. Care should be taken that after the crisis the patient should have two or three weeks complete rest, before he returns to his work.

Bronchial Asthma.

By bronchial asthma (to be distinguished from asthma of the heart) we understand a spasm in the smallest branches of the bronchi which occurs in paroxysms, occasioning an extreme want of breath, and great difficulty in respiration. Asthma can occur both in the earliest period of life and amongst adults. It particularly attacks persons who have organs of respiration imperfectly developed in consequence of curvature of the spine, and consequent misplacement of the lungs; or those who have a particular proclivity to it from nervous temperament or hysteria. It frequently develops itself in children when proliferation of the tonsils, or swelling of the manifold mucous surfaces in the nose appear to present a mechanical hindrance to respiration.

The actual paroxysm of asthma (which the patient feels to be approaching, as in the case of epilepsy or whooping-cough) reveals itself principally in a very great difficulty in inhalation and exhalation, accompanied by a whistling sound. The patient, with face painfully contracted and covered with perspiration, sits crouching, and, as in diphtheria, exerts all the respiratory muscles to relieve himself.

The paroxysm is occasioned by an involuntary dilatation of the lungs and a low position of the diaphragm resulting from the bronchial spasm. Its duration is very varied, and can be anything from hours to days; more or fewer moments of freedom from spasms intervening. Particularly in persons of nervous temperament, or suffering from hysteria, it may seem that the asthma has completely passed away, until some emotion (or the recurrence of the menses) brings on a new series of very sharp attacks.

The treatment must aim at removing the cause of the malady, as soon as the latter has been certainly diagnosed. The nose and the pharynx should be examined to discover whether any proliferation exists or swelling of the nasal mucous membrane. After removing these, I have several times cured asthmas of several years standing.

In cases of chlorosis, nervous weakness, and hysteria, an energetic and appropriate cold water cure often has very good results. Change of climate may also affect asthma very favourably—but it is a remedy which, of course, only well-to-do patients can secure.

When the attack occurs, an attempt should be made to shorten it by placing a mustard plaster on the chest, by warm foot baths or by smoking or at least smelling what are called asthma cigarettes, which contain stramonium. There is a danger that out of the dilatation of the lungs (which is present in asthma) what is called emphysema (described in the next section) may ensue.

Of medicines to be taken internally potassium iodide and potassium bromide are the most to be recommended. Both may be taken for a long period without any injury, and have a remarkably good influence upon the duration of the attacks of asthma.

Dilatation of the Lungs. Emphysema.

Chronic dilatation of the lungs is a disorder limited almost entirely to men, and to those of advanced years. This is equivalent to saying that it is almost always the consequence of too great exertions of the lungs, naturally much rarer among women and children than in men. Dilatation of the lungs describes the complaint exactly. It consists in a dilatation of the innumerable minute vesicles in consequence of which the whole region of the lungs affected becomes much enlarged.

I have already mentioned chronic bronchial catarrh as a professional disease which may in the course of time produce a permanent emphysema, and this will explain why so many musicians who play wind instruments, glass blowers, stone masons, preachers, teachers, and persons of other professions suffer from emphysema.

The disease is of a very serious character, and demands from the beginning the greatest attention. I may add at once that it may be modified, but cannot be cured. It must be understood that in consequence of permanent dilatation an atrophy and phthysis of the vesicles of the lungs ensues, and cannot be prevented from affecting their very delicate blood vessels, in consequence of which in the course of time a dilatation of the right side of the heart ensues.

Frequently emphysema must be regarded directly as a sign of senile decrepitude, and we speak therefore of senile emphysema. This is connected with the diminished elasticity of the chest, and the commencement of its ossification. In this case the whole chest assumes somewhat the character of a hollow vessel, and if tapped

returns a sound resembling that of an empty band box or drum.

It cannot be denied that true emphysema does occur also among children. I myself remember treating two boys of the ages of eight and nine for a long period, who showed distinct symptoms of commencing emphysema. Both were asthmatic, rachitic, and had inherited weakly developed chests.

The treatment. What is a patient suffering from emphysema to do, after having learned that a complete cure is impossible? Well, first of all, he should take care that the malady makes as little progress as possible, even if he cannot recover from it. He should avoid every strain of the lungs; should certainly change his profession; and should treat in accordance with the directions already given, the bronchial catarrh which is certain to exist. Fresh air, and gymnastic exercises that strengthen the lungs are to be recommended; also the use, for a considerable time of potassium iodide, in doses prescribed by the medical man.

Congestive Œdema of the Lungs.

Œdema of the lungs occurs only exceptionally, and then generally quite suddenly, as an independent disorder; but is common in the case of patients suffering from weakness of the heart, and disease of the kidneys and lungs, setting in shortly before death. It comes on quickly, and consists in the filling of the vesicles of the lungs with a watery liquid (with a faint blood colour) which renders impossible the entrance of the atmospheric air with its supply of oxygen, and so implies danger of the circulation becoming over-laden with carbonic acid. The watery fluid is an excretion from the blood, which is impeded by the engorgement of the circulation.

The malady makes its presence known by an accelerated, jerky, and stertorous breathing, accomplished only by an effort. The patient generally sits up in bed believing that he will be suffocated if he lies down. A cold clammy perspiration covers the forehead.

Treatment is on account of the nature of the malady generally hopeless, particularly when the attack appears as the precursor of death—which must be occasioned by something. Cool douches and other stimulating remedies, such as strong coffee, and champagne, or even blood letting, would be calculated to produce a subsidence of the symptoms.

Tuberculosis (Consumption).

I shall begin this section devoted to tuberculosis by mentioning

that 15 per cent. of mankind die of tuberculosis. This alarming number is the plainest evidence of the wide distribution of this destructive epidemic, which, in actual fact, neither spares the child in its mother's womb nor ever ceases (in the most various forms) to threaten man from the first day of his life until the last.

It had been long known, from many observations, that tuberculosis is a real infectious disorder, which must be referred to some quite definite irritant. But it was only in 1882 that the celebrated Dr. Koch, by means of microscopic discoveries, demonstrated the fact incontestibly, not only succeeding in always discovering the same microbe in the expectoration of persons suffering from tuberculosis, but also in rearing the germs in what are called pure cultures, and in producing tuberculosis by innoculation.

The tuberculosis bacilli have the form of small narrow rods rounded at the ends. They have no independent motion, flourish best at a temperature of 98° Fahrenheit (37° Centigrade), and propagate themselves by means of sub-division. They have a remarkable power of resisting drought, and can remain for a long time alive outside a living organism; but they perish at a temperature of 212° Fahrenheit (100° Centigrade).—It must not be imagined that tuberculosis is a disease which attacks man alone. Cases of it occur in a great number of warm-blooded animals, for example apes, cats, kine, and many others; and it is more than likely that many persons are infected either from close intimacy with animals suffering from tuberculosis, or through partaking of food containing bacilli, such as the flesh or the milk of an infected cow.

Tuberculosis has the peculiarity of causing a nodulous new growth in the tissues affected by it. From these nodules, or tubercles (little rounded masses), the disease has received its name. They are not permanent, but, in consequence of having no nourishing blood-vessels of their own, sooner or later perish by caseous degeneration. What ensues after that appears to depend upon the capacities of resistence and self-defence of the affected tissue. If we have a case of a perfectly sound organism, this defends itself against the enemy by incapsulating the caseous tubercle and making it innocuous, surrounding it with new close connective tissue, and so shutting it in. If, however, the organism is not perfectly sound, but—whether in consequence of imperfect congenital development, or in consequence of some exhausting malady—has its powers of resistence so weakened that it has not sufficient energy to render the tubercle harmless by incapsulating it, the tubercle degenerates more and more under the influence of the surrounding moisture into a soft purulent mass.

which is carried by the breath further into the lungs, and so attacks new portions.

Tuberculosis is naturally a chronic infectious disorder, that is to say, one that has a long course. It is completely false to call it strictly a disease of the lungs. It is rather a local infectious disease (with new growths and decomposition of these new growths) attacking that part of the body in which the invading bacilli have settled. It may attack the skin, and then we call it lupus. The bacilli may have migrated into the knee-joints, where they produce what is called spongy degeneration; or it may have chosen the lungs as the point of attack, and then produces lung-consumption or phthisis.

But by tuberculosis we generally understand this consumption of the lungs, because the tuberculosis bacillus, assisted by the respiration which draws it in with the air, by far most frequently attacks the lungs.

The course of tuberculosis is almost always slow and lingering. In accordance with this, in a great number of cases it is, at first, almost unaccompanied by fever. Exceptions are presented by far advanced cases, in which the whole body appears to be soaked through and through with the irritants, after which, with accompanying fever, occasioned by the absorption into the blood of the products of the decomposition of the bacilli, the disease ("a galloping consumption") then marches rapidly towards death. Another exception is the happily rare case when an apparently healthy and stout body all of a sudden breaks down under a severe tuberculous infection that appears to have flooded the whole organism, and destroys it in a few weeks. This is acute miliary tuberculosis.

I mentioned that tuberculosis does not spare even the unborn child, and this brings us to the question of the hereditary character of tuberculosis. Two opinions exist on this subject, and it may be difficult to decide either one way or another. There are those who assert that the child of tuberculous parents must be born tuberculous. Others assert that tuberculosis is not transferable from the mother to the unborn child, but that the offspring of such a mother is born with a proclivity to tuberculosis, in consequence of which the child generally becomes tuberculous.

That what is called a tendency to tuberculosis of the lungs—general weakness of the organism, a long flat chest, and thin neck—does have a great deal to do with the development of the disease, has been undoubtedly proved by thousands of cases. I will go a step further, and say boldly that a perfectly sound organism has no need to be particularly anxious about tuberculosis bacilli, and may breathe in

thousands of them without becoming tuberculous. If that were not so, the whole human race would long ago have perished of tuberculosis.

It is not at present certainly ascertained why weakly developed organs of respiration facilitate the installation of tuberculosis bacilli. It has however been discovered that this bacillus loves rest, and for this reason settles upon the apices of the lungs of weakly individuals whose respiratory movements are slight. Here it remains for some time occasioning what is called an apex-catarrh until the malady reveals itself in its true character.

For similar reasons we find tuberculosis occur not only in the lungs but also in the meninges, the middle ear, or other parts of the body after other acute diseases. One hears so often that this or that patient has suffered from a disease which "afterwards turned into consumption." In the strictest sense that is not possible. The patient no doubt suffered first from some feverish disorder, and then was not in a position to defend himself from the attacks of the tuberculosis bacilli, so that he was attacked with a tuberculosis in addition to the previous disorder.

The bacilli appear to be by far most frequently carried by the air. And I have already mentioned that they are not killed by being dried; consequently when a person suffering from tuberculosis spits on the floor (a thing done constantly) the bacilli, as soon as they are dried are swept up by the air, easily to find their way into the bodies of human beings.

After this absolutely necessary explanation of the origin and nature of tuberculosis, we may turn our attention to the most important forms which tuberculosis of different organs assumes.

Tuberculosis of the Lungs (Consumption or Phthisis).

Tuberculosis of the lungs consists essentially in the progressive destruction of the lungs in consequence of a purulent decay of the new growths above described as occasioned by the tuberculosis bacillus. As in this purulent decay the very minute branches of the bronchi perish, instead of a sound tissue holes are formed called lung-cavities. These either constantly assume larger dimensions, and so become united with other similar cavities, or under the influence of good nourishment and proper treatment may heal in the

form of callosities. Tuberculosis of the lungs takes a rapid or a chronic form, according to the degree and progress of the purulent decay.

I proceed to describe briefly the general outward tokens, and the usual course of the malady. It will be understood that attendant circumstances may make both vary a good deal. Tuberculosis of the lungs begins almost invariably with a dry cough. Pains in the chest and side very soon associate themselves with it. The earliest stages of tuberculosis are often also accompanied by a general distaste for labour. The patient is fatigued by the least exertion, and becomes emaciated. All this time neither the patient nor anyone about him has the faintest suspicion that this "cold, accompanied by a cough," has any connection with tuberculosis, or that the phlegm, which becomes more and more abundant, is soaked with fatal bacilli.

If the phlegm is inspected carefully it will be seen that it is somewhat solid and lumpy. It is seldom purely mucous, but generally mixed with morsels of pus; and it may have become entirely purulent before the patient has discovered from any other symptoms by what danger his life is threatened.

But when it presently comes to this pass, that in consequence of the unobserved decay of the tissue of the lungs, a blood-vessel is eaten into, which is immediately followed by hæmorrage from the lungs ("blood-spitting" as it is generally called), the eyes of the patient's friends are generally opened to the truth—and his own hardly ever. For this is really a most remarkable phenomenon of tuberculosis, that the confidence of the consumptive patient, and his hopes of recovery, including plans for change of air and projects for the future, continue frequently right up to the day of his inevitable end.

The hœmorrage may not be abundant, and appears to be directly dependent upon the strength of the vessel which has broken. The blood (unlike that from hœmorrage in the stomach) is bright red and frothy.

Generally the disease declares itself more distinctly after the first hæmorrage of the lungs. One might almost imagine that this alarming and universally understood symptom was necessary to open the eyes before they can rightly appreciate all the numerous others.

There is a general emaciation. This shows itself not only in the narrowing face, but also in the sinking of the hollows above and below the shoulder-bones, and in the prominence of the ribs. And now fever appears in the evenings. At first it is only slightly indicated; but mounts, and compels attention. It has no such critical course as we observed in acute inflammation of the lungs,

but may rise to more or less high grades, in accordance with the degree of the purulent decomposition of the tissues which is going on within.

"Hectic" fever is often observed in cases of tuberculosis of the lungs: that is high temperature in the evening, with a return to a normal temperature in the morning.

Continuous high fever distinctly indicates a severe and rapid course of the complaint. We observe it in a transition from the chronic to the acute form, which, as "a galloping consumption" leads rapidly to death; also from the very commencement in acute miliary tuberculosis —in which countlets masses of bacilli pass suddenly (almost always in consequence of the breaking of a blood-vessel) into the circulation, poison the whole organism, and destroy it, without hope of rescue, in a few weeks.

To mention some other indications which occur during the course of tuberculosis, I may name hoarseness and perspiration at night, which are very seldom absent in pronounced tuberculosis of the lungs. The hoarseness may be occasioned both by tuberculous sympathetic disease of the larynx, and by a chronic catarrh of the same organ, and permanent swelling of the vocal chords in consequence of the perpetual and tormenting cough. With this cough are now expectorated large quantities of phlegm, generally either blood stained and purulent, or merely purulent.

The nightly perspirations occur generally about 4 a.m., and are not rarely so abundant that the patient's night clothes can be wrung out. They naturally occasion excessive exhaustion of the patient, who generally wishes to lie down all day, as his feet are no longer able to support him.

After this the end comes on with giant strides. It is possible for self-denying care and the best diet to preserve life for weeks, even for months, but when the spring arrives, awakening in the ever confident patient longings to be out of doors, death ensues (generally in consequence of some new hæmorrage) with all the symptoms of suffocation produced by hæmorrage.

Whilst this is a brief description of the course of consumption of the lungs, as we may see it unhappily every day, it is of course no exhaustive description. Innumerable variations from the ordinary course present themselves at the beginning, during the course, and also, happily, at the end of the malady, so that it would be possible to dilate at any length on this subject. But my aim is so to acquaint my readers with the causes and spread of tuberculosis that some diminution of this destructive endemic may result both from every

man's doing all he can to protect himself from infection, and from his following, should he contract tuberculosis, the advice which I am now about to give.

Treatment of tuberculosis of the lungs. As soon as Professor Koch had, in the year 1882, discovered the tuberculosis bacillus, and had demonstrated it to be the specific irritant of tuberculosis, diligent study was made of the conditions of life of the bacillus, as, now that the enemy was known, means and medicines might be discovered to render him powerless. And very soon a number of valuable expedients of all sorts were discovered for diminishing the number of deaths from tuberculosis—but not so much in the shape of remedies for those already affected, as in the form of counsels, by following which, it appeared that a check must be placed upon the spread of the bacillus.

And to avoid the attacks of the bacilli—that is to say to avoid tuberculosis—will naturally be the first desire of everyone. But how can that be done, seeing that the bacilli are invisible, and are carried in the air that we breathe?

1. I have said that the bacilli are contained in the expectorations of the tuberculosis patient, so often carelessly spat on the ground, and thence, when dried, carried about by the air.—*All tuberculosis patients should be instructed, whether at home or in factories, never to spit on the floor, but into a vessel filled with a solution of carbolic acid which kills the germs.*

2. The bacilli are destroyed by a temperature of boiling water. *All handkerchiefs and linen of tuberculosis patients should be boiled as soon as possible; this also kills the germs.*

3. The bacilli cannot attack sound lungs. *Work in the open air, the practice of breathing fully, and the hardening of the whole organism should be aimed at, so as to secure sound organs of respiration.*

4. *Delicate constitutions are directly exposed to tuberculosis.* A naturally delicate child should be strengthened as much as possible, by massage, by gymnastic exercises, by strengthening diet, and by everything that tends to give a sound and hardy constitution.

5. The bacilli may exist either in meat or milk. *No meat should be eaten that has not been thoroughly cooked, and milk should be boiled.*

6. Tuberculous parents, if they do not have actually tuberculous children, do have children of delicate constitutions, and with a natural proclivity to tuberculosis, and for this reason *marriages with tuberculosis patients are strongly to be deprecated.*

If tuberculosis appears after marriage, the parents must do all in their power to protect their children. *A mother who is suspected of suffering from tuberculosis should on no account nurse her children at the*

breast. (This has been already mentioned).

We may now proceed to the treatment of the disease itself. It will be most convenient to study this from two points of view. (1) First we must attempt to put a stop to the inflammatory process going on in the lungs, and to arrive at a cure; (2) Secondly we shall turn our attention to the mitigation of the various symptoms.

The splendid service which Professor Koch rendered humanity in the discovery of the tuberculosis bacillus would have been doubled if he had also succeeded in discovering a remedy for tuberculosis. That he had discovered it in tuberculin was for some years believed, and crowds of patients presented themselves at Berlin to be innoculated with this tuberculin. Experience, however, proved that the hopes based upon this remedy had been too sanguine. Tuberculin did, indeed, exercise a remarkable influence upon the affected tissues, and in a number of cases it effected an amelioration; but in others it made matters worse, so that we cannot yet regard tuberculin as an effectual remedy for tuberculosis.

Another remedy frequently used is *creosote.* It has a harsh, stinging taste, and for that reason is taken in capsules mixed with cod's liver oil. I have myself observed that it in many cases does real good; but it must be taken regularly for a long time; thrice a day to produce any result.

Appropriate dieting is of the greatest assistance to any treatment. Tuberculosis is a wasting (consumptive) malady, and for this reason it is necessary to provide from the outset a more than merely sufficient diet, of a light and befitting kind, so as to maintain the strength of the organism. I consider it superfluous to enumerate here a number of dainties, or to state the good they may do consumptive patients, for this simple reason that persons with limited means will hardly be in a position to daily purchase them for an invalid.

But I may mention that in the most renowned German institutions for cure of tuberculosis (Sanatorium Wehrawald, near Todtmoos in the Black Forest, Görbersdorf, Falkenstein), all make a superior diet a principal point of the treatment, in fact, might be said to pursue a fattening cure.

But even where the means are limited an effort should be made to provide a *variety* of diet. The patient's appetite is generally much smaller than could be wished. A little should be given many times a day. This way of dieting has been proved by experience to be best for the patients.

The following diet is recommended for patients suffering from maladies of the lungs:—

I. For well-to-do patients.

7—8 a.m.—Good coffee or tea or cocoa, taken with the best white bread and plenty of butter or honey, until the appetite is thoroughly satisfied. Afterwards half-a-pint or more of milk, to be drunk slowly in very small quantities.

10 a.m.—Milk, half-a-pint to a pint, to be drunk by mouthfuls, with bread and butter. Soup, with eggs and bread and butter, or cold meat and bread and butter, and a glass of wine, as may be desired. If possible afterwards a half-pint or more of milk.

1 p.m.—Beef tea, roast loin, potatoes, and dressing; cold meats; carrots, peas; roast veal; salad, fruit; boiled puddings; fruit; dessert. One or two glasses of wine. Coffee.

4 p.m.—Half-a-pint or more of milk, with biscuits or buttered rolls.

7—7.30 p.m.—Warm or cold meat, mashed potatoes. Rice. Macaroni; good salad and fruit. One or two glasses of wine.

9 p.m.—Half-a-pint or more of milk, with two or three teaspoonfuls of brandy.

II. For less well-to-do patients.

7.30 a.m.—Coffee with milk and bread. Rolls and butter. Afterwards a glass of milk.

10 a.m.—A glass of milk, with bread and butter.

12 noon.—Soup, meat, vegetables. Half-a-bottle of beer.

4 p.m.—Coffee and bread and butter.

7 p.m.—Soup. Warm meat. Salad or cheese with bread and butter. A glass of beer or cup of tea.

9 p.m.—A glass of milk. (In case of night perspirations with a little brandy.)

The subject of *climate* must not be overlooked. Respecting this I shall mention that dusty raw air is simply poison for tuberculous patients. Wherever it is within his reach the patient should seek a moderately warm and sheltered locality. Naturally very few of my readers will be in a position to go to Algiers, Madeira, or San Remo, which, on account of their marvellous climate, may be called a paradise for consumptive patients. But no one who has the means should neglect, at his medical man's advice, to avail himself of the prospect of curing his malady with the assistance of a change of air.

We next come to the remedies which are at our disposal for partially alleviating the painful symptoms of the malady. These symptoms are cough, fever, bleeding from the lungs, pain, and night perspirations.

To alleviate the cough and the pain, we possess in what are called narcotic remedies a number of medicines, which are generally to be given in a certain number of drops. The patient must on no account

be deprived of the assistance which these medicines can afford him. They are directly healing medicines to this extent, that they quiet the larynx, and protect the lungs from repeated violent efforts.

Washing the whole body with cool water does good service in diminishing the evening feverishness and the nightly perspirations; but I advise that the washing should take place in the evening, and that all other water treatment should be avoided as well as gymnastic exercises and massage, which in these cases would be absolutely injurious.

I may add in conclusion a word of advice both to the patient and those about him in the case of the occurrence of a sudden hœmorrage of the lungs. My advice is but one word—quiet. Quiet for the patient, who should lie down, and have a compress as cold as possible placed above the region of the heart; but quiet also for those about him whose inconsiderate excitement and signs of acute distress merely agitate the patient and do him harm. The patient must not speak, nor be moved unless that is absolutely necessary; either can lead to a recommencement of the bleeding. The bleeding is often a symptom of much less gravity than most people suppose.

I have already mentioned that tuberculosis is not a disease of the lungs alone, as many people still seem to suppose. The tuberculosis bacillus can settle itself upon other parts of the body, if it can find a suitable base for its operations. It may either in consequence of a tuberculosis of the lungs which already exists pass by means of the blood to some other portion of the body, and there set up what is called a "secondary tuberculosis"; or it can from the outset, or as we say "primarily" (without affecting the lung) attack some other organ.

By way of preface I may say that the different forms of tuberculosis are either tuberculosis of skin, tuberculosis of the bones, or tuberculosis of the glands; and of the organs affected, the digestive organs, the urinary and generative organs, the larynx, and the meninges (integuments of the brain) will principally claim our attention.

Tuberculosis of the Skin. (Lupus).

Lupus is an extremely protracted form of tuberculosis of the exterior skin; it generally attacks the offspring of either consumptive or extremely weakly parents. Rickets and scrofula (which we shall, in a subsequent section, encounter as tuberculosis in children) seem

Poisonous fungi.

1. Hypholoma fasciculare. 2. Scleroderma vulgare, and section of the same. 3. Red agaric. 4. Agaricus bulbosus. 5. Deadly agaric.

to aggravate the proclivity to lupus, which will be easily understood when we remember that the tuberculosis bacillus requires a suitable base, that is to say an organism already out of health, in order to propagate itself.

Lupus (or tuberculosis of the skin) is most frequently met with in the face, and more particularly either immediately under the nose or on the nose itself. Here the lupus begins with small nodules scarcely of the size of a pin's head. These are generally ranged beside one another in a string, and have a dark brownish red appearance. They soon grow into tubercles about the size of a pea, and then degenerate either purulently involving more or less of the deeper parts of the tissue, or in scales leaving a scar.

Unfortunately the corroding spot exhibits a great tendency to spread constantly further and further. In consequence of this, after a few years we find the form of the disease so altered, that we find an original patch no bigger than a threepenny bit, developed into an ulcer as large as the palm of the hand, with a flat red ground and border of tubercles, which continuously attack yet larger and larger portions of the skin, and render the companionship of his fellow creatures almost impossible for the unhappy patient.

The treatment must first aim at a diet as nourishing as possible, and a hardening of the whole body. The advice already given for the case of tuberculosis of the lungs should be followed.

Whether Koch's tuberculin is more efficacious in cases of tuberculosis of the skin than in cases of internal tuberculosis—which many experiments seem to show—I shall not venture to say, as I have personally had no experience of its effects.

Hitherto the treatment has consisted principally in the destruction of the tubercles, and in drawing sound portions of the skin over the portions of the face affected, after they have been subject to a careful previous preparation. The late Professor Thiersch, of Leipsic, first performed this operation of transference of the skin with great success.

Tuberculosis of the Bones.

Tuberculosis of the bones, which should be more correctly called tuberculosis of the marrow of the bones, arises from an invasion of the tuberculosis bacilli. Here again it is chiefly in the medulla (marrow) of the bones of weakly individuals, or of the offspring of consumptive parents, that the bacilli settle. By degeneration and destruction of the blood-vessels that nourish the bones they affect finally the collapse

of the bones themselves.

Tuberculosis of the bones can attack the most different bones of the human body. The vertebræ and different bones of the arms and legs are those most usually attacked. But whilst it will not be possible here to enumerate all the different cases that are possible, I must not omit to mention that whatsoever part of the body may be attacked this tuberculosis is a disease which can be unusually satisfactorily dealt with if a proper treatment is taken as soon as possible.

Tuberculosis of the bones always has a slow course. It is accompanied by little fever. It is a purely local malady; but it can suddenly change into a general one, and become a tuberculosis that will rapidly lead to death. This happens when the bacilli, in consequence of obtaining some entrance into the circulation, pass from their original locality to attack the whole organism.—New foci of infection are always slowly and gradually forming. These degenerate in turn, and finally break their way through the solid bone. The tuberculous degeneration now (according to the locality of the disease) attacks the neighbouring tissues. For example, if the orginal locality of the tuberculosis of the bone was near a joint (and an elbow-joint or knee-joint is a common locality) a tuberculosis inflammation of the joint ensues. If, however, a sheath of a tendon lies near, we get a tuberculous inflammation of this sheath. In a word, the malady is ever advancing and seeking an exit, until it at last breaks in one or more places through the skin, whereupon what is called a fistula is formed from which the tuberculous pus can be evacuated.

The treatment. Of course, the treatment must be one that deals both specially with the affected part and generally with the malady. A strengthening diet must be provided, and all the other directions followed, which have been already given, for the care and strengthening of an organism attacked by tuberculosis. This is absolutely necessary if a satisfactory result is to be obtained.

Next I must urge imperatively that priceless days are not to be wasted in attempting useless remedies.

Any attentive reader will have observed that I am entirely in sympathy with the simplest and most natural remedies. And in this case the simple natural remedy is—early removal of the bone affected by tuberculous degeneration. This is the only way in which cure can be effected. I have frequently seen cases in which early operations on the bones for tuberculosis healed perfectly; whilst I have seen other cases of patients who after using salves, poultices, painting, and medicines, taken internally for weeks, afterwards succumbed to a general tuberculosis.

Tuberculosis of the Glands. (Scrofula).

Our knowledge of the malady called scrofula has been much enlarged by the discovery of the tuberculosis bacillus, and by the further discovery that this bacillus is found in the swollen lymphatic glands of children of tuberculous parents, and it would certainly be no mistake to regard scrofula as a hereditary form of tuberculosis, or at least a tuberculosis contracted at a very early age. One is compelled to suppose that the case is this—the tuberculosis bacilli or their spores must have got into the child's organism either through heredity or through infection (say from milk of infected cows). From the child's body they should be expelled and destroyed by the lymphatic glands, which might be called the guardians of the body. If this destruction is not always effected, at least the bacilli are caught by the lymphatic glands, and to a certain extent, held prisoners; the glands themselves becoming chronically inflamed and swollen ir consequence of the invasion of the bacilli. What is to ensue now seems to depend entirely upon the development of the organism, that is whether the bacillus is to be made permanently prisoner, or, in consequence of bad nourishment and imperfect development of the organism attacked, shall find it easy to break from its prison and to bring about a general tuberculosis.

After having realised this we shall not be surprised that scrofula and tuberculosis are frequently found amongst the very lowest classes, who find it impossible to give their children the nourishment and attention which the middle and higher classes can bestow upon them. Scrofula in children, however, does not show itself alone in the swelling of lymph glands that can be seen or felt, but also in general concomitant symptoms. Such children are more poorly furnished with blood than others. They have a proclivity to weak and rachitic development of the body, and are frequently attacked by ulcers, catarrhs, and purulations of all kinds, occasioned not only by imperfect nourishment, but distinctly by the poor quality of the blood,

The treatment must aim first at a strengthening diet, and general strengthening of the whole body. This is the only thing that can guarantee that the bacilli imbedded in the lymphatic glands shall not be able to leave their place. Strong country air, if possible sea air and salt water baths are particularly good for such children, who should play about out of doors as much as possible, in order to get the good appetites that will help to strengthen their organs. Of internal remedies the only one I have ever allowed is good cod liver oil, a tea-spoonful to a dessert-spoonful to be taken thrice daily according to the patient's age. But I recommend its discontinuance during the

warm summer months, a period at which this medicine is less suitable.

Lymphatic glands which show a tendency to inflammation are best treated with fomentations of green soft soap; but if it appears that the gland is becoming soft, and is about to break, warm poultices should be placed upon it which assist an almost painless discharge of the pus. The alternative of early removal by the surgeon will be left to the decision of the medical man.

Tuberculosis of the Organs of Digestion.

Tuberculosis of the organs of digestion—that of the pharynx, of the intestine, and of the peritoneum are the most practically important—is in adults almost always of a secondary character; that is to say follow from an already existing tuberculosis of the larynx or of the lungs. It seems by no means impossible that the tuberculosis of the glands of the intestines, often connected with atrophy in sucklings (see page 43), may have arisen directly from the milk of a tuberculous mother or of an infected cow.

Tuberculosis of the pharynx consists at first of a nodulous new growth which quickly degenerates, either in the form of a crater or with wide ulcerous surfaces, with a yellowish grey coating. It develops itself either on the soft palate, on the uvula, or on the posterer wall of the pharynx, and at the same time generally occasions painful difficulties in swallowing, caused by the inflamed swelling of the neighbouring parts. It has almost always a slow course, but is occasionally acute, and then affects the deeper tissues as well as the mucous membrane of the mouth, which generally wastes in consequence of ulceration,

Whether the case is one of tuberculosis or of some other disorder should be settled as soon as possible. That can be best done by the microscope. The treatment is so like that of tuberculosis of the larynx that I may refer the reader to the latter.

Tuberculosis of the intestines in adults is almost without exception found as a complication during the course of tuberculosis of the lungs. It reveals itself by the appearance of a painful diarrhœa. It affects both the small intestine and the large, and seems at first to attack the solitary mucous glands (follicles), which we observed when studying the organs of digestion. The same form of disease repeats itself also in this case. First of all the invading bacillus stimulates the intestine to the formation of nodulous new growths. These, however, perish,

because they have no blood-vessels, and then gradually commences the continuously progressive process of tuberculous ulceration of the intestines. This proceeds generally in rings throughout the whole wall of the intestine, and occasions more or less extended disturbances. The treatment is a combination of that of chronic catarrh of the intestine, and of the general principles of the treatment of tuberculosis.

Tuberculosis of the peritoneum is, particularly in its chronic form, a much more common malady, particularly among women, than is generally supposed.

When the tuberculosis bacillus has once laid hold on the body it has so many possibilities and ways of reaching the peritoneum, that it would be wonderful indeed if amongst its so numerous migrations out of the lungs into other parts of the organism, it did not sometimes also take this way.

It is after tuberculosis of the intestines that the bacillus most frequently and most easily gets into the neighbouring peritoneum. But it can (after a tuberculous inflammation of the pleura) pass to the peritoneum through the diaphragm, or may get into the abdomen by the way of the lymph ducts. It often also migrates from a tuberculous womb through the Fallopian tubes to reach the peritoneum.

If we are dealing with an already advanced case of general tuberculosis, the affection of the peritoneum may frequently produce death in a few days—this will be an acute form of a secondary tuberculosis of the peritoneum. But the disease generally takes a slow course with the form of chronic inflammation of the peritoneum, of which both the symptoms and the treatment have been elsewhere described.

Tuberculous Diseases of the Urinary Organs and of the Organs of Reproduction.

It is disputed whether tuberculosis of the urinary and sexual organs, which is fairly frequent, arises in the majority of cases from a previously existing general tuberculosis, or from an invasion by the bacillus of the urinary passages. There is no doubt that the disease in some cases arises in the latter way.

In males the malady generally takes the form of a local tuberculosis of the kidneys, the prostate gland, or the testicles. In women the tuberculous degeneration generally attacks the ovaries and the womb.

The general symptoms are as follows:—Tuberculosis of the kidneys appears at first in the form of a simple inflammation, and it is the fever (generally high), the continual purulent sediment of the urine,

and the perpetual considerable pain that generally first lead to a suspicion of tuberculosis. The microscope can always give a decisive reply. Tuberculosis of the testicles is externally perceptible by a rigid swelling. Tuberculosis of the prostate gland, and of the ovaries, can only be concluded probably from the character of the malady; it almost always causes death in the course of a few months, with a general excessive emaciation and complete collapse, defying all treatment.

Tuberculous Inflammation of the Meninges.

It cannot be said why tuberculous inflammation of the meninges should be by far commonest in childhood. But it may be asserted with certainty that we have always (even in the rare cases that occur among adults) to deal with a migration into the meninges of bacilli from other degenerated tissues; for it is scarcely possible to suggest any other way by which the bacilli could succeed in reaching the meninges.

We may conclude from the symptoms of irritation (which will be presently mentioned), and from the invariable evidence of dissection after death, that the disease almost always affects the meninges on the lower surface, which is called the base of the brain. The disease consists in the new growths of a number of tubercles and of their subsequent purulent decay, as well as in an issue of fluid matter from the inflamed meninges, sometimes clear, sometimes lightly blood stained, and in the severest cases also purulent.

To speak here first of all of the more frequent form of tuberculous inflammation of the meninges in childhood, I may remark to begin with, that it generally attacks ill fed, anæmic, rachitic, and scrofulous children, whose proclivity to tuberculosis can, as we say, be seen in their faces. But it does claim also as its victims apparently healthy and blooming children; for unfortunately there seems to be no possibility of rescue from this malady, which will be seen to be only too natural when we reflect upon the locality which it attacks.

That measles, scarlet fever, diphtheria, whooping-cough, typhoid, in a word all infectious diseases can facilitate the occurrence of a tuberculous inflammation of the meninges is no wonder. We have seen again and again that the tuberculosis bacilli have far greater opportunities of attacking any organism that has been weakened by disease. In consequence of this we find that often after recovery from one of the maladies above mentioned, the little patient makes no

proper progress with his convalescence. He has no appetite, and crouches languidly here and there without being himself able to say what is the matter with him. This unsatisfactory state of things, which may be taken for sulkiness on the child's part, continues for about fourteen days; then headaches, pains in the limbs, often also in the abdomen, and violent vomiting show the parents that the child is ill. Very soon there can be no longer any doubt that the malady is a severe one. The fever is high, but it is very variable. The respiration is sometimes quick, sometimes remarkably slow. The child presses his head back deeply into his neck, and simultaneously raises his whole body, so that he seems to be supported only by the back of his head and his heels. He gnashes loudly with his teeth, and gives loud, piercing screams of pain, without knowing anything about what he is doing, whilst his eyes are generally turned in different directions. He throws himself about restlessly; the teeth are generally tightly locked together so that to give any nourishment is impossible. The abdomen appears deeply sunken, and convulsions shake the whole body one after another. The temperature continues to rise; the pulse, which a few days before was low is doubled and more than doubled, and with all the appearances of complete exhaustion the heart at last ceases to beat.

The treatment. As no one at first suspects how grave a malady is lurking behind the fretful and peevish humour of the child (which we might compare with the preliminary stage which we have observed in other maladies of children), the treatment generally begins when the vomiting appears that always introduces the period of the symptoms of irritation. Though we are not able to cure the malady, we can considerably alleviate the sufferings of the unfortunate child, and effect, to begin with, cooling of the brain. This should be done with a cooling pipe, as represented in plate XIII, from which the mode of proceeding will be immediately understood. Those who cannot afford the expense of this instrument should use cold compresses cooled with ice, which must be frequently renewed. Narcotic remedies, often indispensable, are to be recommended in cases of great restlessness, particularly when the convulsions are continuous. For drink, milk should be given with Valerian tea, which acts soothingly upon the nervous system.

Tuberculosis of the Larynx.

Undoubtedly the vast majority of cases of tuberculosis of the

larynx represent secondary disorders of this organ in consequence of tuberculosis of the lungs. That will be easily understood if we reflect how day after day the expectoration (charged with bacilli) from the lungs passes through the larynx inflamed in consequence of the constant coughing.

The principal symptom of this malady is hoarseness, which, in proportion to the degree in which the vocal cords are affected, may be either slight, or so excessive that the patient is permanently voiceless, and can speak only in a whisper. A torturing cough which often gives the patient no rest either day or night, almost always accompanies the malady.

But as tuberculosis of the larynx seems sometimes to occur also primarily, that is to say independently of any tuberculosis of the lungs, it is highly advisable in cases of long catarrh of the larynx, and particularly if it is accompanied by hoarseness, to make an examination of the organ with a laryngoscope, or to have the expectoration examined with a microscope, so as to make certain of the nature of the malady; because it is always better to know the truth, howsoever serious it may sound than to make the mistake of taking tuberculosis for a mere catarrh, and so to lose precious time.

The treatment of tuberculosis of the larynx is partly general and partly local; the general treatment of tuberculosis has been already sufficiently described. Respecting the application of local remedies I shall say a few words, but it must be understood that these, to a great extent, require a specialist's assistance.

To begin with the tormenting cough, no hesitation must be felt about mitigating it with narcotic remedies or by inhalation of balsam of Peru. Patients are also very fond of taking small pieces of ice in their mouths which relieve their throats, and seem to make it easier for them to swallow.

I shall not attempt to say what value the medicinal remedies have which are painted upon the ulcerous parts of the larynx, or blown upon them by instruments specially constructed for that purpose. Iodoform, menthol, and boric acid are used, and I have myself been assured by patients that they have been thoroughly contented with the results. But I cannot help reflecting that if these remedies were really capable of curing a true tuberculous ulcer in the larynx, they ought also to afford us assistance in the case of tuberculosis of the skin, or even in the case of an open tuberculosis of the bones; and so long as they do not do this, I must abide by the opinion which I have already expressed that we know of no medical remedy for tuberculosis.—That very small ulcers may cicatrize and

heal I am quite ready to believe. There are persons whose lungs have been affected by tuberculosis who go about their work with old tuberculous cavities in their lungs. But in these cases we have instances of men of a powerful physical constitution, who also, from the very first day when they were warned of their danger, did everything in their power to keep up their forces and to strengthen them, so that I must once more in conclusion advise parents to attach the greatest importance to the climatic and dietetic treatment of tuberculosis.

Pleurisy.

The pleura envelops the lungs (as if in a bag) in a thin glossy double integument the outer part of which partly adheres also to the chest and lines it. The various disorders of the pleura form no small part of the inflammatory maladies of the organs of respiration.

We distinguish between primary and secondary inflammations of the pleura. By primary inflammations we mean those which apparently arise independently of an affection of any other organ. These are certainly rare. Secondary inflammations are those which arise in consequence of some other malady, through which the pleura becomes affected.

Whether this division will prove in the end to be a sound one, or whether it will turn out that pleurisy or inflammation of the pleura is really always of a secondary character we need not discuss here. It is certain that the secondary inflammations are those with which we are most familiar: as, for instance, there can be no case of acute inflammation of the lungs, or of advanced tuberculosis of the lungs without the pleura becoming sympathetically affected.

In order to gain a clear idea of what is meant by pleurisy, we must understand that this consists at the beginning merely of a congestion and a disturbance of the ordinarily smooth pleura, which appears covered with a thin coat of fibrinous clots. This covering, which has some resemblance to a diphtherial skin, is at first greyish-white, but soon becomes yellowish, and thickens itself into a firm deposit. If the process stops here, we have briefly described a case of dry or fibrinous pleurisy. This generally takes a protracted course, and in space of time always leads to adhesions between the pleura and the thoracic lining.

But in the majority of cases, and particularly when the inflammation of the pleura occurs as a complication of acute inflammation of the

lungs, scarlet fever, influenza, *etc.*, that is to say, when the infectious irritants that have occasioned the malady have reached the pleural cavity, there occurs, in addition to the symptoms already described, also an inflammatory excretion of fluid out of the small blood-vessels of the pleura. This excretion is often very considerable, and of the gravest importance on account of the symptoms of pressure that ensue.

This excretion of fluid is not to be confounded with hydrothorax, of which I shall speak in the next section. The fluid is at first as clear as water, but it may be clouded by fibrous flakes, or (if purulent germs are acting) may be very purulent. In certain cases also (for example, if connected with tuberculosis or blood-poisoning) it can assume a bloody or sanious character.

Pleurisy is not a disease that has a critical course. Even in the progress of the fever great irregularities are observed, dependent upon the species of the bacilli that cause the malady. Its issue depends particularly upon the further consequences of the inflammatory exudation. This may be slowly absorbed, but it may also break through into the cavities of the body, or externally. In any case, this kind of pleurisy is a serious and dangerous malady, and I shall not attempt to conceal the fact that it is often the precursor of a lingering tuberculosis.

Next, to describe briefly the course and the most important symptoms of pleurisy: we may observe sometimes a sudden and sometimes a gradual commencement of the malady. Most frequently it begins with headache, general listlessness, distaste for exertion, and a complete loss of appetite. These pass gradually into the more definite symptoms of the disease, of which the principal one is a painful stabbing in the side on every occasion of coughing or sneezing, and even of swallowing. The pain indicates distinctly the locality of the mischief.

In the case of a dry inflammation it is interesting to place the ear against the affected side of the patient. A distinct murmuring, rubbing, and scratching will be heard. This arises from the integument of the lungs, which has become overlaid with a fur, rubbing against the integument of the chest with every movement of respiration. In health the two smooth surfaces glide over each other noiselessly.

But if the liquid above mentioned is gathered between the two surfaces of the pleura, the rubbing sound is not heard. But the patient's breath is somewhat short. This is occasioned by the pressure of the fluid upon the lungs, a pressure that becomes more and more obstructive as the quantity of liquid increases.

When we reflect that the quantity of fluid can amount to four quarts and more, we easily understand that the half of the lungs on the affected side may be forced out of its place. In autopsies cases have been observed in which the lung appeared reduced by strong pressure of the liquid matter into a thin lappet completely devoid of air. But not the lungs alone, but other organs can be pressed out of their places. For example, in a case of pleurisy on the left side the heart may be pushed an inch or more to the right; whilst a pleurisy of the right side may thrust the liver down so far that it can be felt near the navel.

I shall not, however, go farther into these pathological symptoms which, as indications of the exact state of the case, are interesting only to medical men, and might be expanded by the addition of many other interesting details; but merely remark that an excessive dislodgement of the heart and a high degree of pressure upon the lungs may represent direct danger of death, and demand immediate measures. —I have already observed that the course of the fever is so irregular that nothing can be concluded from it. The temperature will remain for weeks at about 103° Fahrenheit (39·5° Centigrade), and commence to fall slowly but steadily only when the fluid matter is absorbed, or removed by an operation.

In all cases of excretion of liquid in the pleura the urine is markedly diminished in quantity. It should be daily measured, and a gradual increase in its quantity may be regarded as a favourable symptom of the absorption of the excreted liquid.

Matters continue in this condition often for many weeks without any substantial difference, until, in cases that terminate favourably, a slow improvement and gradual cure set in. The cough, the pain in the side, the fever, the loss of appetite, and the shortness of breath give way day by day; and in proportion as the re-absorption of the collected liquid is more rapid and more thorough, and as the lung on the affected side becomes able to breathe more freely so the more rapid is the recovery.

The treatment. Treatment of pleurisy may be called a grateful and hopeful enterprise. We have a whole number of really effectual remedies that are calculated to assist the cure of the patient. So much the sadder is it that we frequently see, at the conclusion of a pleurisy which has progressed favourably, the slow development of tuberculosis of the lungs. But I feel it my duty to mention this fact, in order that patients suffering from pleurisy may pay redoubled attention to the general care of their strength, and to their organs of respiration.

Water treatment does excellent service in cases of dry pleurisy. The patient should at once go to bed (which, strange to say, many men can hardly make up their minds to do), and put a hot compress around the whole chest. Care should be taken that it should come right up to the shoulders, even the arms being enclosed. The compress must be renewed every two hours during the day, but may remain on all night, enclosed in a waterproof covering to prevent evaporation. The diet should not be stimulating, but nourishing. No more drink (weak tea is the best) should be taken than is absolutely required to quench thirst.

Also in the case of pleurisy with the excretion of liquid matter, the whole chest should be similarly enveloped from the outset. But the poultices are best left on from three to four hours. Simultaneously the kidneys should be stimulated by one of the diuretic teas—of which a number will be found in the appendix. In this case also the diet (with the exception of this tea) should be as dry as possible; as this is the most likely way to prevent the excretion of liquid matter from becoming excessive.

If the fever is high, and its character compels the conviction that pus exists in the pleural cavity, or if the symptoms of pressure produced by the liquid matter increase to such a degree that difficulty in breathing results, the question whether tapping will prove eventually necessary should not be postponed. Of course the liquid matter *can* be absorbed even when it is purulent. But it is also possible that on account of the pressure an *immediate unburdening* of the pleural cavity may be necessary on account of peril of death; and in this case the tapping cannot be too soon performed. I must add that the operation sounds by far more formidable than it really is. Anyone who sees how well the patient feels even after having struggled with the most terrible want of breath, when perhaps as much as a quart of white pus has been removed, will be equally astonished or delighted.

To relieve the pain in the side, which is often most acute in the first days of the malady, I have used, with the best results, large American horse-radish plasters (called Benson plasters). It is best to use two pieces, so that the whole side is covered.

A little brandy must be given daily to patients accustomed to the regular use of alcoholic drinks, as such patients are liable to attacks of weakness of the heart and faintness, particularly when the inflammatory excretion is of a purulent character. In conclusion, care should be taken during the absorption of the collected liquid matter (which can be best observed by the subsidence of the

symptoms of the malady, and by the increasing quantity of urine) not to break off the period of convalescence too abruptly, because the future of the patient, to a great extent, depends upon an undisturbed absorption being as perfect as possible. It must not be forgotten that for the future the patient is a person liable to consumption, and that he should do everything in his power to secure himself against the tuberculosis bacillus, about which all necessary hints have been already given:

Hydrothorax.
(Dropsy of the Chest.)

In contradistinction to the above mentioned inflammatory excretion of liquid into the pleural cavity in pleurisy, there occurs in different diseases a non-inflammatory collection of liquid in the same locality. In these cases we have almost always a phenomenon of engorgement in the circulation, producing a consequent enlargement of the lungs, or chronic pains of the heart and kidneys. This "water on the chest," as it is commonly called, is two sided, and has nothing to do with a malady of the pleura. It generally appears in common with a similar ascites (dropsy of the abdomen), and must be treated in accordance with the rules which we shall give in the subsequent chapter, dealing with diseases of the heart and kidneys.

CHAPTER IX.

The Organs of Circulation.

Structure and Functions of the Organs of Circulation.

The organs of circulation are the heart and the vasicular system (arteries, veins, and capillaries), with which the system of lymphatic vessels is loosely united.

The bright red blood, rich in oxygen, which may be compared to a living stream, hastens without rest, and with the greatest regularity, from the left side of the heart through the arteries, which become constantly smaller and narrower, to carry nutritive matter to the remotest parts of the body. The blood passes through the capillaries into the veins, and now returns, dark red and loaded with carbonic acid, back to the right side of the heart. This sends the blood, in need of freshening, into the lungs, where it is simultaneously renovated and chemically purified, and whence it hurries back to the left side of the heart again to begin the same course which, from the first moment of our life until the last is an indispensable condition of our existence.

The course which the blood takes on its way from the left to the right side of the heart is called the greater or systemic circulation. Its course of purification, which it takes on its way from the right side of heart to the left is called the lesser or pulmonic circulation.

The blood is a fluid of a uniform red colour: opaque even in small quantities, of a faintly salt sweetishly insipid taste. It consists of liquid and solid portions, but these seem so closely combined that the component parts of the blood can be perceived only when powerfully magnified in a microscope. Its composition varies slightly according to age, sex, and physical development: but in accordance with an ancient dictum, the weight of the blood in a human body may be correctly reckoned as one-thirteenth part of the weight of the whole body. Thus, for example, a woman weighing 130 pounds would have altogether 10 pounds of blood.

The solid elements of the blood are represented by two kinds of what are called blood-corpuscules, the red and the white. The red corpuscules are by far the more numerous, and are reckoned at not

less than 40 millions. These are very small disc-like plates, whose opposite surfaces are not flat, but slightly hollowed on both sides in the middle. These are by nature cellular bodies containing albumen, without a nucleus, and contain in themselves hœmoglobin rich in oxygen, and hœmatin which contains iron.

The white blood corpuscules or leucocites are by no means so numerous as the red corpuscules, but they are larger. In healthy blood it is reckoned that there are about 700 red corpuscules for every white one. During digestion, and in certain maladies, for instance anæmia, the number of white corpuscules is distinctly increased, so that one white corpuscule is found for every red one, or even for fewer. The leucocites have a very variable form and vivacious movements. The latter can be very clearly seen under the microscope if the swimming membrane of a frog is placed under the glass. The white corpuscules are cell-bodies possessing a nucleus, and appear to be simply younger forms of the red corpuscules, that are brought into the blood from the marrow of the bones, out of the spleen, and out of the lymphatic vessels. In time they lose their nucleus and take a red colour. On account of the quantity of fat which they contain, they are lighter than the red corpuscles.

The liquid part of the blood or the plasma of the blood is a watery solution of albuminous substances (fibrin and albumen), and contains also fat, sugar, salts and various gases, of which the oxygen and carbonic acid are the most important.

When the blood leaves the vessels, and emerging, comes into contact with the atmosphere, it coagulates in about five minutes into a soft jelly-like mass, which after a few hours becomes constantly more solid and gives off a fluid. This pale yellow fluid is the serum of the blood. The hard, coagulated, dark red substance is called the blood clot; it consists of the blood corpuscules and the coagulated albuminous substances of the blood plasma. If the coagulation takes place slowly the heavy red corpuscules sink to the bottom, whilst the lighter leucocites form a pale coagulation on the surface of the clot.

The lymph is a watery, yellowish red fluid of slightly salt taste, which, like the blood consists of lymph plasma and lymph corpuscules. Lymph plasma is compounded like blood plasma, so that comparing the two one might say lymph is blood without red corpuscules. Lymph also has the capacity of coagulating, but it coagulates more slowly than blood, and the clot appears to consist solely of the above mentioned coagulum.

The chyle is a particular kind of lymph which is formed in the lymph vessels of the mucous membrane of the intestine during

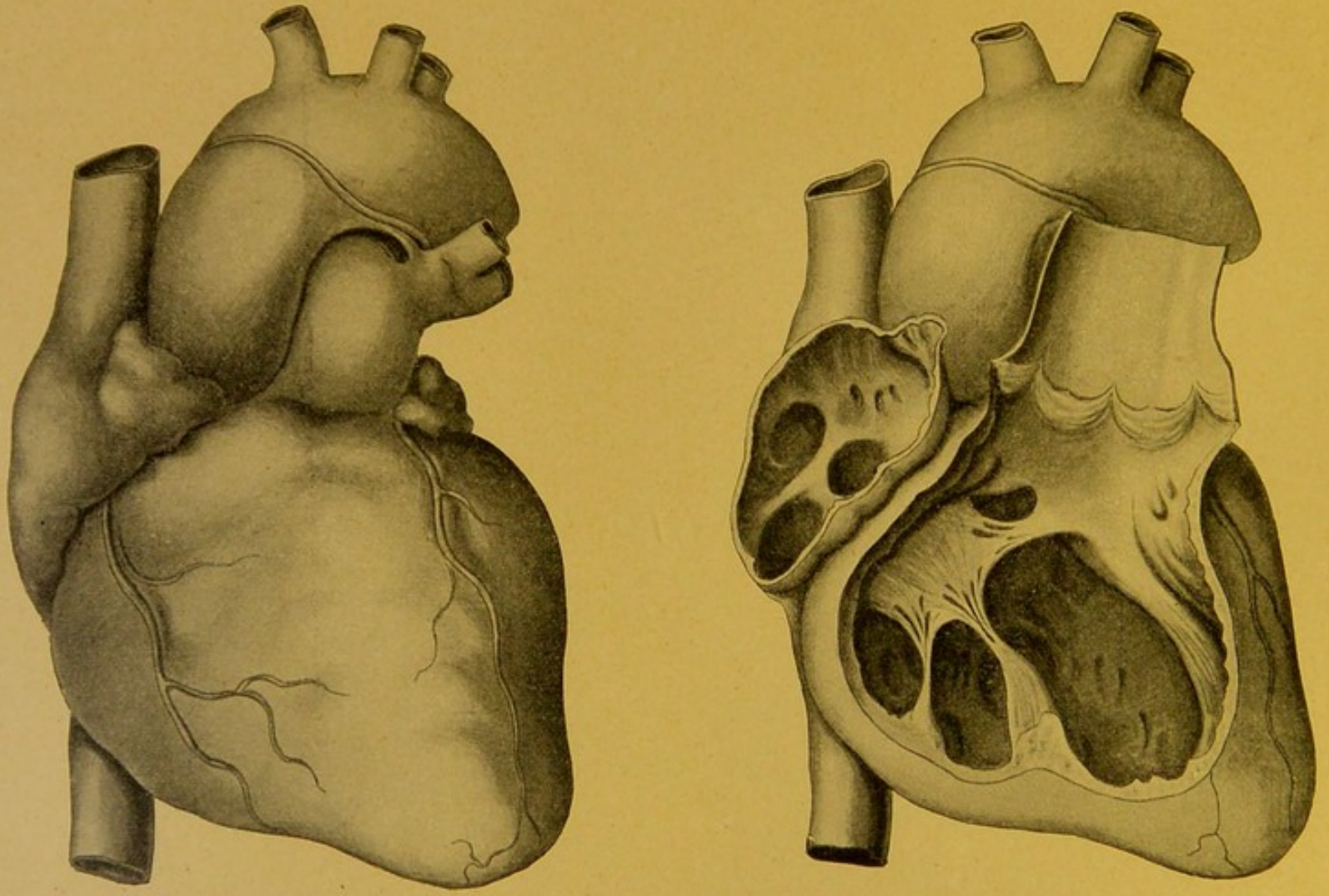
digestion, and is of great importance for the nourishment and renovation of the blood. Chyle is an opaque milk-white fluid, compounded in exactly the same manner as lymph, with this exception that it contains a considerably greater quantity of fat, which makes it appear to a certain extent as an extract of lymph.

The heart is the central force station of the whole vascular system. It lies behind the breast bone between the right and left lungs, and is enclosed in a fibrous bag called the pericardium. Its form is that of a hollow muscular inverted cone. We distinguish the upper base of the cone and the lower point. It is about the size of a man's fist. To describe the position of the heart more exactly, I may say that the upper base lies behind the breast bone about the height of the sixth dosal vertebra. The point is behind the front end of the sixth and seventh ribs. From this it will be seen that the heart does not stand vertically, but a little slanted. A small part of the front surface of the heart lies against the front wall of the chest, and can be medically examined in consequence of its beating.

On the front surface a plainly visible longitudinal furrow divides the whole heart into right and left halves. This furrow corresponds to a musuclar dividing wall, which passes through the whole heart, and separates the interior of the hollow muscle into two completely separate parts. Each of these halves of the heart are again divided by cross furrows on the outside, corresponding to interior walls that separate upper and lower parts, connected with each other by openings. We see that the heart thus contains four cavities; of these, the upper ones are called auricles, and the lower ones ventricles. The ventricles of the heart are more fleshy, and have thicker walls (see plate III).

If we study the interior of a heart that has been opened so as to afford a view of the structure of the ventricles and auricles, we find that the inner surfaces are not smooth but crossed by many independent muscular bands, of which some, without any certain arrangement, penetrate into the cavities, and some cross from one wall to the other. In the ventricles these muscles are called columnæ carneæ. In the auricles, in which they run more parallel with one another, they are called, on account of their likeness to the teeth of a comb, pectinated muscles.

On both sides the great veins open into the auricles; namely, the upper and lower vena cava into the right auricle, and the four pulmonary veins into the left auricle. On the contrary the great arteries issue from the ventricles, the pulmonary artery from the right, and the aorta from the left ventricle.



ANTERIOR OF THE HEART AND THE GREAT VESSELS.

I. The right side of the Heart Unopened (from Heitzmann). II. The right side of the Heart Opened (from Heitzmann).

In order to prevent a back current of the blood (which always flows in the same direction) valves are placed both on the right and the left sides between the ventricles and auricles, and at the points of discharge of the chambers. These valves open and shut regularly, working something like the valves of a pump. The valve between the right ventricle and auricle is three pointed; that between the left ventricle and auricle two pointed. Both are so placed that their wide bases are against the walls of the heart, and their free points protrude into the ventricles. In similar fashion triple valves exist on either side at the points of egress of the arteries. These on account of their shape are called semi-lunar valves. Their functions will be presently explained.

The whole heart is provided, both externally and internally, with a coating. The inner coating (by folds of which the valves above described are formed) is a delicate membrane, consisting of elastic fibres, which invests the whole interior of the heart, including the columnæ carneæ and the pectinated muscles. The outer covering, which is closely attached to the surface of the heart, represents nothing more than an inner continuation of the pericardium wrapped round the heart. The pericardium lies between the two layers of the pleura, to which it is partly attached.

The *arteries* and *veins*, through which (with the exception of the pulmonary artery) the bright red blood flows from the left side of the heart, are elastic vascular organs, having an integument, consisting of three strata. The innermost of these is a direct continuation of the interior covering of the heart, already mentioned. The middle stratum is that which, by its abundance of muscular fibres and elastic tissues, gives the walls of the vessel their strength and expansibility. The outer stratum, of little importance, consists of connective tissue only.

The further the arteries proceed from the heart, and the less pressure they consequently have to bear, the smaller is their transverse section. The walls of the vessels also become more delicate, and that principally in consequence of the gradual disappearance of the innermost stratum of their integument, which becomes constantly thinner and thinner, until in the capillaries it seems to have entirely disappeared.

The general principle of the course and ramification of the arteries is this, the diameter of an artery remains *unaltered* throughout its course until a branch starts from it, and the sum of the diameters of all the branches is *greater* than the diameter of the original artery.

The principal arteries run, as far as possible, in long direct courses. The minor arteries branch from them at varying angles, and run

partly directly, partly meandering, partly spirally. So far as possible, the arteries take the side of the limbs which bend inwards; also, so far as possible, run in the interior near the protecting bones.

We may now turn our attention to the courses and ramifications of the principal arteries, so as to observe their different provinces. We have already seen that the great arteries proceed from the ventricles—the pulmonary artery from the right, and the aorta from the left.

It is important here to guard against a possible misconception which the reader may have formed after reading that the arteries carry only good blood (that is to say bright red blood, rich in oxygen), in accordance with which he would be quite right in assuming this, also, of the pulmonary artery. But we must here remember that it was said at the beginning of our remarks on the circulation that the blood returns dark red, and loaded with carbonic acid, to the right side of the heart, from whence we shall see that the pulmonary artery carries used up or venous blood into the lesser or pulmonic circulation, which returns bright red and purified through the four pulmonary veins into the left auricle. To avoid error we may say most simply *the right side of the heart deals only with venous blood, loaded with carbonic acid; and the left, on the contrary, only with arterial blood, loaded with oxygen.*

The aorta, the largest of all the arteries, is the head of the whole arterial system. It is of the thickness of a thumb, and starts from the left ventricle, rising at first upwards and towards the right. It next curves in a bow, or backwards, over the left bronchus, and then proceeds, as the descending aorta, on the left side of the vertical column, to the diaphragm. It passes through this to enter the abdominal cavity, in which, at the height of the fourth lumbar vertebra, it branches into the right and left common iliac arteries.

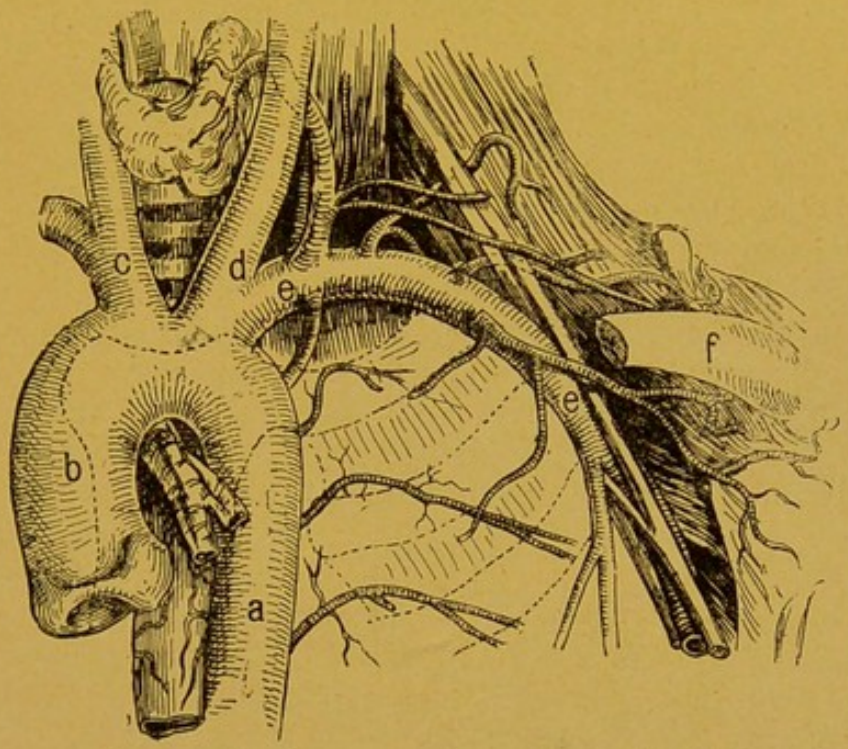
Out of the arch of the aorta, above mentioned, spring (apart from smaller branches for the nourishment of the heart itself, called coronary arteries) three great vessels, namely—

1. The innominate branch, which, after a very short course, divides into the right carotid artery, and the right subclavian artery.
2. The left carotid artery.
3. The left subclavian artery.

These vessels (the carotid arteries and the subclavian arteries) serve principally the head and the upper limbs. The descending aorta and its branches serve the abdomen and lower limbs.

We now follow the course of a carotid artery. It passes upwards close to the trachæa and larynx, and here its pulsation can be distinctly felt if a finger be laid upon it. At the height of the larynx it divides into two equal branches, distinguished as the external and internal carotid.

The external carotid serves the soft portions of the head, with the exception of the brain, the eyes, and the forehead. It passes near the surface on the side of the neck, reaches the head, and divides behind the joint of the lower jaw, into the temporal artery and the maxillary



A. Descending branch of aorta. B. Ascending aorta. C. Innominate branch. D. Left carotid artery. E. Left subclavian artery. F. Clavicle.

artery. At this part of its course it gives off a number of vessels, some of them important, by which it supplies the thyroid glands, the oral cavity, the muscles of the face, the pharynx, the ear, and the back of the head. The superficial temporal artery, which branches from it, supplies, partly independently, and partly by means of branches, the scalp, the skin of the temples, the forehead, and a part of the masticating and cheek muscles. The interior maxillary artery supplies, by means of many branches, the upper jaw, the lower jaw, the soft palate, the tonsils, and many neighbouring soft parts of the head (see plate IV).

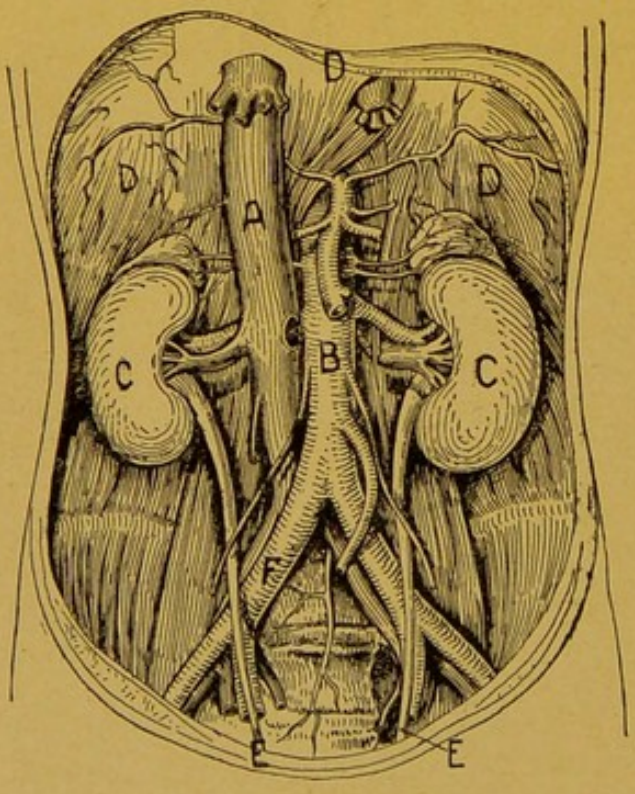
The internal carotid lies at first outside the exterior carotid, but then proceeds with a turn into the interior, and, winding slightly, proceeds upwards to supply principally the brain, and by a particular branch the eye and its hollow, and the forehead.

The subclavian artery proceeds with a convex arch over the first rib to the upper arm, to supply with many branches the whole of this

member including the hand and fingers. It gives off, before reaching the upper arm, five branches.

1. *The vertebral artery*, which proceeds upwards through the orifices in the transverse process of the cervical vertebra, enters the cranial cavity, and unites itself with the corresponding artery of the other side, principally to supply the base of the brain with blood.
2. *The internal mamillary artery*, which runs towards the posterior surface of the front wall of the chest.
3. *The thyroid artery.*
4. *The superior intercostal artery.*
5. *The transverse cervical artery.*

The cervical artery, having by these branches supplied the muscles of the neck and chest, passes under the clavicle into the shoulder, giving on its way six important branches which supply partly the breast, and partly the muscles of the shoulders. It then becomes an upper arm artery running downwards between the biceps and triceps towards the elbow. Here it divides into the radial artery and the ulnar artery. The radial artery runs on the thumb side of the lower arm, and on account of its superficial situation can be plainly felt a little above the ball of the thumb as what is called the pulse. For this reason, this locality is in general use for feeling the strength and activity of the heart, which can be judged from the character of its pulsation.



The abdominal aorta.

a, the lower great vena cava; b, the abdominal aorta; c, the kidneys; d, the diaphragm; e, the ureters; f, iliac artery.

Both arteries of the lower arm enter the hand, and break up into superficial and deep branches. From the union of these arise what are called the palmar arches, from whence again small branches supply both the hand itself and the fingers.

We will now return to the aorta, of which we have thus far examined only the arch of the aorta and the

blood vessels springing from it which supply the upper portion of the body. But we have mentioned that the descending aorta passes through the diaphragm. On its way, before reaching the diaphragm, it sends off several branches to the œsophagus, and also to the bronchi. Its most important branches in this region are the intercostal arteries. These dividing into small branches supply the muscles of the back, those of the breast, and the intercostal muscles—in women also the glands of the breasts.

The descending aorta of the abdomen also sends out a number of branches, partly single and partly in couples. The former start from the anterior side of the aorta, and supply the organs of digestion with blood. The branches that are in pairs start from the sides of the aorta, and supply partly the walls of the abdomen and partly the uninary and sexual organs.

The single arteries branching from the abdominal aorta are—

1. *The short abdominal artery*, or cœliac axis, which sends out branches into the stomach, and two other branches into the liver and spleen.

2. *The superior mesenteric artery*, which supplies by various branches the duodenum, the pancreas, the mesentery, and the large intestine.

3. *The inferior mesenteric artery*, which sends branches to the colon and to the rectum.

The pairs of branches of the abdominal aorta are—

1. *The renal arteries*, which enter in two short powerful arteries into the kidneys.

2. *The spermatic arteries*, which in men lead by the inguinal canal to the testicles, and in women, run through the broad uterine ligaments to furnish blood to the ovaries.

3. *The lumbar arteries*, which run in four pairs like the intercostal arteries, and supply the anterior wall of the abdomen with the anterior branches, and, with the posterior, the spinal cord, and its integuments.

The descending aorta now divides at the height of the fourth lumbar vertebra, like a fork, into the two common iliac arteries. Between them runs the solitary sacral artery, going downwards on the front side of the sacral bone as a continuation of the aorta. The iliac arteries run, without giving off any important branches, downwards from the side of the fifth lumbar vertebra, and separate exactly at the point of juncture of the lumbar vertebræ column and the sacrum into two branches. One of these, as the external iliac, becoming a little further on the femoral artery, supplies the lower limbs; the other, as internal iliac artery, supplies the organs of the pelvis.

The internal iliac artery is a short but fairly large vessel, which passes from the point of juncture of the sacrum with the ilium into the small

pelvis. It has a number of important branches, which supply more particularly the viscera of the pelvis, the haunches, and the sexual organs.

The external iliac artery, which is the outer branch of the common iliac artery, passes under what are called Pourpart's ligaments to the anterior part of the upper thigh. In the uppermost part of its course it gives off two great branches, the deep epigastric artery and the deep circumflex artery. It then proceeds, as the femoral artery, downwards from Pourpart's ligaments and passes through the tendon of a large muscle (called the adductor magnus), and then emerges as popliteal artery in the bend of the knee. Lower down it divides into the anterior and posterior tibial artery. The anterior tibial artery runs between the extensor muscles of the lower leg, to reach the foot as the dorsal artery of the foot, and supplies by branches the upper side of the foot and toes. And the peroneal artery, arising with it from the popliteal, runs down the back of the leg, and supplies the sole of the foot and under-side of the toes. At the ankle the posterior tibial branches form the Planter arch.

The veins. The pressure of the blood is smaller in the veins than in the arteries. In consequence they have much more delicate walls. In particular the muscular elastic stratum, which we observed in the arteries, is in the veins very slightly developed. Otherwise the veins are formed like the arteries. They are divided into superficial and deep-lying veins. The latter lie near their arteries, and follow the same course. The superficial veins have courses of their own, unaccompanied by arteries, near the skin, and can be seen through it as bluish threads on the arms, near the temples, and in many other parts of the body. Whilst many of the deep-lying arteries are accompanied by a single vein, we find sometimes two veins accompanying an artery in the lungs and in the limbs. Connective passages also often lead from one vein to another, and in certain parts of the body they unite into a net-work.

The arterial blood flows out of the left side of the heart through one great vessel, the aorta. The venous blood returns to the right side of the heart by two principal routes. These are the superior vena cava and inferior vena cava. All blood that comes from organs above the diaphragm returns through the superior vena cava, and all from organs below through the inferior vena cava. Both veins discharge into the posterior wall of the right auricle.

It has been already mentioned that the four pulmonary veins bring red blood from the lungs into the auricle of the left side of the heart.

The portal vein system deserves our particular attention. It brings

the venous blood from the stomach, intestines, spleen, and pancreas not directly into the heart, but first of all to the liver, into which it enters

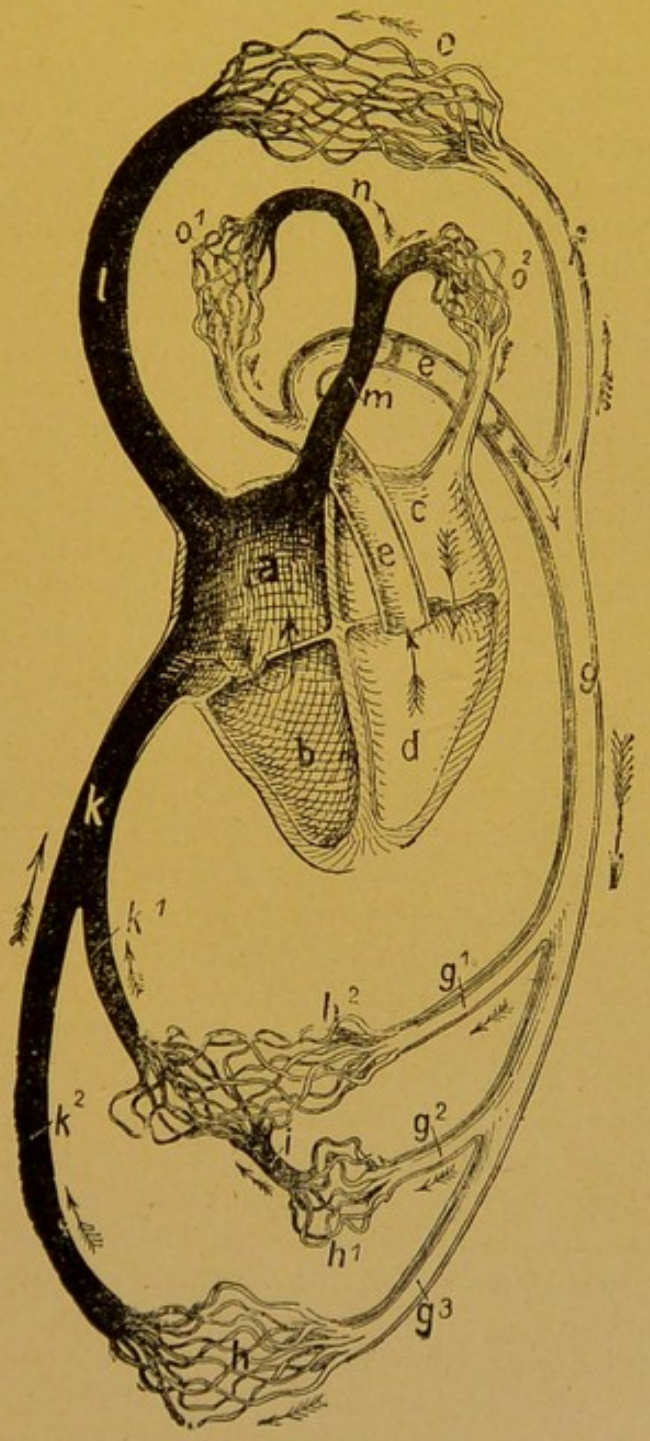


Figure representing the circulation. The dark vessels represent veins; the light ones arteries; the network capillaries. The blood flows in the direction of the arrows.

a, right auricle; b, right ventricle; c, left auricle; d, left ventricle; e, aorta; f, ascending aorta; g, descending aorta; g 1, g 2, g 3, branches of the descending aorta in the chest, abdomen, and lower limbs; i, system of the portal vein; k, k 1, k 2, collecting veins of the inferior vena cava; l, superior vena cava; m, pulmonary artery emerging from b, and carrying venous blood; n, branches of the pulmonary vein in the lungs; o 1, o 2, the lungs.

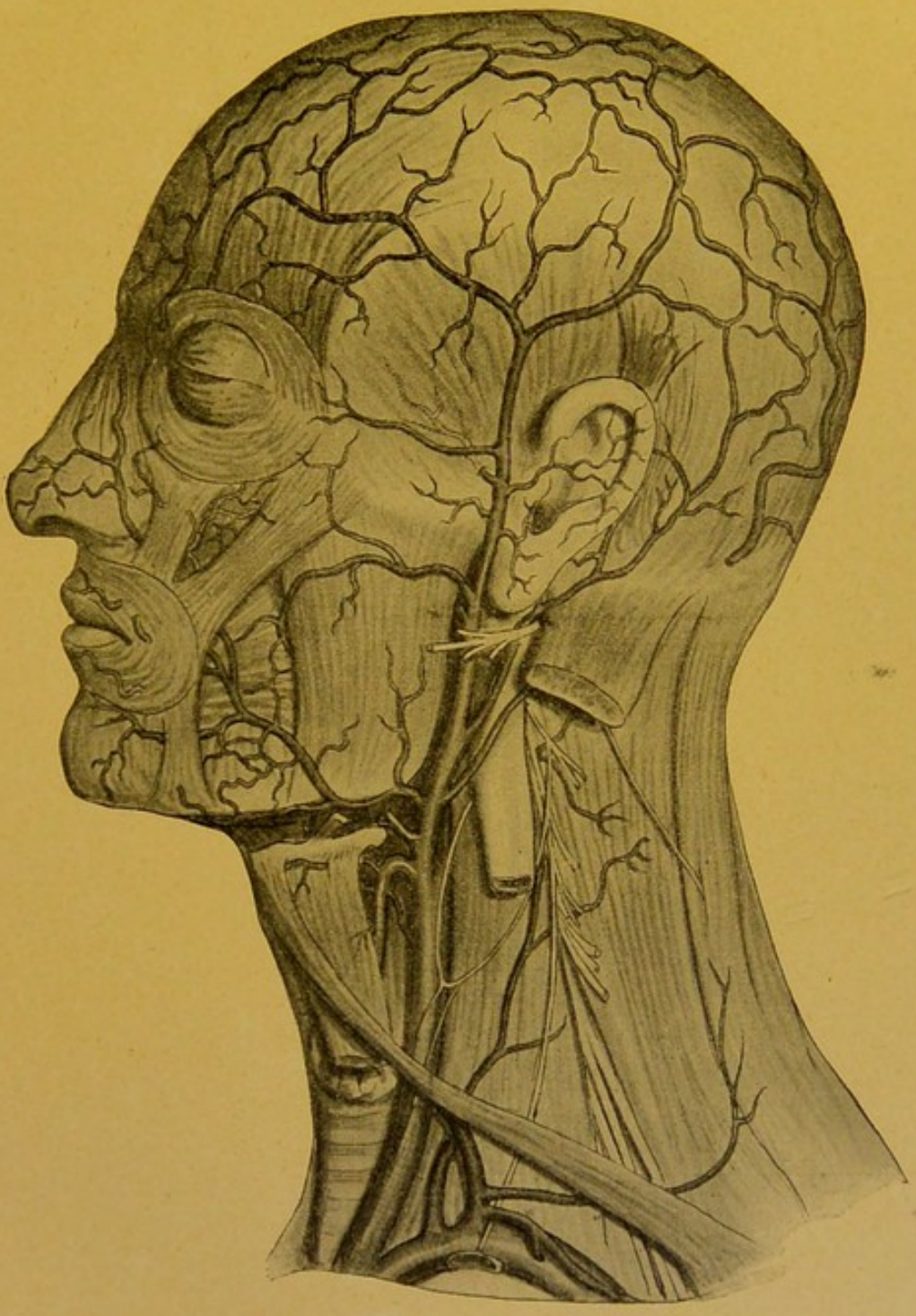
by the portal vein, which is formed by the union of the splenic and the superior mesenteric veins. The portal vein branches inside the

liver into constantly diminishing and narrowing vessels, which pass at last into capillaries, out of which the veins of the liver gradually develop, emptying themselves later by the hepatic vein into the lower vena cava.

The capillaries are the most delicate final branches of the arteries which affect the passage of the bloodfrom the arteries into the veins, and at the same time permit the nutritive matter of the blood to pass through their delicate walls. It is impossible to say exactly where a capillary commences or ends; but this is certain, that no capillary presents a "no thoroughfare," but is always part of a net-work.

Having now skerched the structure of the heart and of the blood-vessels, and the principal brauches of the latter, before we proceed to observe the course of the blood through the vessels, that is to say the circulation, it is necessary to explain that both the ventricles and auricles of the heart are constantly rhythmically expanded and contracted. The expansion of the ventricles is simultaneous with the contraction of the auricles. The ventricles and auricles of the two sides also work simultaneously. In a healthy full-grown man both ventricles and auricles expand and contract about seventy times in every minute. With each contraction of the ventricles a wave of blood is driven either into the aorta or into the pulmonary arteries, which can be felt as a pulse in different places, and most plainly in the radialartery of the lower arm.

Let us now suppose that at this moment the ventricle of the left side of the heart contracts itself. By doing this it pressed its contents into the aorta, whence they are driven both upwards and downwards into the various branches. At the same moment the ventricle on the other side of the heart passes its contents towards the lungs. But, as we have seen that the contraction of the ventricles is simultaneous with the expansion of the auricles, at the same moment the left auricle is filled with arterial blood returned from the lungs, and the right auricle with venous blood brought back by the veins. Thus the blood flows, wave after wave, from the left side of the heart, through the body, reaches the capillaries, parts with its oxygen, takes up carbonic acid in its place, and then slowly returns through the upper and lower vena cava to the right auricle. This is the great or systemtic circulation. From the right auricle it passes into the right ventricle, to be driven thence, through the pulmonary arteries, into the lungs. Here it gives up its carbonic acid, takes in oxygen, and returns as arterial blood through he pulmonary veins into the left auricle, whence it comes once more into the left ventricle. This is the pulmonary



Jugular Vein (Carotid Artery) and its ramifications on the Head.

circulation.

We have finally to turn our attention to the lymphatic passages and lymph vessels, and their importance to the body.

The lymphatic system is not to be regarded as an independent system. I have already observed that the lymphatic vessels stand only in a loose relation to the other vessels. The function of the lymphatic vessels is to collect the remains of the nutritive fluids, which have passed out of the capillaries of the vascular system into the tissues, and to bring them into the venous system. In consequence, they are everywhere developed in the vicinity of the capillaries, and by means of trunks, which grow constantly larger and larger, bring the lymph of the lower portion of the body finally into one large vessel, called the thoracic duct, which arises (in front of the third lumbar vertebra) out of the juncture of various lymphatic passages passes through the diaphragm, and finally empties itself into a branch of the superior vena cava. The lymph of the upper part of the body is similarly collected into a single lymph trunk, which also pours its contents into the superior vena cava, and so mixes it with the venous blood.

The lymphatic system of the whole body is, at the most various places, interrupted by lymph glands. These are introduced to act to a certain extent as controlling stations in the circulation. The lymph glands are traversed by the lymph stream, and surrender to it the lymph corpuscles which they have formed. It appears to be at present doubtful how far the lymph glands perform the function of freeing the body from injurious substances; but they may certainly be regarded as protective organs of the body, because, in the case of any local infection, the neighbouring lymph glands immediately swell, and can be often distinctly felt through the skin as nodules as large as a bean.

The best known groups of lymph glands lie before and behind the ear, near the lower edge of the lower jaw, in the nape of the neck, at its sides, in the shoulder, and in the groin.

Disorders of the Organs of Circulation.

Now that I am about to acquaint my readers with the most important disorders of the organ and the vessels, I must not omit to remark, in the interest of all patients, that a correct diagnosis of a disorder of the organs of circulation is one of the most difficult problems that can be set before a medical practitioner. The most different particulars have to be taken into consideration and to be duly

balanced in order to determine with certainty the nature of the disturbance that has arisen.

The medical man uses percussion, or tapping on the anterior wall of the chest, as one of the most important means of recognising alterations in the conditions of the heart. The difference of sound between lungs and the heart enables him to judge of the size of the latter. Another important expedient is auscultation, or listening at the breast, which gives him information respecting the purity of the heart's sound and the strength and rhythm of the pulsation. It will be quite plain from all this that a correct diagnosis of any complaint of the heart is essentially a question for a scientifically trained medical man. And I must seriously warn any patient who believes that he is suffering from an affection of the heart not to attempt any cure before he has received from a medical man assurance of the exact nature of his malady.

This advice is the more important because frequently other and important maladies are connected with a malady of the heart. These disorders have either arisen in consequence of disease of the heart, or they have occasioned it. Thus (to mention a well known fact), the lungs, the heart, and the kidneys are closely related to one another, and affect one another, and it is impossible for one of these organs to be out of order for long without the others being sympathetically affected.

For these reasons it is absolutely impossible that any one should be able, by reading a few paragraphs about diseases of the heart, to acquire all the information necessary to understand how to treat them whether medicinally or generally. The most different things, the age and sex of the patient, the profession, the physical condition, and the habits of life require in every case to be taken into consideration.

But the patient who suffers from any disorder in the action of the organs of circulation may always act safely on this advice—to lead a quiet and regular life and to make moderation his rule and motto in everything. There is no case in which "too much" of anything, whether work, or movement, or physical or even intellectual amusement, is so quickly or so certainly punished as in cases of disease of the heart. I have already said elsewhere that a man may become a slave to a weakness of his heart; and I may go further and say that only the man who does make himself the willing slave of a weakness of his heart, that is to say pays due attention to his malady in everything that he does, has any expectation of arriving, in spite of his malady, at an advanced age.

Acute Inflammation of the Lining of the Heart.

This is the commonest malady of the heart. It can affect both the interior of the cavities of the heart and the valves. It often occurs as a rapid consequence of various infectious disorders, of which acute rheumatism of the joints is by far the most likely to occasion it. But other disorders, especially blood poisoning and one of its forms puerperal fever, can produce acute inflammation of the interior of the heart by direct transmission of sanious products of decomposition. We distinguish according to their character a papillary and an ulcerous form of the inflammation. They generally attack the valves of the left side of the heart, and only attack the right side after the disease has existed for some time.

The nature of the papillary form is this:—little nodules or warts are formed on the lining of the heart. In the ulcerous form, which is by far the more dangerous, we have a degeneration of the originally inflamed spots. This form is so dangerous because these decayed ulcerously disintegrated parts are carried on by the circulation to other organs, in turn to cause in them new purulent inflammations, which finally invariably cause the death of the patient.

There are no external symptoms of this malady. It can be discovered only by medical examination of the heart; and the particular character of the disease, and its duration, cannot be prognosticated. The papillary form can be completely healed, but generally becomes chronic, and may occasion a valvular defect.

The treatment of inflammatory disease of the heart consists primarily in the completest repose, and in the use of cold fomentations over the whole left breast. The mechanism, of which I give a representation in plate XIII, can be used with good effect. Nothing is to be expected from medicines administered internally; but ether, wine, or camphor, may be rendered necessary by threatening pains in the heart.

Valvular Disease of the Heart.

At least one half of the cases of valvular diseases of the heart arise in consequence of previous rheumatism of the joints. And, in these cases, we may rightly consider the anatomical base of the valvular disease as the chronic form of the inflammation of the lining of the heart, described in the previous section. But there can certainly be other causes of this malady, and we know, not only that some valvular disease is actually congenital, but also that excessive use of alcohol,

excessive exertion, and other indescretions, can be directly responsible for its occurrence.

Valvular disease of the heart may be briefly explained to consist in the incapacity of the valves to close the orifices of their respective cavities sufficiently, or to open sufficiently. The former case is described as *weakness*, or insufficiency of the valves. In consequence of it a portion of the blood that has been urged forward may flow back, in consequence of the insufficient closing of the valve. The other case is called narrowing, or *stenosis*, of the valve. In this case the blood has to force its way through too narrow an orifice. In both cases the circulation is impeded by a backward pressure, and a congestion of the blood caused. Insufficiency of the valve results from the free edges of the points of the valves being crumpled, or in the valves being hindered from unfolding properly. Stenosis is occasioned by the thickening of the points of the valves, or by their coalescence.

Seeing that a continuous obstruction of the blood in a mechanism so delicately organised as the vasicular system must in a very short time occasion marked disturbances, particularly in the veins with their delicate walls, it is fortunate that the organism is able for a very long time to accommodate the several parts of the heart to commencing and slight functional imperfections of a valve, by a corresponding greater activity—that is to say to *make a compensation.* This accomodation can last for a long time according to attendant circumstances, and more particularly according to the extent to which the patient spares himself. In this way we find patients with pronounced valvular disease of the heart live long in rest and comfort without being particularly inconvenienced by their malady. In the course of time, however, the activity of the muscles of the heart (strained by the pressure of long continued excessive exertion) fails to a certain extent. In the course of years the muscles have become stronger and more massive in consequence of their long exertions, and gradually but steadily a fatigue of the distended or much thickened walls of the heart sets in, and they appear no longer equal to the strain demanded of them. Hereupon the congestions so long compensated for inevitably supervene in the parts of the venous system behind the valves. We will here turn our attention to the most assential phenomena of these congestions on account of their importance.

In many cases it is first a shortness of breath that leads the patient to turn his attention to his state of health. He generally entertains no suspicion of a disease of the heart, but has noticed a tendency to headaches, pains in the abdomen, palpitation of the heart, and

faintness after protracted physical or intellectual exertions. He now goes to a medical man, and after an examination of his heart, is informed of the valvular disease. Generally he has nothing more to do than to use a certain medicine, and to conform with the instructions given him for regulating his life in a manner befitting his state of health, to be for a long time freed from the first symptoms of commencing fatigue of the heart. But in other cases the shortness of breath (which is simply a symptom of engorgement in the pulmonary circulation) continually increases, and finally causes not only a troublesome bronchial catarrh, but also a swelling of the lungs, with which we have already mentioned when studying emphysema.

Matters, however, do not stop here. The symptoms of congestion in the lungs extend further backwards in the circulation (reckoning from the heart), and in consequence of the hindrance of the flow of venous blood into the right side of the heart, we find symptoms of congestion, also in the liver, the kidneys, and the spleen. There are not only marked swellings but also a feeling of pressure, tension, and pain in all these organs.

Almost always after this an accumulation of congested venous blood ensues in the superficial vessels of the skin. In consequence of this, certain parts of the skin of the patient (for example, that of the nose, lips, and hands) present a characteristic faintly bluish colour. An experienced medical man immediately recognises from this indication alone a disease of the heart indicating lack of *compensation*.

The disease of the heart, which is now becoming constantly more dangerous, shows its effect upon the kidneys principally by the alteration of the urine. The quantity of this is sensibly diminished, and the colour is darker than usual. If the urine is allowed to stand, it often forms a sediment of uric acid salts.

About this period also a more or less marked accumulation of water takes place in the lowest portions of the body, more especially about the ankles, and on the backs of the hands. At first it is perceptible only in the evening, and in the morning seems to have disappeared. Soon it is also quite plain in the early hours of the morning, and if a finger is pressed upon the swollen portion of the hand, a deep indentation remains for some considerable time. Slowly the accumulation of water extends also to other parts of the body. Dropsy of the chest and abdomen follow. The limbs become swollen, and at last, after long sufferings, death concludes these severe disorganisation of the circulation.

The treatment of valvular disease of the heart. I have already said that it would be impossible for me to give special directions here for

the treatment of a long standing valvular disease of the heart. The situation is often made the more serious by the fact that further and further disease of the valves is frequently developed in the same patient. I purposely omit here any description of the whole series of different diseases of the valves and their symptoms, because they could be of no use to the reader, and have limited myself to a description of those general symptoms and peculiarities of the course of the malady.

Respecting general treatment I must repeat first what I have already said of all forms of heart disease—the patient must avoid excess.

Skill in treating the malady consists in managing that the compensation shall be continued as long as possible. As the malady does not require to be treated medicinally, but by habits of life, prudently accommodated to the patient's malady, it really lies with the patient himself to show whether he has energy enough, and strength of will enough, to keep himself within limits about eating, drinking, smoking, dancing, athletic amusements, *etc.*,—and, perhaps, to give up old habits.

It is when the fatigue of the heart sets in, which we may call *lack of compensation*, that medical treatment becomes necessary. Happily, we have an excellent remedy, *digitalis*—which, taken internally, produces a strengthening of the heart, and a retardation of its pulsation, and can, in a few days, remove even severe symptoms of engorgement. It must, however, be clearly understood that too large doses of this remedy, or too long continuous use of it, are directly injurious, and that a medical man alone should prescribe this remedy.

Respecting water treatment of valvular disease of the heart, there can be no doubt that a course of baths, kept within right limits, may do the patient good. Certain watering places, Kissingen, Reichenhall, Nauheim, and others, enjoy a great reputation for benefitting patients suffering from heart complaint, by their salt wells or carbonic acid warm salt springs. But I do not think that I am detracting from their reputation by saying that I believe that a great part of the good effect is due to change of air, and to the wise regulations which compel the patient to conform with certain rules of diet, and to avoid all physical and intellectual excitement.

Perspiration cures, warm packs, and steam-baths are in the case of heart complaint to be avoided, as well as various ways of using *cold* water. Both heat and cold produce a rapid change of the distribution of blood in the vessels, which only a healthy heart can regulate. On the contrary, luke-warm baths, douches and washing are wholesome

and beneficial for all patients whose hearts are affected.

The patient must be especially cautioned against using narcotic remedies. In any case they are to be used only when the symptoms of want of compensation become continuously more marked, and the patient is approaching dissolution. They may then, in the hands of a medical man, be valuable lenitives, and seem to be not only justifiable, but even necessary to mitigate the patient's severe sufferings during the last weeks of his life.

Independent Enlargement and Dilatation of the Heart.

Whilst describing valvular disease of the heart I mentioned that the organism was capable at first of compensating an imperfection of the valves, but by an increased activity of the other parts of the heart, and that in consequence of this increased activity the muscles become thickened and the cavities of the heart enlarged.—This strengthening of the muscles is called a secondary one. It is a result of continuous efforts, and may be compared with the case of the gymnast who, in time, acquires by exercise muscles of extraordinary strength. But the same enlargement may also occur primarily, that is to say of itself, and not as the consequence of a long-standing valvular disease. I mention it here because it is a fairly common complaint among men of middle age, and particularly among the working classes.

The occurrence of this malady is most easily explained in the case of men engaged in extremely severe physical labour—such as coal-heavers and blacksmiths, whose constant excessive exertions in time produce an enlargement of the heart. But enlargement of the heart has in some cases been observed to arise from a *single* mountaineering expedition, from a *single* night spent in dancing, from a *single* exhausting march, and even from a *single* very violent emotion.

In particular the habit of drinking large quantities of beer has much to do with producing enlargement of the heart. The disease is particularly common in the city of Munich, celebrated for its brewers, and is there known as " Munich-beer-heart."

The treatment is in all its general features identical with the principles laid down in the previous section. To these I may add that the cause of the malady should be discovered when ever that is possible, and when discovered as far as possible avoided.

But these primary enlargements of the heart can also be favourably influenced by systematic curative gymnastic treatment, and by methodical stimulation of copious respiration by massage of the chest

It was Professor Oertel who first pointed out the value of these mechanical treatments of various diseases of the heart, and particularly of fatty heart, and of what are called nervous disturbances of the heart. His particular prescriptions, long the fashion, have since been supplanted by medico-mechanical and curative gymnastic treatments.

I shall have occasion in another place to speak of Oertel's proposal for relieving the body of water by means of limiting the supply of liquid. (See the section on corpulence).

Nervous Disturbances of the Heart.

There are three maladies in particular which I shall here mention, which consist less in any anatomical alteration of the heart itself than in an irritation of the nerves of the heart. They occur both by themselves independently, and in company with an existing weakness of the heart.

Spasm of the heart, or angina pectoris, can occur quite suddenly, coming on in a sharp attack like cramp of the stomach, and cause a condition of great distress. The malady attacks women distinctly more often than men; and it is not impossible that chlorosis, anæmia, and hysteria, as well as general nervous weakness, favour its occurrence. The pain is often described by the patient as "a feeling as if someone took the heart in their hands and squeezed it." It is not always limited to the region of the heart alone, but passes by reflex transference sometimes to the arm or the foot. Difficulty of breathing is often connected with it.

If the malady occurs independently, that is to say, as a purely nervous affection, so that it might be called a neuralgia of the nerves of the heart, it is neither so dangerous, nor by any means so ominous for the future of the patient as when it must be regarded (and this is frequently the case) as a partial symptom of degeneration of the muscles of the heart, and of an ossification of the coronary arteries. In the latter case one must be prepared not only for a sudden death of the patient during an attack, which sometimes ensues, but also daily anticipate the symptoms of an uncompensated fatigued heart.

The treatment must, before everything else, investigate the cause of the nervous disturbance, and if possible remove it. If the patient is nervous and hysterical, energetic cold water treatment and regular doses of effervescent salts of bromium will generally suffice in a short time to give a month's immunity from the attacks. At the same time the general treatment of hysteria must not be neglected. If partial

symptoms of a weakness of the heart accompany the attacks, the aim of the treatment should be to establish compensation. The attack itself will be beneficially affected by mustard plaster on the chest *(for not more than eight minutes)*, by warm foot-baths, and, after the mustard plaster, by luke-warm damp sheathing of the whole chest. Rest in bed for an hour or more after the attack is strongly to be recommended.

Acceleration of the pulse shall be mentioned next. It sometimes comes on in a sudden attack; and, without any disease of the heart being observable, can attain to so high a grade as to give from 180 to 200 and more pulsations in a minute. The several attacks generally occur suddenly, and subside after a time with a copious perspiration. It is supposed that here also nervous temperament, chlorosis, and hysteria are predisposing causes; but this, on the whole unusual, acceleration of the heart's action, which is attributed to a *transient* paralysis of the pneumo-gastric nerve, sometimes occurs as a direct consequence of existent heart disease.

The treatment. Rest in bed in a horizontal position, and compresses as cold as possible on the region of the heart, are the remedies which should be first used, as they generally soon quiet the excitedly active heart. After this some large cups of valerian tea should be given, and care taken to relieve the bowels. A crowded stomach and costiveness of the intestines may be partially responsible for the attack, which if frequently repeated and of long duration may produce symptoms of severe congestion in the circulation.

Nervous palpitation of the heart, the third and last of the symptoms of nervous excitement of the heart which I shall mention, means a condition of the patient in which he can plainly hear his heart beat, whereas under healthy conditions we do not remark the perpetual activity of the heart.

Just as in cases of a sudden fright, a man may have a sensation of his heart ceasing to beat, so a strong emotion in the case of many men suffices to evoke a nervous beating of the heart, sometimes so startling as to have given rise to the expression "my heart felt as if it would leap from my breast."

The treatment of this almost purely nervous disorder should alleviate the attack itself, best by cold compresses on the heart, warm sheathing of the feet, and repose; but the principal aim should be to remove the cause of the palpitations. A prudent hardening of the body, and cultivation of general strength, almost always suffices in time to overcome the palpitations.

Inflammation of the Pericardium.

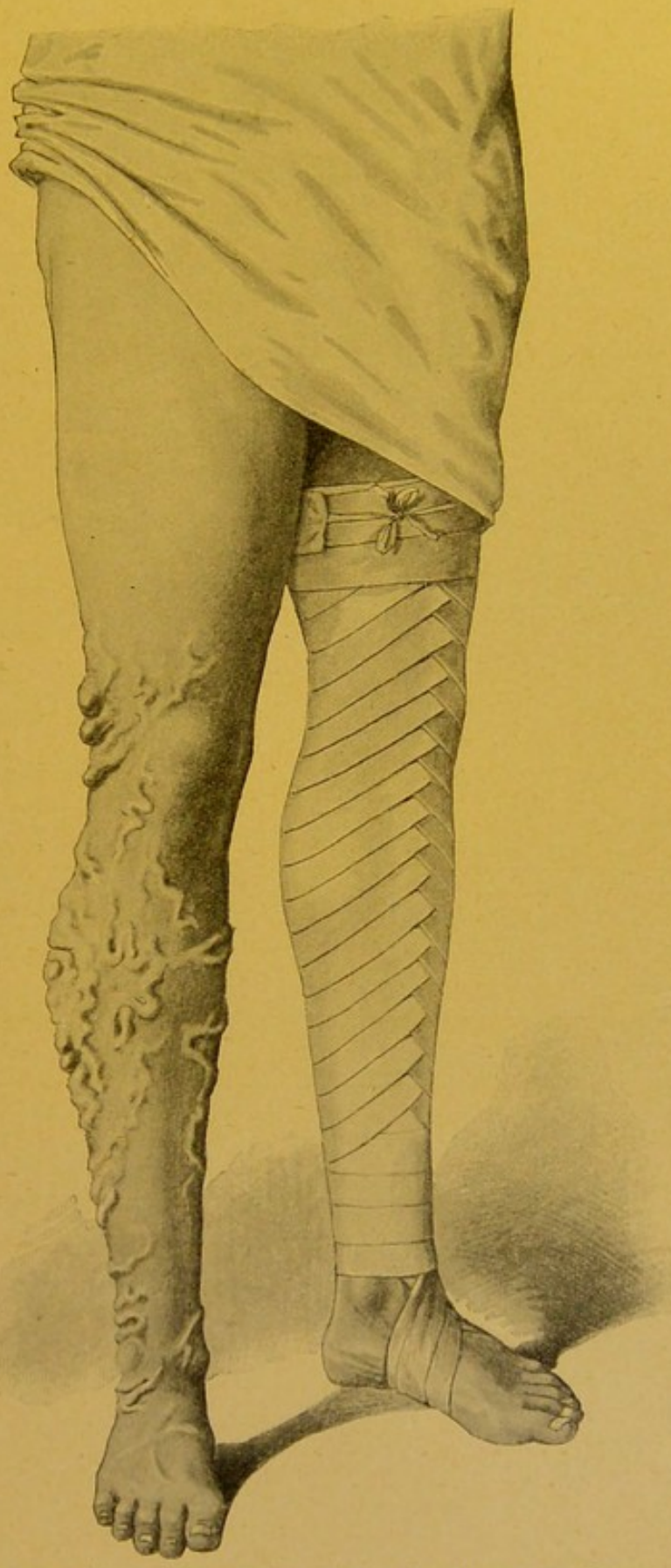
A whole number of infectious disorders, amongst which rheumatism of the joints and tuberculosis must be placed distinctly first, can through migration of the infectious germs to the interior of the pericardium produce an inflammation of its tissue. This inflammation is very similar to that of the pleura; and we must in every case of inflammation of the pericardium assume that it is not an independent disorder, but a secondary one, in consequence of some primary malady; the latter, however, may be not seldom entirely latent.

In some cases the inflammation is limited to the excretion of a furry fibrinous coating on the surface of the pericardium. (This form may be compared with the dry fibrinous inflammation of the pleura). But in the majority of cases the inflammation results in an effusion of fluid into the pericardium, which (according to the kind of the infectious germs) may be sometimes pellucid with flaky contents, sometimes flaky and purulent, but sometimes also completely purulent. In other cases, and particularly in tuberculosis, it may appear stained with blood. That inflammation of the pericardium is always a serious malady will be doubly clear when we reflect that the frequently copious exudation of fluid matter not only forces the heart from its normal position, but also exercises a strong pressure upon it, and interferes with its regular expansion and contraction. It is with this that the principal symptoms of the malady are connected, shortness of breath, head aches, and a discoloration of the skin tending towards a pallid blue.

I do not describe the symptoms which can be observed by percussion of the chest and by auscultation. They can be understood only by a medical man, but will much assist him to recognise the nature of the malady.

The best prospects of a complete recovery exist when inflammation of the pericardium arises from rheumatism of the joints and inflammation of the lungs. These cases are attended with little fever, and after a course of about fourteen days, take a favourable turn in consequence of gradual absorption of the fluid matter. But inflammation of the pericardium also frequently leads to death, particularly when a severe tuberculosis is present, or if the fluid matter in the pericardium assumes an exclusively purulent, or sanious character.

Treatment. At the height of the malady repose in bed, and that the patient should lie perfectly still are the chief things necessary. A cold water bottle, or the mechanism explained in Plate XIII., should be placed over the region of the heart. Care should be taken that the water should be kept constantly cold. In order that the heart



Leg with Varicose Veins, with and without Bandages.

may be exerted as little as possible, and to facilitate its labour, doses of digitalis should be given from time to time in such quantities as are suitable to the age of the patient. Of course the doses can be prescribed only by a medical man. Inflammation of the pericardium is a grave malady in which medical assistance is absolutely necessary.

Sudorific and duiretic teas (of which various sorts are described at the end of the volume) are very beneficial.

Hæmorrhoids or Piles.

A vein may become, under certain circumstances, dilated at a particular point of its course. These dilations of the veins are called varices, and the vein is said to be varicose. Hæmorrhoids, or piles, as they are more commonly called, may be described as a form of varicose veins occurring in smaller or larger masses about the anus, or exterior orifice of the lower bowel.

It is necessary to give some account of this very common complaint, and some hints about how it should be treated. It has been known from the earliest historical times as one of the commonest inflictions of mankind; and is, even in its mildest forms, a very worrying and distressing malady. In severe cases it has, both directly and indirectly, serious effects upon the general health of the patient, producing a peculiarly lowering effect upon the nerves, spirits, and energies; and, in serious, aggravated cases, gives rise to intense pain and prostration, rendering the patient incapable of any employment. These last cases are frequently accompanied by a great deal of bleeding; in consequence of which the patient is sometimes reduced to a pitiable condition.

Hæmorrhoids are generally described as either external or internal; the reference being to the tightly constricted sphincter muscle that closes the opening of the bowel. But these forms, though often distinct, and found alone, more frequently, in important cases, run into one another.

The people most subject to this distressing malady are those whose duties prevent them from getting regular exercise; for instance, clerks, whose sedentary habits prevent their quitting their office stools, and shop-assistants, who are compelled to stand nearly all day, but, at the same time, get little real exercise. This want of exercise generally leads to constipation. The constipation is, unfortunately, often neglected, and, in consequence, becomes gradually habitual; and is the most fruitful source of piles. It occasions a congestion of all the

pelvic veins, and this, with a want of the free action of the portal system, tends to a stasis or stagnation in the vessels so freely distributed around the anal sphincter. The veins now become distended, and lose their elasticity, exactly as in cases of varicose veins of the legs and feet, and a permanent condition of engorgement is established.

It has been mentioned that the usual classification of piles is that which divides them into external and internal. The latter are very much more common, and also, fortunately, those more likely to yield to simple remedies.

The external pile first appears as a small swelling in the folds of the skin just outside the sphincter of the anus. It is a little tender to the touch, and very prone to troublesome itching. If no treatment is applied, in the course of time it increases in size, and occasions also an increasing discomfort. Other similar swellings are also very probably developed in its neighbourhood, until a stage is at last reached when to sit is difficult and painful, and the motions are accompanied by discomfort and suffering. In many cases the little tumour, full of semi-coagulated blood, will burst under the strain, some bleeding taking place, which is followed by a rapid shrinking of the pile, and by an at least temporary cure. This, however, though common, is not the ordinary result. The various predisposing causes which have been mentioned are, of course, unaffected by the temporary cure of the single pile, and the process goes on until the lining of the sphincter muscle, and afterwards the mucous membrane of the lowest portion of the rectum, become involved; whereupon we find also the internal pile.

The internal pile, when once established, presents a further and obviously more distressing course of results. It is formed in the delicate mucous membrane, which has no covering of skin, and, every effort to evacuate the rectum has a tendency to thrust the pile outwards, either to be constricted by the sphincter, or, if it is large enough, and its attachment is loose enough, to be pushed quite outside it. A severe constriction of the pile ensues, involving a great engorgement with blood; the thin walls give way; and a free bleeding follows. The whole process is accompanied by acute pain, as the immediate return of the whole mass through the constricting sphincter is obviously necessary. As a rule, this is also a matter requiring the assistance of a surgeon, as we shall see when we come to speak of the treatment of piles.

It would be out of place in a book of this kind to enter closely into the various kinds of piles, distinguished as sessile, pedunculated, or mixed internal and external, *etc.*, and we shall proceed rather, at once,

to the directions which will be of some service to the reader in dealing with the simpler forms of the malady.

The treatment. It must be said at once that advanced forms can be dealt with only by a surgeon; whether these advanced forms are a number of external piles, which have become an insufferable nuisance to the patient, without, however, involving much danger; or take the form of serious internal piles, constantly extruded in the act of defæation, involving great loss of blood, and corresponding pain and exhaustion.

In mild cases, whether the piles be internal or external, or in the commoner combined form, the first aim of the treatment will be an endeavour to relieve the congested venous circulation, and to promote the quick return of the blood. The constipation is always the first enemy to be combated; and, as this is invariably troublesome to treat, each case will require attention to its particular circumstances. Saline waters have an excellent effect in the case of many patients—Hunyadi Janos, Apenta, or Carlsbad. The last can be conveniently procured in the form of Kutnow's Carlsbad salts. An excellent pill, which can be taken over a long period nightly, without any trouble, is composed as follows:—half a grain pulv. ipecach; one grain pulv. saponis; one grain aloes barb.; one half grain nux vomica.

Constant and free ablution with warm water is also to be recommended, and the application of the ordinary gall and opium ointment. Or, as that ointment has the disadvantage of being a little dirty in use, hazeline, a preparation from the witch hazel, may be substituted for it.

Most cases of external piles will yield to these measures. In the case of internal piles it will be generally necessary to take more active measures. Alleviation can be obtained by suppositions of opium, with some astringent like hazeline. But the surgeon should be consulted, as it is seldom that cure can be effected without operation for removal. It is also much to be recommended that early surgical advice should be sought, as the operation is likely in early stages to be less severe, and the recovery quicker and more effectual.

CHAPTER X.

Diseases of the Urinary Organs.

Structure and Functions of the Urinary Organs.

Like the organs of respiration and digestion, the urinary organs form a single system lined with mucous membrane; but to a certain extent this system is so closely connected with the organs of reproduction that a complete distinction between urinary and generative organs, at least anatomically, is impossible. Thus, for example, the male urethra serves for a passage equally for the urine and the semen. The fact that the mucous membrane of the one system also passes directly into the other further demonstrates their close connection.

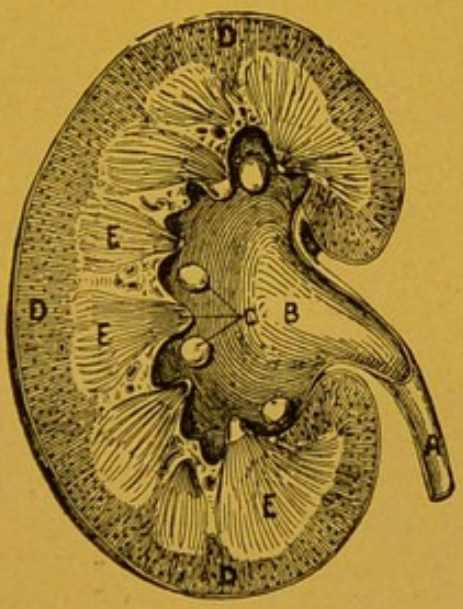
The function of the urinary organs is to evacuate from the tissues the final products of the albuminous substances, and especially the nitrogen. The urinary system is composed of the kidneys, the ureters, the bladder, and the urethra. We will study their structure and functions before proceeding to their maladies.

The kidneys lie right and left near the lumbar portion of the vertebral column and outside the peritoneum, which passes immediately in front of them. They are of a light brown colour, somewhat bean shaped, and have an exterior convex and interior concave border into the centre of which the vessels of the kidneys open. The actual tissue of the kidneys is like that of the spleen surrounded with a closely attached capsule, which at the hilum or entrance of the kidney enters with the vessels into the interior of the kidney and assists to cover the vestibule of the kidney, which is called the pelvis of the kidney, and the renal calices which discharge into it. The kidneys themselves, of which the right one lies somewhat lower than the left, are almost always surrounded by a largely developed stratum of fat, which, especially in stout persons can be so massive that the kidneys appear to be completely hidden in this kidney fat.

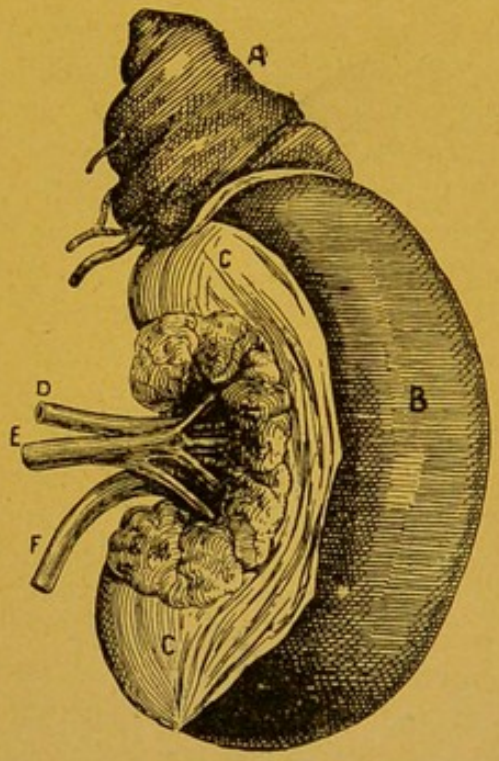
If a longitudinal section of a kidney be made from the convex to the concave border, we at once see even with the naked eye that the

tissue of the interior is peculiarly constructed. We can easily distinguish a dark exterior zone about three-quarters-of-an-inch thick, and an interior, somewhat lighter medullary portion. The latter consists of some fifteen pyramids, whose section is triangular. The bases of these pyramids rest upon the outer zone. Their rounded apexes, called papillæ are turned towards the entrance to the kidney.

It must be added that the exterior cortex consists almost exclusively of numerous small and successively finer and finer branches of the renal arteries. Their minutest extremities before they become capillaries form themselves into vasicular convolutions called glomerules, every one of which is enclosed in a membraneous envelope.



Section of right kidney.
a, ureter; b, pelvis of kidney; c, papillæ of the pyramids; d, cortical substance; e, medullary substance.



External view of the right kidney.
a, supra renal capsule; b, kidney; c, partly removed capsule; d, renal veins; e, renal arteries; f, ureter.

The interior medullary substance on the contrary consists of an immense number of very minute canals. These commencing from the glomerules mentioned above, after many windings at acute angles, form the papillæ. The tubes, at first very small, unite with others constantly becoming larger, until finally at the apex of the pyramid only about fifty discharge their contents, the elaborated urine, into the pelvis of the kidney; the last narrowing like a funnel leads directly to

the ureter. The ureters run downwards on both sides as membranous tubes on the anterior surface of the muscles of the loins, pass obliquely through the walls of the urinary bladder near its base, and so enter the cavity of the bladder which is the urinary reservoir.

The urinary bladder is a membranous muscular reservoir lined with mucous membrane. In sound health a man can open or close it voluntarily. It has a somewhat oval form, and lies directly behind the symphysis of the pubic bone, above which it rises when full. In men it is bounded behind by the rectum. In women the womb is situated between the rectum and the bladder; with the result that the depth from front to back is less, though the capacity is altogether greater. The upper portion is called the body of the bladder, that below it, the widest, the fundus. The lower front portion is joined by the neck of the bladder to the urethra, through which the urine is evacuated.

The urethra. The urethra of the male is a membraneous elastic tube about four inches long. Its uppermost portion passes through the prostate gland, and contains not only the minute excretory ducts of the prostate gland, but also the orifices of the spermatic ducts. Next below this what is called the membranous part follows, which is the narrowest: after that what is called the spongy part, surrounded by the corpus cavernosum; beyond which the urethra terminates externally in the orifice of the gland. The urethra of the female is much shorter, measuring scarcely an inch and a-half. It is in close contact with the anterior vaginal wall, and opens into the upper part of the rima valvæ just above the ostium vaginæ, where its opening, a slightly raised round border can be easily felt and seen.

The urine, which is by filtration drawn, with the assistance of arterial blood-pressure, from the blood in the glomerulæ of the corticle substance of the kidneys; and then brought by the fine tubes in the medullary substance to the papillæ of the pyramids, and thence into the pelvis of the kidneys, is a clear transparent fluid of a yellow colour, and slightly aromatic acid smell. Its average daily quantity is about a quart and a-half, but varies according to the time of year, the quality of the liquid nourishment taken, and the activity of the skin.

It has been already mentioned that the urine contains the final products of albuminous decomposition in a state of solution; in health about 96 per cent. is water, and 4 per cent. *urea*, *uric acid*, *inorganic substances* and *gases*.

Of these substances the most important is the *nitrogenous urea and uric acid.* Of the former a healthy man should daily void about 360 grains. If this is retained either in the blood or in the tissues a fatal

poisoning with urea (urœmia) rapidly ensues. Of uric acid about 15 grains are daily voided, being contained in the urine in the form of uric acid salts. The imperfect evacuation of these acids and their deposit in the body produces gout—of which we shall say more when speaking of constitutional maladies.

The appearance of the urine, its quantity, and its composition, are important factors for determining the general state of the health. This has been already several times pointed out, particularly in the case of acute infectious maladies, in which the urine, in consequence of fever, is of dark colour, small in quantity, and of a more acrid smell. In general, healthy urine should be *easily passed without pain, in quantity not less than a pint and a half, nor more than a quart and a half, daily, of a transparent bright colour, not fœtid if kept, and free from sugar and albumen.* The presence of sugar and albumen indicate serious disturbance of the metabolic changes in the body.

Blood and *pus* are also very undesirable components, and always indicate disorder. On the other hand, it should be mentioned that a *muddy appearance of the urine* is often of no importance, indicating merely the abundant presence of salts of phosphoric acid and uric acid, which dissolve themselves, and leave the urine perfectly clear, if it be exposed to heat.

To test the urine for albumen and sugar is not difficult, but requires a certain amount of chemical knowledge and chemical reagents. I shall not here enter into the processes in question, but I shall have occasion in the following sections to speak several times of the importance of the presence of albumen in the urine.

Diseases of the Kidneys.

When we remember that the kidneys not only have continuously to withdraw from the tissues the nitrogenous remnants of the albuminous matter, but that the organism also exerts itself to discharge, by means of the urine, as quickly as possible, everything pernicious that may have entered it, in so far as it cannot do this through the skin, we shall not be surprised to find inflammations of the kidneys ensue in consquence of the various infectious disorders produced by bacterial products of decomposition. But there exist other causes which, sooner or later, occasion inflammation of the kidneys; and it is observed that chemical irritation, in consequence of poisoning, excessive use of alcohol, excessive exposure to heat and cold, in fact, injuries of every kind, according to their duration or repetition,

occasion either acute, or chronic inflammations of the kidneys.

Acute inflammation of the kidneys is a disease possible at any age. It originates almost always from local irritation, occasioned by infectious or poisonous matter brought by the blood to the kidneys, in order to be removed from the body by the urine. Scarlet fever, diphtheria, measles, and small-pox, are the infectious diseases which, in the majority of cases, bring acute inflammation of the kidneys after them. Of poisons, lead, phosporus, and arsenic, seem particularly to act as irritants upon the tissues of the kidneys.

An acute inflammation of the kidneys can arise in two different ways. The irritation may occasion either a degeneration of the very delicate integuments of the uriniferous tubules, or it may attack the blood-vessels, and especially the minute globulæ. But in every severe inflammation of the kidneys these two forms of the disease run into each other, and as the treatment of both forms is the same, we may say that, roughly speaking, we have to do with a disturbance, proliferation, and loosening of the integuments of the vessels, and a stoppage both of the smallest blood-vessels, and of the urinary tubules, in consequence of which these last are naturally disturbed and hindered in performing their functions.

In mild cases of inflammation of the kidneys the fever is often slight, and a certain painful feeling of pressure in the region of the kidneys, and a slight diminution and cloudiness of the urine (which when chemically examined shows only slight traces of albumen), are often the sole symptoms, which also after a day or two subside. But in severe cases, in which a great part of the vessels of the kidneys are completely impassible, inflammation of the kidneys is a very serious malady. The urine appears considerably densified, and contains a large quantity of albumen. The daily amount of urine is reduced to barely a pint. The sediment is abundant, and contains very likely blood and pus with which are also found very small detached portions and casts of the urinary tubules as seen by the microscope. The urine itself is turbid and dull red coloured. It is voided only slowly and with great pain both in the kidneys and in the urethra. In consequence of the diminished quantity of water evacuated a plainly visible dropsy of the skin (œdema) sets in. This shows itself in the face in the "puffiness" of the features, in the ankles, the hands, and other parts of the body in a generally doughy swelling. The heart labours in vain by greater activity and an increase of the blood pressure to overcome the resistence in the blocked vessels; and a consequence of the excessive exertions of the heart is an enlargement of the left ventricle. This is even externally visible on the exterior

wall of the chest, in consequence of the increase of the heart's beat to the left.

This condition of things, accompanied by a general disturbance of the health, want of appetite, and a certain amount of fever may continue for weeks, until the first symptoms of improvement occur in the gradually increasing quantity of urine, and its clearer colour. After this, if no relapse ensues, daily palpable progress is made with a subsidence of the symptoms of the malady.

It is true that the malady may end otherwise. In the course of severe inflammations of the kidneys not only severe inflammations of the lungs sometimes arise, threatening the life of the already debilitated patient, but a still greater danger is occasioned by the urea retained in the body. With vomiting and serious disturbances of the brain this urea not seldom produces urœmia, and can prove fatal to life through paralysis of the heart.

The treatment. Inflammation of the kidneys must be always regarded as a serious disorder, and even in the milder cases rest in bed is absolutely necessary. To spare the inflamed organ as much as possible is also of primary importance. This will be best done by a very plain fluid diet, the patient taking nothing but milk. If the patient evinces great distaste for this, lime-blossom tea, and seltzer water may be added, or small quantities of brandy to make the milk diet more endurable. From time to time butter-milk, easily digested vegetables and stale white bread may also be given. Slight perspiration is always beneficial, as it directly relieves the kidneys of a part of their task. For this reason the patient should daily take a luke-warm bath of about 94° Fahrenheit (35° Centigrade) of ten minutes duration, and afterwards try to stimulate the activity of the skin by damp packs. On the contrary, no attempt to increase the activity of the kidneys by diuretic medicines or teas must be on any account made, as the consequences would be directly injurious.

In case of threatened poisoning with urea (urœmia), the first thing to be done is to try to strengthen the heart. For this purpose, in addition to alcoholic stimulants digitalis is useful. It can of course be ordered only by a medical man; but in so serious a malady medical assistance will of course have been sought.

Chronic inflammation of the kidneys may continue for a number of years, concluding in death from exhaustion (generally preceded by severe dropsy), in consequence of the continuous loss of albumen. It occurs in two forms, which at least thus far resemble each other in their final symptoms, that both at last exhibit a shrivelling of the kidneys, but are, particularly at first, to be strictly distinguished.

In one form of chronic inflammation of the kidneys, called *primary atrophy of the kidneys*, we find from the beginning a shrivelling and diminution of the kidneys, and a remarkable increase of the quantity of urine which contains only little albumen. In the other form of chronic inflammation of the kidneys, which is generally known as *Bright's disease*, we find *first* an enlargement of the kidneys and a marked diminution of the urine which contains a large quantity of albumen, and *only afterwards* a diminution of the kidneys.

Primary atrophy of the kidneys sometimes follows directly after acute inflammation of the kidneys, but more generally occurs independently about middle age, and particularly among men who are habitual drinkers, or who suffer from valvular disease of the heart, lead poisoning, *etc.* It shows itself first in the general emaciation and pallid complexion of the patient, who is often first aroused to the fact that he must be suffering from some severe internal disorder by palpitation of the heart, dizziness, or even the accumulation of water about the ankles.

Naturally chemical and general examination of the urine gives the simplest evidence respecting the nature of the complaint. The daily quantity of urine voided is doubled, or even trebled. It is of a pale colour, has a small specific gravity, and contains little or no albumen. In addition the left side of the heart is evidently enlarged, which generally reveals itself in violent action of the heart, headache, and attacks of shortness of breath, other important symptoms are *disturbance of the sight in consequence of hæmorrhages in the retina*, and the slowly increasing symptoms of the retention of urea in the blood, which often occasions sudden attacks of acute blood-poisoning with urea. Also catarrhs of the stomach, disturbances of the intestines, and hæmorrhages in the brain or from the nose are common phenomena during a chronic inflammation of the kidneys.

With a failure of the enlarged muscles of the heart, finally the symptoms of congestion ensue. The quantity of urine diminishes. The dropsy of the body becomes constantly more evident; and, as cure is impossible, the patient slowly sinks. Death is generally caused by a painless paralysis of the heart, but often also by a fit of suffocation.

The treatment. As primary atrophy of the kidneys is usually unaccompanied by any fever, it is not only unnecessary, but even mistaken to put the patient in bed. The malady takes a far slower and more favourable course when the body is strengthened generally in the open air than when the patient folds his hands in bed to meditate that nothing can be done for him because his malady is incurable.—

Curable, in the sense that a once wasted kidney should recover its original healthy form, this malady certainly is not. But anyone who will scrupulously conform to a rule of life befitting his case may live ten, twelve, fifteen years and longer, in spite of his withered kidney, without any great injury to his personal comfort.

The greatest attention must be paid to diet. The diet must be plain, easily digestible, and appropriate. Milk in particular, gelatinous soups, and young vegetables should form a large part of the bill of fare. Coffee and tea are to be as much avoided as possible. *Alcohol is for a patient suffering from chronic inflammation of the kidneys directly poisonous*, and must be given up in every form. In order to maintain the strength of the heart as long as possible all severe physical exertion, and even fatiguing, running, mountaineering, hurrying upstairs, gymnastics, *etc.*, must be forbidden. But general strengthening of the body by regular moderate walks, sleeping with the window opened, methodic deep breathing in pure fresh air, regular bathing, and all other measures which have been already recommended in cases of valvular disease of the heart, are to be strongly recommended. In conclusion the necessity of regular digestion must be insisted on, though it is indeed likely to follow of itself if the rules above given are complied with.

Bright's disease. How this differs from the malady just described has been already explained. It should be understood that in this case the final symptoms, corresponding to those which we have just described, are secondary, that is to say, consequences of other disorders.

Bright's disease seems very seldom to arise from an acute form of inflammation of the kidneys. It has been observed rather that continuous stimulation of the kidneys, such as severe purulations, chronic attacks of swamp fever, and continuous work in water, are wont to occasion it.

We must distinguish between two forms of the beginning of the malady. One of these is called *white enlargement of the kidneys*, or inflamed fatty kidney; the other, which is by far more common, *red*, or *coloured enlargement of the kidneys*. In both cases the kidneys appear enlarged. In the former we have a fatty degeneration of the tissues of the kidney; in the latter, a great number of small hæmorrages appear to determine the character of the inflammation.—Later, after about a year or more, both forms of enlarged kidney are attacked by atrophy, and then the symptoms of a primary atrophy are developed.

The course of Bright's disease is distinctly rapid, and can seldom exceed three years.

One of the first indications of the disease is almost always a

marked accumulation of water under the patient's skin. This first shows itself in the swelling of the face, and particularly by the swelling of the folds under the eyes. Soon afterwards the ankles swell first, or the hands. Hand in hand with this goes a marked diminution of the urine evacuated. The urine is dark, turbid, full of salts, which form a sediment if it is allowed to stand, and so much charged with albumen that often the whole contents of the test tube curdle with heating. Pus, blood, small portions of tissue, and casts from the urinary tubules are seldom absent. General languor, difficulty in breathing, palpitations of the heart, loss of appetite, and great pallor of the face, always show the serious nature of the malady, which the medical man has been able to diagnose correctly after the first examination of the urine.

Whilst in the case of patients with strong constitutions a sort of improvement seems to take place after some six or eight months, in consequence of the increased activity and enlargement of the left side of the heart, with the consequence that a larger quantity of urine is passed, and the dropsy somewhat absorbed; in the case of delicate patients, whose hearts are incapable of the additional labour, the accumulation of water is often enormous, and, passing into the internal parts, and particularly into the chest, may occasion great difficulty in breathing, by the pressure on the lungs.

In addition, *poisoning with urea*, *disturbances of vision*, *violent diarrhœa*, *pleurisy*, and other maladies, often occasion the patient serious discomfort.

If the patient survives all these attacks, the malady, after some time, takes a milder form. The urine becomes distinctly clearer, more abundant, paler, and more free from albumen. In short, the patient passes from the stage of enlarged kidneys to that of atrophy of the kidneys, whose further symptoms have been already described.

The treatment. During the first stage of the malady the treatment is the same as that of acute inflammation of the kidneys. In the second stage the treatment is that of primary atrophy of the kidneys.

I must here add that upon the appearance of dropsy great attention must be paid to the patient's bed. It should be often smoothed and kept scrupulously clean. The very irritable skin of patients suffering from dropsy is, if injured, extremely prone to ulcerous inflammation and erysipelas. For this reason the patient should be warned on no account to scratch the swollen and itching skin.

Kidney-stones and Renal Colic.

The pelvis of the kidney is like the gall-bladder liable to the

formation of solid substances out of the elements which are normally in solution; and as we observed that gall-stones could occasion a colic, often of a very painful nature, kidney-stones can be the cause of attacks of excruciating pain consequent upon the irritation of very fine branches of the nerves. These attacks are known as colic of the kidneys, and are justly feared.

The secretions of solid substances out of the urine are distinguished according to their appearance as *gravel*, and *renal calculi*. Gravel generally passes through the ureters, bladder, and urethra without difficulty, and falls as a sediment of the urine. But larger masses formed into calculi (stones) consisting principally of uric acid or salts of lime often occasion a mechanical hindrance of the evacuation of the urine as soon as they approach the size of a pea. By obstructing the passages they cause extremely severe pains which come on in paroxysms, and appear to radiate from the kidneys in the direction of the bladder, and often shoot through the whole body, whilst weakness of the heart, vomiting, shivering fits and clammy perspiration are accompanying symptoms of the malady. If the colic passes after a few hours it may be concluded that the pressure of the urine behind the stone has forced it onwards and overcome the obstruction. It must be added that the stone may subsequently occasion similar symptoms, after having passed through the bladder, when it reaches the urethra. We shall mention these when speaking of stone in the bladder.

The treatment. The first thing is to get the patient over the attack of renal colic, after that attention should be paid to guarding against the formation of calculi.

During the attack *warmth* proves more beneficial than anything else. This can be most simply applied in the form of large poultices of decoctions of linseed, rye pap, or hot mashed potatoes placed on the loins. The patient should also drink large quantities of luke-warm water or lime-blossom tea, so as to facilitate the descent of the stone by increased pressure from above. Careful rubbing of the region of the kidneys with warm liniment of chloroform seems to afford distinct alleviation of the pain.

As the formation of calculi almost always recurs it is of great importance as far as possible to remove the causes of the formation; particularly as large calculi may occasion inflammations of the pelvis of the kidneys, or by their sharp corners may cause laceration of the vessels and hæmorrage.

In the first place a vegetable diet is to be preferred to a meat one; a vegetable diet is of importance in all maladies of the kidneys.

Alcoholic stimulants are to be avoided as much as possible. White wines, on account of their acid contents, are absolutely forbidden, and the use of all acids with food to be deprecated.

In order to heighten as far as possible the solubility of the solid elements of the urine the regular use of alkaline waters is to be advised. Vichy water has a great reputation for being beneficial in maladies of the kidneys. These waters can be purchased from any chemist or in the form of the various salts, with full instructions for use.

Catarrh of the Bladder.

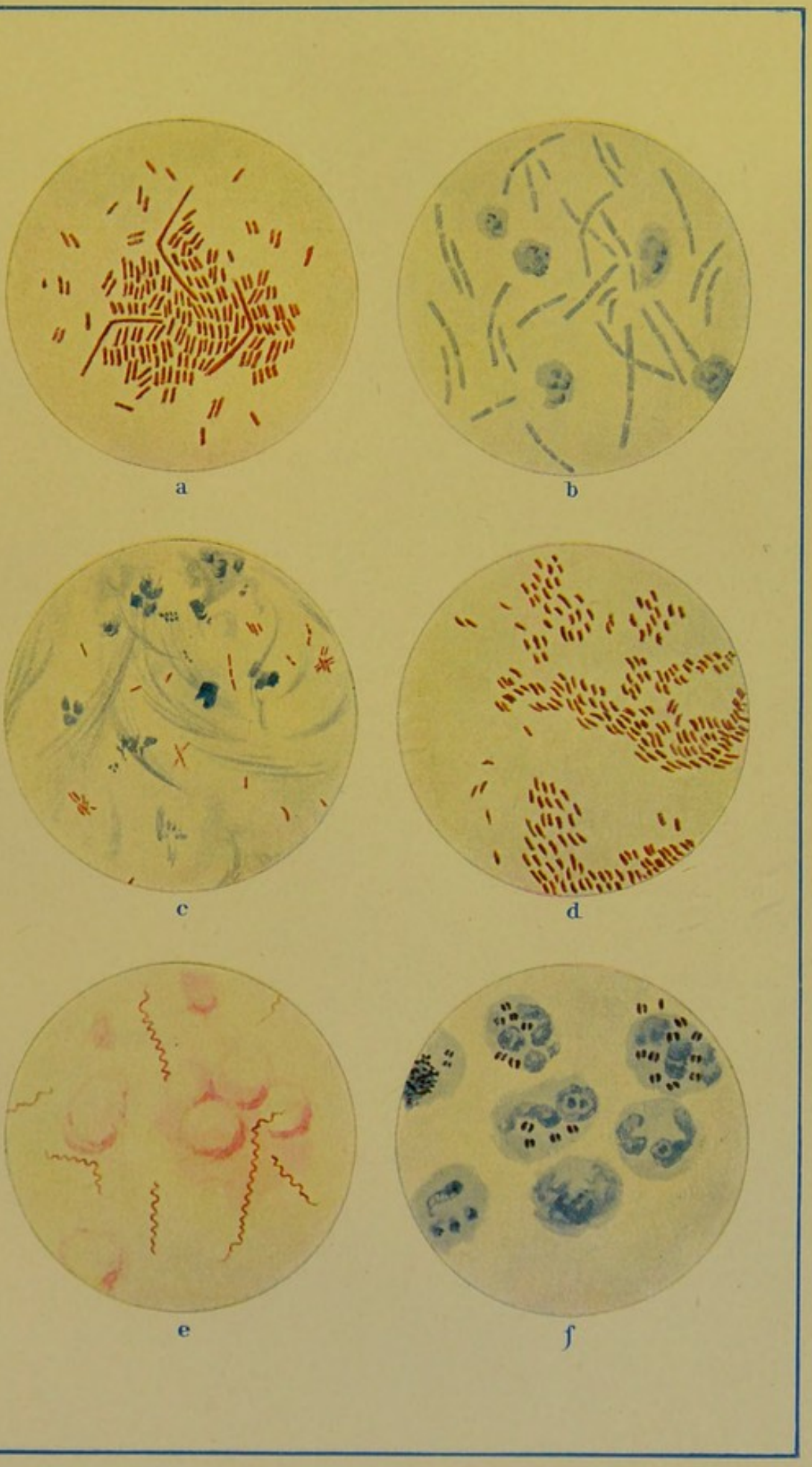
Catarrh of the bladder is an inflammation of the mucous membrane of the bladder, which, according to the severity of the malady, may vary from a slight catarrhal irritation to a severe purulation or a degeneration of the walls of the organ.

On the one hand it appears to be quite possible that the milder forms of the malady (consisting merely in a painful reddening and inflammatory swelling of the mucous membrane which soon subsides), may be occasioned by grave errors in diet (such as excessive drinking on a certain occasion), stone, poisonous substances (turpentine, cantharides), or by a sudden chill of the lower abdomen : but on the other hand all severe feverish forms of catarrh of the bladder must be attributed to an infection, and to one that has reached the bladder either from the urethra or from diseased kidneys.

In the milder cases of catarrh of the bladder (which may also be called acute cases) we find only a burning pain during the evacuation of the urine, continuous strangury even during the passing of a few drops, and a general sense of pressure in the region of the bladder. In infectious cases, in addition to all the above symptoms, we encounter also fever, headache, and general infirmity, rendering the condition of the patient grave. The urine is turbid, clouded, mucous (in consequence of the mixture of pus and blood), and in a state of fermentation, which can be easily perceived from its disagreeable pungent smell.

Mild forms of catarrh of the bladder subside under proper care in a few days. In consequence of insufficient attention or mistaken treatment the inflammation may become a chronic catarrh, which may finally lead to ulceration of the mucous membrane and severe injuries to health.

The treatment. In milder forms of catarrh of the bladder, rest in



a) Typhoid bacilli. *b*) Anthrax bacilli. *c*) Tuberculosis bacilli.
d) Cholera bacilli. *e*) Germs of intermittent fever in human blood.
f) Gonococci.

bed, simultaneous warming of the abdomen with a hot fomentation, and a simple diet (milk diet is best), suffice to remove all symptoms in a few days.

At the same time the patient should be given plenty of tea (that of Uva Ursi leaves is best), and may in the evening take a warm bath, followed by a packing of the abdomen, which may remain all night if it has been properly protected with waterproof covering.

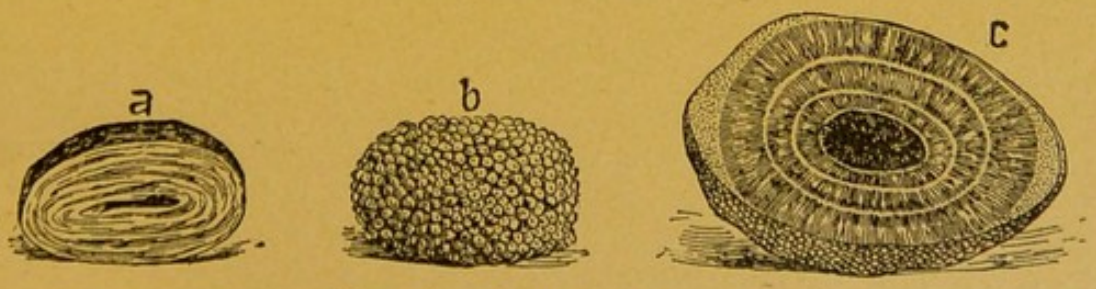
In the severe feverish forms of the malady *rinsing the bladder* with a luke-warm three per cent. solution of boric acid or sublimate is of primary importance, as this not only cleanses the bladder, but also kills the infectious germs. The operation can be performed of course only by a medical man.

Together with this, care should be bestowed upon a generous diet, avoidance of all alcoholic drinks, and daily warm baths, so as far as possible to prevent the malady from assuming a chronic form.

Stone in the Bladder.

The secretions of solid elements of the urine in the bladder may be either quite small in the form of gravel, or conglomerations of the size of peas, pigeon's eggs, and even of hen's eggs. These stones or calculi occasion more or less serious maladies.

The stones are generally round, sometimes rubbed down against each other, and of very different appearance, according to the substances of which they are composed. Most stones consist of salts of uric acid, and have a yellowish-brown colour. They are hard, and have either a smooth surface or one covered with small nodules. Another kind of



Stones (calculi) from the bladder.
A, uric acid stone; b, oxalic acid stone; c, section of a stone from the bladder, with a renal stone as nucleus.

stone consist of oxalate of lime. These stones are very hard, dark brown, and have a rough surface. Soft crumbling stones also occur, having

a light rough surface, and appear to be composed of salts of phosphorous acid.

Various opinions exist concerning the formation of these calculi; and it is unknown why a greater proclivity of the urine to form calculi should exist in children and elderly people. There is certainly a hereditary tendency both to gout (which is also to be referred to the deposit of uric acid salts), and to the formation of stones in the bladder. But this tendency also is unexplained.

Stones from the kidneys often form the kernel, or neucleus, of a calculus in the bladder, and, when a large stone is cut across, the manner in which the salts have gathered around the neucleus in layers can be plainly seen.

To proceed to the symptoms. Such acute pains as accompany the colic caused by stones in the kidneys are rare. The calculus in the bladder also seldom present symptoms of incarceration in the ducts, as they are too large to enter the urethra. But if a kidney-stone, or a small bladder-stone, does get through the neck of the bladder into the urethra, it then causes acute pains in that locality, which last until the stone is finally evacuated.

Larger calculi in the bladder almost always cause pain by pressure on the anterior part of the organ. These pains increase during rapid walking or going up stairs. A horizontal position, on the other hand, gives distinct relief, in consequence of the stone's falling back. Blood in the urine, catarrh of the bladder, without any previous infection, and a sudden interruption of the flow of the urine (caused by the stone placing itself over the orifice of the bladder) must always raise a suspicion of the presence of one or more calculi.

The treatment. If surgical removal of a large calculus is necessary, the anterior wall of the bladder can be opened by the operation for stone, or the stone may be broken by the introduction of proper instruments through the very elastic urethra. Both operations are performed by specialists with complete success, and have produced perfect cures.

But operation is, of course, the last remedy, and when it is known what the chemical composition of the calculus is (the gravel passed with the urine decides that question), there are methods which, together with general dietetic rules, may be used to remove the stone.

If the stone be of uric acid salts, the diminution of the formation of uric acid in the organism is the primary aim of the treatment. The patient should abstain from meat and alcohol, and, so far as possible, live on a vegetable diet. Acid foods and drinks are directly

injurious. The patient should, on the contrary, exert himself to avoid the formation of acids, and constantly make free use of alkaline mineral waters—Carlsbad, Ems, Salzbrunn, *etc.*

Spasm of the Bladder.

Spasm of the bladder shows itself in severe pains, coming on in paroxysms, which attack the whole of the lower abdomen, but shoot principally into the thigh and rectum, and, like the pains of cramp in the stomach, compel the patient to double himself up. The causes of the spasms are principally nervous, and hysterical and neurasthemic individuals are the chief sufferers; but chemical irritants, sexual disorders, pregnancy, and stone in the bladder, can cause the spasms, which resemble a severe colic.

The treatment consists in the use of copious enemats of hot water, and warm compresses on the whole of the lower abdomen. Careful rubbing in a cross direction of the region of the bladder with liniment of chloroform mitigates the pains. Plentiful drinking of barley water is to be highly recommended.

Incontinence of the Urine, and Passage of the Urine in Drops.

We occasionally meet with cases of children of eight, ten, and even twelve years of age, who possess very imperfect control over their urine. They are almost always sprightly, excitable children, and their infirmity—likely rather to be aggravated than cured by frequent scoldings and punishments—are due to a general weakness of the bladder, and more particularly of the muscles which close its orifice, which invariably disappears with advancing years. But irritation caused by worms, anæmia, stone in the bladder, and other causes may also produce this incontinence of the urine. The patient's efforts to control themselves are vain, and their urine is passed involuntarily during sleep.

The treatment must first find the cause of the malady and make an effort to remove it. The child should be given little to drink in the evening. Daily washing of the whole body with cold water (75° Fahrenheit, 24° Centigrade) should be tried to strengthen the constitution. The diet should be generous and appropriate, and care should be taken that the child may have ample opportunity for

physical exercise, walks, and play. As a medicine, effervescing salts of bromium deserves special mention for cases of excitable children. Treatment with weak electrical currents often produces a rapid amelioration of this troublesome weakness.

The incapacity of adults to retain their urine, which is, in consequence, perpetually exuding by drops must be completely distinguished from the above childish malady. The disorder is incurable and the patient should use a proper appliance.

Stoppage of the Urine.

This malady, the opposite of those last described, consists in an incapacity voluntarily or otherwise to empty the bladder even when it is completely filled. This kind of stoppage of the urine occurs chiefly among old men, in consequence of an enlargement of the prostate gland. But it may attack women during pregnancy, or directly after delivery, and may arise from severe injury of the spinal column. In all these cases the patient loses all control over the bladder, and if proper measures are not taken in time, the organ may even burst under the pressure of the constantly increasing contents.

The treatment apart from the investigation and earliest possible removal of the cause of the malady, must first of all provide for the immediate emptying of the bladder. To effect this a carefully cleansed catheter is introduced into the bladder through the urethra. If the complaint is chronic—which is the case with old men whose prostate gland has become enlarged—the attendant medical man will show either the patient himself or some competent adult member of his family how the catheter is to be used, so that in an extreme case the patient may be able himself to use it. But the patient must be warned against any personal *habitual* or *arbitrary* use of the catheter, unless the greatest attention is paid to its being properly cleansed, as any neglect will be sure sooner or later to induce a severe catarrh of the bladder.

CHAPTER XI.

Disorders of the Nervous System.

Structure and Functions of the Nervous System.

In order to make the origin and nature of the most important disorders of the nervous system to a certain extent intelligible, I will begin with explaining what the reader ought first to know about the brain and nerves. Experience has taught me that many people have incredibly little knowledge, and very false ideas about these parts of their own bodies.

Nothing is, of course, further from my intention than entering into difficult questions or disputed points of the physiology of the brain. But I hold that in the present day anyone who lays claim to being a man who has learned to think, ought to know what a spasm or a paralysis is; what is the work of the nerves; how they are distributed in the body; and similar simple facts concerning them.

The whole nervous system may be divided into two systems—the cerebro-spinal system and the sympathetic system.

The cerebro spinal part of the nervous system, which makes possible the phenomena of movements and feelings which are connected with consciousness, is divided into a *central part* (namely, the brain and spinal cord) and a *peripheral part*, namely, the nerves which spring from the brain and spinal cord, and branch out into the most various parts of the body.

The sympathetic part of the nervous system, represented by the sympathetic nerves and their plexuses, affects, without any co-operation of the consciousness, the involuntary movements and actions of the vascular system.

Both parts pass much into each other; and, in many localities of the body, are closely connected by reciprocal actions and reactions of their filaments; which, if we examine them microscopically, are composed of *nerve fibres* and *nerve cells*.

The nerve fibres are extremely minute threads or tubes, unbranched throughout the whole length of the nerve. Each of them consists of a delicate outer membrane and of nerve medulla or pulp, in which

what is called an axis cylinder is imbedded. Many nerve fibres, taken together, form by their unity a single nerve, and have a common sheath or integument in which they are isolated. They might be compared to the numerous threads spun together to make a cable.

The nerve cells are flattened formations containing a nucleus. They are of different forms and size. They are particularly numerous in the grey substance of the brain, and in the ganglia or nerve tubercles. These are inserted in many places in the course of the nerves, and will concern us more particularly when we come to speak of the sympathetic nerve system. They are characterised by one or more bifurcated processes, and give out branches, which in their further course are changed first into nerve fibres without medulla, and later into fibres with medulla; and thus prove that every nerve fibre takes its origin from a nerve cell, whether this last lies in the brain, in the spinal cord, or in a ganglion.

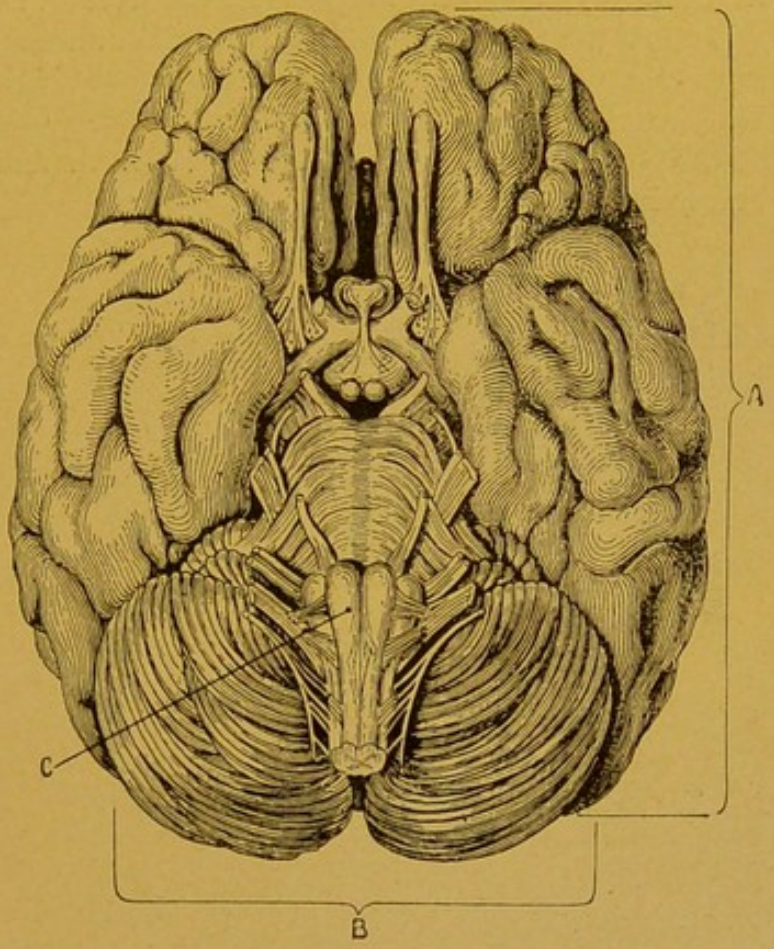
1. The Cerebro-spinal Nerve System.

The brain, the chief substance of the central nerve system, consists of the cerebrum, the cerebellum, and the medulla oblongata. It lies, a completely symmetrically formed soft substance, in the superior and posterior portions of the cavity of the skull, and is directly continued downwards by the spinal cord. It is enclosed in three integuments, which also clothe the spinal cord, and serve partly for the protection and partly for the nourishment of the central organ of the cerebro-spinal nerve-system.

The outermost of these three integuments is known as the dura mater. It lies close against the inner surface of the skull, and sends processes inwards, dividing both the two halves of the cerebrum, and the cerebrum and cerebellum from each other. The middle integument is the arachnoid membrane. The third and innermost is the pia mater, which is richly supplied with blood vessels. It dips down between all the convolutions and folds of the substance of the brain and enters also into the cerebral cavity to line it.

The two symmetrical hemispheres of the cerebrum appear externally, separated from each other by a longitudinal fissure from front to back; but in the centre they are connected by the corpus callosum, which joins the hemispheres to each other. The hemispheres show over their whole surface a great number of apparently irregular convoluted prominences. These convolutions consist of what is called *grey matter*, and constitute the especial locality of mental processes. The inner

part of the brain, the *white matter*, is employed only in the transmission of impressions, either generated in the grey matter, or brought from outside to the centre by the nerves. The hemispheres of the brain are practically divided into four sections. The foremost part is known



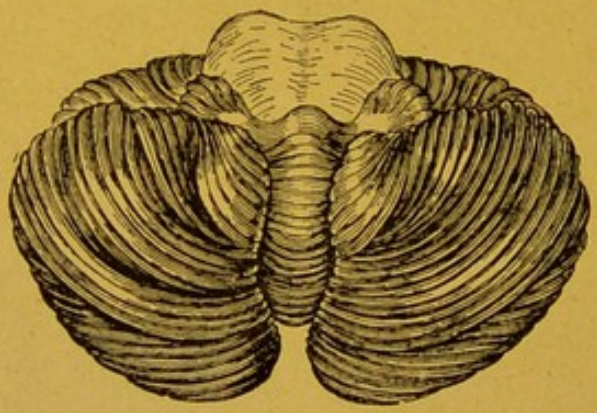
A. Cerebrum. B. Cerebellum. C. Medulla oblongata.

as the frontal lobe; that behind it as the temporal lobe; that on the side as the parietal lobe; that at the back, overlying the cerebellum, as the occipital lobe. In the interior, between the two hemispheres, lie on both sides the cerebral ventricles. The entrance to the third cerebral ventricle (one only, not a pair) lies in the central region of the brain, between the bigeminate bodies and the eminence of the corpus callosum, which forms the connection between the two hemispheres of the brain. The fourth cerebral ventricle (again one only, not a pair) is situated in the cerebellum.

In connection with the different functions of the mind, and the reflex centres, the cerebrum is divided into the *covering layer of the*

brain, and the root of the brain. In the former are situated seeing, hearing, feeling, and tasting, and the voluntary actions. The more deeply situated root of the brain contains principally conducting tracts and reflex centres.

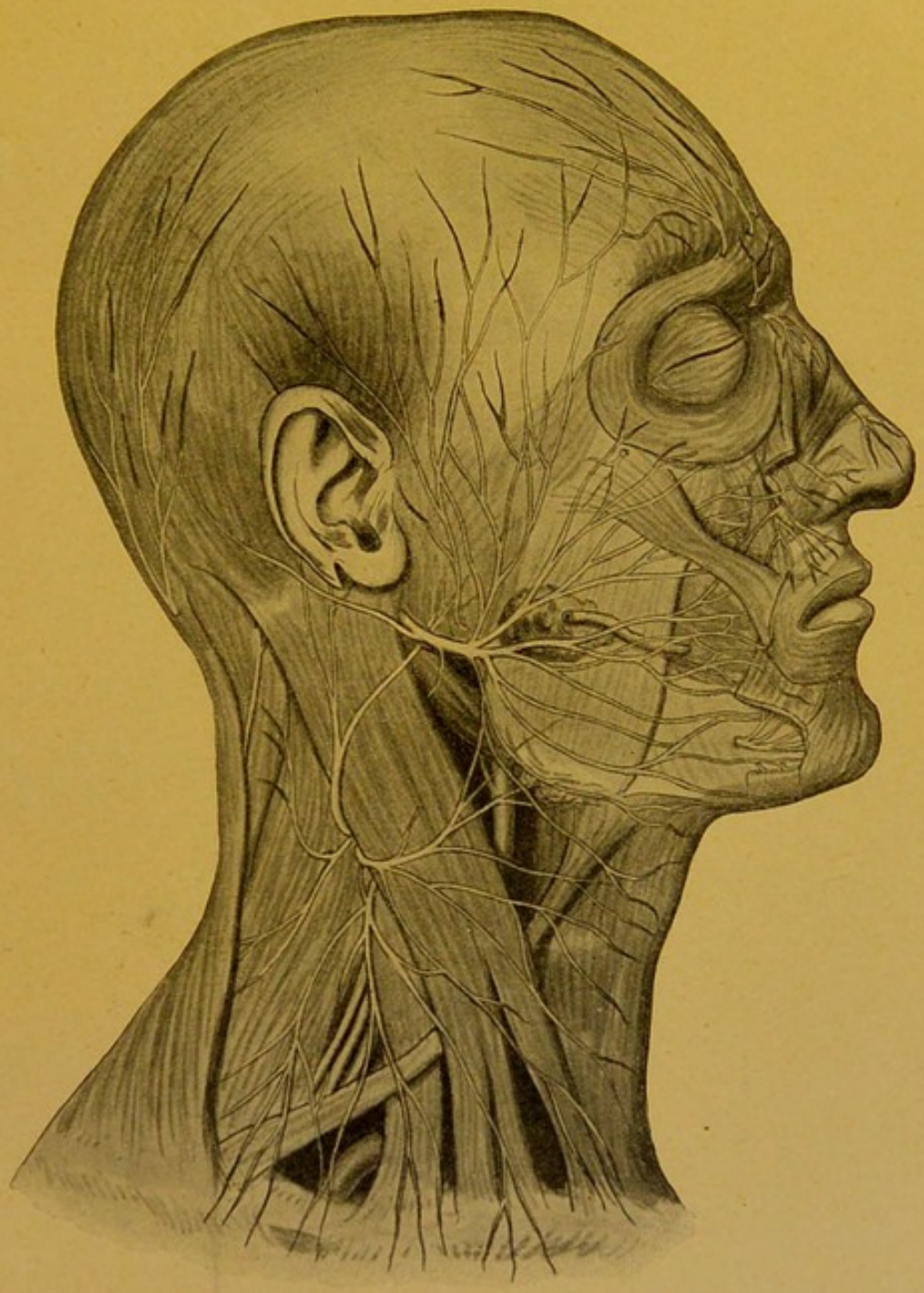
The cerebellum which constitutes scarcely one eighth of the whole mass of the brain * is situated behind the posterior lobes of the cerebrum. It consists of two symmetrical halves connected together by a middle portion called the *pons varolii.* *The medulla oblongata* lies on the under surface of this connecting portion. It wedges itself as a single body between the two halves of the cerebellum and is directly continued below in the spinal cord.



Cerebellum seen from below.

The upper surface of the cerebellum shows a number of curved oblique furrows which pass over the small connecting portion of the vermiform process, and continue in the other half. It is divided into two lobes divided from each other by a deep fissure. The lobes are the anterior or irregularly four sided lobe, and the posterior or crescent shaped lobe. The lower surface on the contrary, whose halves are united by the inferior vermiform process consists of four lobes. They are called the posterior inferior lobe, the slender lobe, the digastric lobe, and the tonsil. They exhibit narrow fine furrows running parallel with one another. If a vertical section be made from the superior vermiform process to the inferior vermiform process we see that from the middle of the white matter which is found in the centre

* The weight of the whole brain is about 2½ pounds, and averages 2 per cent. of the weight of the body. It was formerly supposed that the weight of the brain was an index of the mental ability of the possessor. But this depends rather upon the quantity of the grey matter. Idiots' brains have been met with which weighed nearly three pounds.

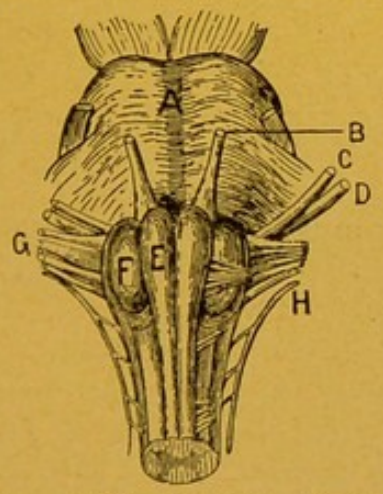


Ramifications of the Nerves on the Neck and Face.

seven or eight branches go off which are surrounded by grey bordering matter and tend some upwards and some downwards. These are called the *arbor vitæ* of the vermiform process to distinguish them from similar forms which we find if a section is made through the medullary layer of the cerebellum, which are called the *arbor vitæ* of the cerebellum.

The cerebellum is the great centre for co-ordination of muscular movement or of the sense of balance. Injuries of the cerebellum occasion a feeling of dizziness, reeling, and want of co-ordination of movement.

The medulla oblongata is a single, white, medullary cone which passes through the great posterior orifice of the skull and forms to a certain extent the uppermost or first portion of the spinal cord, and constitutes its connection with the brain. It lies in the centre of the lower surface of the cerebellum, and shows on the anterior surface a long furrow on both sides of which are seen the "pyramids" and outside them the "olivary nuclei," corresponding to columns similarly named in the interior of the *medulla oblongata*—pyramidal columns, and olivary columns. Near the olivary nuclei lie what are called the restiform bodies which run from the *medulla oblongata* to the cerebellum. It is also important to observe that there is here a crossing of filaments from one pyramid to another (called the pyramidal decussation), which enables us to understand why a patient who suffers from a hæmorrhage on the right side of the brain shows symptoms of paralysis not on the right side but on the left, and *vice versa*. I may add that the pyramidal tracts are conducting routes for the nerves of motion of the limbs. The central station for the movements made in chewing lies in the *medulla oblongata*, as well as for the acts of swallowing, coughing, and sneezing. It contains also the automatic centre of breathing, the vascular vaso-motor centre, and the centre of contraction of the heart.



The *medulla oblongata* with the *pons varolii*.

A. *Pons varolii.* B. Sixth cranial nerve. C. Seventh facial nerve. D. Eighth auditory nerve. E. The pyramids. F. Olivary bodies. G. Ninth and tenth cranial nerves. H. Eleventh cranial nerve.

The spinal cord is joined to the cerebral portion of the central nervous system as a continuation of the *medulla oblongata*. It runs down the vertebral canal, and terminates, at the height of the second

lumbar vertebra, in a conical point, from which extends a slender filament, that extends to the end of the sacral canal. The same three integuments which clothe the brain pass through the great posterior orifice of the skull, with the spinal cordto protect and nourish it.

The spinal cord is a cylindrical column, slightly flattened from front to back. It is not of the same thickness throughout its whole length, but of slightly larger diameter where the most powerful nerves branch from it, that is in the regions of the neck and loins. Whilst in the brain the grey matter, abounding in nerve cells, is outside, and the white, consisting of nerve filaments, within; in the spinal cord the arrangement is exactly the opposite; for the spinal cord consists of two semi-cylindrical halves, with an exterior white medullary portion, and an inner grey nucleus. The white medullary exterior zone consists on both sides of three columns, or tracts, which are called *the two anterior columns*, *the two lateral columns*, and *the two posterior columns*. The grey, or nuclear column of the spinal cord, which consists almost entirely of nerve cells, leaves free in the centre a minute canal, which is called the central canal of the spinal cord. In the grey nuclear substance we distinguish an anterior horn, and a posterior horn, on each side.

The spinal cord, regarded as a central organ, controls, through the grey matter, reflex actions. Regarded as a conducting organ, the white anterior columns, and the lateral columns (pyramidal column tracts) conduct the impulses of motion, which proceed from the brain to the motor nerves, and thence to the limbs.

Respecting the connection between the *medulla oblongata* and the spinal cord we may observe that the three double columns of the spinal cord pass upwards into the columns of the *medulla oblongata*, and the side columns of the spinal cord to the pyramids, the anterior columns to the olivary nuclei, and the posterior into the restiform bodies, respectively.

From the spinal cord spring, on both sides, thirty-one nerves, namely eight cervical nerves, twelve dorsal nerves, five lumbar nerves, five sacral nerves, and one coccygeal nerve.

The nerves of the brain. We find that from the basis of the cerebrum and cerebellum twelve cranial nerves start on each side. These, after a more or less brief course, emerge through orifices of the skull, proper to them, to proceed to the localities under their charge, partly as nerves of sense or feeling, and partly as nerves of motion. With the exception of the tenth, the pneumogastric nerve, they are restricted to the regions of the head and neck.

The point where the cranial nerves emerge from the brain is by no means identical with that of their origin. The point of origin of all the nerves is not known, and must be conceived to be situated deep in the brain. All that we know, with certainty, is that the many nerve filaments which constitute a single nerve spring from the nerve cells of the grey matter, which is not only found largely developed on the surface of the brain, but also in its interior, gathered into what are called the grey foci. The order of the cranial nerves from before, backwards, is as follows :—

1. Olfactory.
2. Optic.
3. Motor oculi.
4. Trochlear.
5. Trigeminal.
6. Abducent.
7. Facial.
8. Auditory.
9. Glosso-pharyngeal.
10. Pneumogastric (or Vagus).
11. Spinal accessory.
12. Hypoglossal.

The olfactory nerve is a nerve of sense that has a short course. It springs from the brain with two roots which join themselves into a single nerve branch, which emerges on the lower surface of the anterior lobe of the brain. It lies like a club-shaped prominence on the perforated plate of the ethmoid bone, and sends two series of its branches through the orifices of the same bone to the mucous membrane of the nose. Here the branches break up into smaller branches and terminate in the olfactory cells of the mucous membrane which communicate smell.

The optic nerve is also a nerve of sense with a short course. It springs with various branches, of which the most important lie in the optic *thalami*, from the chambers of the grey substance. The right and left optic nerves come so close to each other at the base of the brain that they almost touch each other. They are also connected by filaments called the decussation of the optic nerves, which are very important in many disorders of the eyes.* The optic nerves afterwards pass through

* Severe injury of one eye, and especially an infectious wound, can transfer itself in the form of what is called a sympathetic malady to the uninjured eye, the infectious irritants reaching the sound eye through the decussation of the optic nerves.

the optic foramen of the sphenoid bone into the orbital cavity which contains the eye. They pass into the back of the eyeball and spread themselves out as a layer of filaments in the retina.

The third, fourth, and sixth pairs of cranial nerves are exclusively nerves of motion for the muscles which move the eyeball and the eyelids.

The fifth or trigeminal nerve is by far the stoutest and most powerful of all the cranial nerves. It originates like a spinal nerve with two roots, of which the anterior serves the purposes of motion and the posterior those of sensation. Both roots unite into a single nerve trunk.

The posterior root forms a large strong ganglion called the Gasserian ganglion. Out of the convex border of this ganglion the fifth cranial nerve issues with three branches (whence its name), distinguished as *the first or ophthalmic branch, the second or upper jaw branch,* and *the third or under jaw branch.*

The first branch is a purely sensory branch, and consequently consists entirely of nerve fibres of the posterior root. It divides into three branches, the lachrymal nerves, the frontal nerve, and the nasal nerve.

The second branch is also a purely sensory nerve. It issues from the skull through the *foramen rotundum* of the sphenoid, and divides into four branches, the temporal nerve, the posterior dental nerve, the spheno-palatine nerve, and the palpebral nerve.

The third branch is a mixed nerve, as it carries with it all the filaments of the anterior root and also nerve filaments of the posterior root. It issues from the skull through the oval foramen of the sphenoid bone and sends out a number of branches one after another. The most important of these are the nerves of the tongue, which end with from eight to ten final branches in the upper surface of the *dorsum lingua*, and here communicate taste, and the lower maxillary nerve which serves the teeth of the lower jaw. The other branches of this third branch have charge partly of the masseters (muscles for chewing), and of the muscles of the cheeks, and partly of the muscles of the temporal region.

The same trigeminal nerve also forms, in addition to the Gasserian ganglion already mentioned, a whole series of other ganglia, from which in turn small nerve branches start. These, however, are not to be regarded as independent parts of the cranial nerve system, but are connected with the sympathetic nerve system, as filaments of the same show in all these ganglia.

In addition to the Gasserian ganglion I will mention only the ciliary ganglion, the superior maxillary ganglion, the otic ganglion, and the inferior maxillary ganglion.

The seventh or facial nerve starts with two roots from the base of the fourth chamber of the brain. Both roots stretch together with the eighth cranial nerve, the auditory nerve, into the interior of the organ of hearing, where they unite in a single nerve tract. This issues through the stylomastoid foramen of the temporal bone close below the external ear, to take charge, with a whole series of delicate muscles, of all the muscles of the face, of the ear, and of the neck, in so far as they are not under the control of other nerves.

The eighth or auditory nerve arises from two roots, which are situated around the restiform bodies, and soon combine into a single nerve tract. This enters together with the facial nerve into the interior auditory meatus, where it divides into the cochlear nerve and the vestibular nerve, which proceed into the interior organs of hearing, and there divide into very minute branches.

The ninth or glosso-pharyngeal nerve originates from a grey nucleus of the *medulla oblongata* in the immediate vicinity of the tenth cranial nerve, with which it at first has a common course. It forms a connection with filaments of the sympathetic nerves various ganglia, and then issues from the interior of the skull to descend into the neck where it lies hidden between the exterior and interior carotid arteries. On its way it sends out branches both to the pneumogastric nerves, and to the muscles of the pharynx and of the neck. After having taken charge with its branches of the base of the tongue, the tonsils and the epiglottis, it finally runs with a number of branches into the papillæ which stand upon the root of the tongue, to share with the tongue-nerves of the third branch of the trigeminial nerve in communicating taste.

The tenth cranial nerve or the pneumogastric nerve. There is no other cranial nerve which wanders through so extensive a tract as the pneumogastric.

This nerve originates with a number of small branches out of the *medulla oblongata*, and issues from the skull together with the glosso-pharyngeal nerve and the eleventh or spinal accessory nerve. Its long course is conveniently divided into three sections, a cervical section, a pulmonic section, and a gastric section.

In the course of its transit through the neck it forms a series of ganglia by unions with filaments of the sympathetic nerves, and also sends out branches to the ganglia of the neck and to the ninth and eleventh nerves which are in its vicinity. It also controls by small branches both the region of the pharynx, and more particularly the larynx and its muscles, so that it has influence both upon speech and upon swallowing.

In its course through the chest it is first near the branches of the bronchi, and later near the anterior and posterior walls of the œsophagus. Here it is brought by a whole series of links into very close connection with the *plexus* of the sympathetic nerves which are in in this region largely developed. It also sends out a series of branches both to the larynx and the bronchi, also more particularly to the œsophagus whose mucous membrane and muscles it controls.

The gastric section of the pneumogastric nerve is simply a continuation of the branches last mentioned, which pass through the diaphragm, and surround the œsophagus like a network. It gradually loses itself in the mesentery, at the same time sending off a number of very small branches to the stomach and the intestine; from which we may conclude that it is not without influence over these organs.

The pneumogastric nerve is both a nerve of motion and a nerve of sensation, and of all the nerves in the human body, has by far the most extended functions. To give some examples of the manifold offices of this nerve, I may mention that vomiting, swallowing, hiccoughing, and coughing, are reflex movements, to be referred to the filaments of this nerve; that it also communicates the feelings of hunger, thirst, and satiety; that it regulates the action of the heart, and has particularly so great an influence upon the regularity of respiration that, if this nerve be severed, death from excess of carbonic acid in the blood must inevitably ensue.

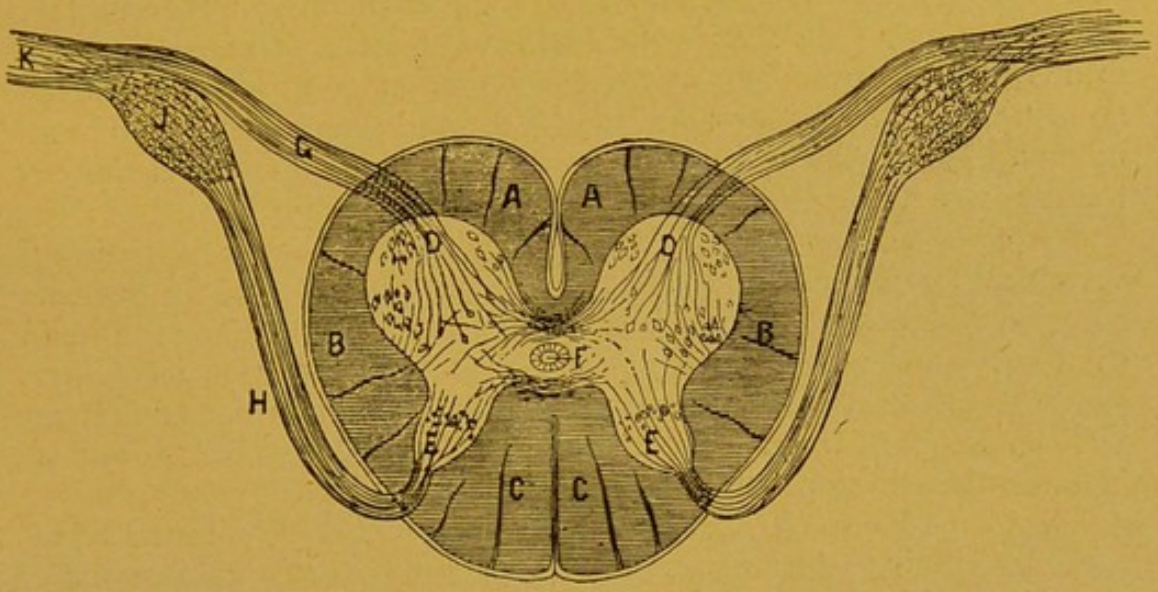
The eleventh cranial nerve, or the spinal accessory nerve, springs partly from the *medulla oblongata*, but, to a great extent, draws its roots out of the cervical spinal cord, as far down as the sixth cervical vertebra. It joins the pneumogastric nerve, and divides, when about to issue from the skull, into an anterior and a posterior branch. The latter proceeds to the great muscle on the side of the neck, which is known as the sternomastoid, and then divides and terminates in the muscle known as the *trapezius*. The anterior branch runs into the pneumogastric nerve, and becomes one with it; so that it may be regarded as a part of the tenth nerve, to which, it is supposed, it supplies the nerve filaments which control motion.

The twelfth cranial nerve, or hypoglossal nerve is purely a motor nerve. It starts between the olivary bodies and the pyramids of the medulla oblongata. It runs on the side of the neck, down to the hyoid bone, and divides into three branches, which control all the muscles of the tongue and the neighbouring regions.

The spinal nerves. As, has been already mentioned, 31 pairs of nerves start from the spinal cord, of which eight pairs are

cervical, twelve dorsal, five lumbar, five sacral, and one pair coccygeal.

It is important to know that every spinal nerve has both an *anterior* and a *posterior* root in the spinal cord, and that *the anterior root contains motor filaments alone; and the posterior, sensory filaments alone.* The posterior, or sensory filament, swells into a ganlion when connected with the sympathetic nerve. Both quit the vertebral canal by their respective intervertebral foramina, and then unite into a single nerve



A. Anterior tract of white matter. B. Lateral tract of white matter. C. Posterior tract of white matter. D. Motor, or anterior horn of grey matter. E. Sensory, or posterior horn of grey matter. F. Central canal. G. Motor root of nerve. H. Sensory root. J. Ganglion of sensory root. K. Spinal nerve.

trunk, which thus consists of both motor and sensory nerves. *The motor filaments* conduct from the centre towards the distant parts of the body, are, as we say, *centrifugal;* the sensory filaments, on the contrary, transmit external sensations to the centre, and are *centripetal.*— In other words, if the anterior motor roots are divided, all the muscles in charge of the spinal nerves become incapable of motion, as the motorial conduction is interrupted, and the central organ is no longer able to give the muscles the directions necessary for motion. If, on the contrary, the posterior sensory roots are divided, the same portions of the body become insensible, as the sensory nerves are no longer able to transmit to the brain the consciousness of the sensations awakened in them.

The eight cervical nerves issue at the sides of the cervical vertebræ, and at once divide into anterior and posterior branches. The latter are of a subordinate nature and disappear among the

muscles of the neck and its nape. On the contrary, the anterior branches unite into a large plexus, and form the anterior branches of the four superior cervical nerves called the cervical plexus, whilst the anterior branches of the four inferior cervical nerves unite with the first dorsal nerves to form what is called the brachial plexus.

The cervical plexus sends out (in addition to branches connecting it with the tenth and eleventh cranial nerve, and with the sympathetic nerve system) small branches to the muscles of the nape, the neck, the ears, and the diaphragm. The brachial plexus on the contrary passes under the shoulder bone to the arm pit, and passes into the arm with the brachial vascular system, extending its branches (becoming more and more delicate as they advance) to the tips of the fingers. It has charge of all the movements and all the sensations of the muscles of the arm, as well as of its external skin.

The twelve dorsal nerves issue from the spinal canal through the inter-vertebral foramina, and divide exactly like the cervical nerves into anterior and posterior branches. The latter control the muscles in the back and the exterior skin of the back. The anterior nerves pass as intercostal nerves from the back to the anterior breast and breast walls and control the exterior muscles which are found in this region, and also the exterior skin of the chest and abdomen.

The five lumbar nerves, as soon as they have emerged from the spinal canal lose their posterior branches in the muscles of the loins and of the region of the haunches. Their anterior branches are particularly large, and by their connections form what is called the lumbar plexus. From the loops of this plexus a series of important nerves take their origin. These are called the *ilio-hypogastric* nerves, which control the muscles of the abdomen, the *ilio-inguinal* which passes through the inguinal canal, and reaches in the male the penis and scrotum, in the female the external labia, the *genito crural nerve*, *the external cataneous nerve*, and the *obturata nerve* which controls the muscles of the haunches and of the lower pelvis. The lumbar plexus now continues itself as the *crural nerves*, which leave the pelvis by the femoral canal and break up into a number of cutaneous and muscular branches by which the skin and muscles of the upper thigh are controlled.

The five sacral nerves send out their posterior branches backwards through the posterior foramina of the sacral bone. They form an unimportant plexus and lose themselves among the muscles of the haunches. The anterior branches enter the cavity of the pelvis through the anterior foramina of the sacral bone, and are the strongest, that is to say the largest in diameter of all the nerves. These branches form by their juncture two large plexus, distinguished as

the sacral plexus. The nerve branches of the plexus control the muscles of the perineum, of the rectum, of the bladder, and of the sexual organs. The sacral plexus, after sending out some branches to the muscles of the haunches, continues as the great sciatic nerve, the largest nervous cord in the human body, which passes out of the pelvis through the great sacro-sciatic foramen, and proceeds down the posterior side of the upper thigh. It subsequently separates into the external and internal poplitean nerves, continuing with branches continually more and more minute until it reaches the toes.

The coccygeal nerve, the smallest of all the spinal nerves, passes downwards in the spinal canal with the terminal filament which has been already mentioned. It issues at the coccyx, and forms with the lowest loops of the sacral nerves the coccygeal plexus, whose four or five branches lose themselves among the muscles at the back and side of the coccyx.

2. The Sympathetic Nerve System.

The sympathetic system which regulates the movements of the heart and of the vascular system, independently of our will and consciousness, consists of two tracts of nerves situated on the anterior side of the vertebral column. They extend from the uppermost cervical vertebra to the coccyx, and consist of a number of plexus which arise from the sympathetic nerves, and accompany the neighbouring blood-vessels in their course. Both the sympathetic nerves and the plexuses are in many places interrupted by ganglia.

We distinguish a cervical, dorsal, lumbar, and sacral section.

The cervical section has three ganglia, which send out connecting branches both to the neighbouring nerves and to the vessels.

The dorsal section has eleven ganglia; the lumbar five, and the sacral either four or five; which are connected with one another, and with the neighbouring nerves.

The plexus of the sympathetic nerve are divided into cephalic plexus, cervical plexus, pectoral plexus, abdominal plexus, and pelvic plexus. They all send out branches to the blood-vessels in their vicinity to envelop them, and are distinguished by the intercalation of more or fewer ganglia; respecting which we know that they consist principally of grey matter.

1. Disorders of the Motor Nerves.

Any attempt to treat of all the disorders of the peripheral and

central nervous system would lead me far beyond the limits of this work. For this reason I restrict myself to touching upon the most important nervous disorders (unhappily so numerous), and to explaining their nature in accordance with the description of the structure and functions of the nervous system which I have just given.—At the same time I may remark that nervous disorders, at least so far as they are capable of anatomical explanation, can be diagnosed only by medical men, as in the majority of cases electrical examination of the nerves and muscles is necessary in order to determine approximately the degree of the disorder and the probabilities of its course, as well as to determine upon its right treatment.

Nervous and apprehensive persons whilst reading the following sections on disorders of the brain and nerves will do well not to imagine that they find on every page some complaint whose symptoms they think they have discovered in themselves. They will do well to pay attention only to the principal rules, which everyone suffering from disorders of the nerves should observe. These rules culminate in a simple and staid way of living—abstinence from everything that can produce either physical or mental excitement, and attention to keeping a sound mind in a sound body by means of generous but suitable diet, by means of moderate intellectual activity, and most of all by sensible attention to the body.

General remarks on paralysis and muscular spasms. We have seen that the centre of the voluntary movements of the muscles lies in the grey matter of the superficies of the brain. Thence, the impulse for the accomplishment of a voluntary movement is carried by the anterior and lateral columns of the spinal cord to the several nerves, and, by them, conducted to the muscles which they control.

Any interruption or disturbance of these lines of connection must necessarily produce the result that the impulse is either not communicated to the muscle at all, or only imperfectly; that is to say, a complete paralysis ensues, or a partial one (paresis).

It is evident that the disturbance may be either in the brain itself, (in the case of severe injuries of the head; for example, caused by blows or falls), or in the spinal cord (for example, in cases when the patient has been run over), or finally in the nervous tracts (for example, in cases of wounds). We distinguish, therefore, according to the locality of the injury, cerebral, spinal, and peripheral paralysis.

Cerebral disturbances generally result in paralysis of separate portions of the body, an arm or a leg—hemiplegia. Spinal disturbances generally produce paralysis on both sides—paraplegia. Peripheral disturbances generally paralyse only the particular muscles

controlled by the nerve (monoplegia).

It must not be supposed that only purely mechanical injuries or wounds in the brain, spinal cord, or nerves, can produce paralysis. There are, on the contrary, a whole number of injuries (some of them invisible) which finally produce visible paralysis. It can be produced by pressure (from ulcers or new growths), heat and cold, alcoholism, chronic poisoning (lead, copper, mercury, arsenic), infectious diseases (diphtheria, typhoid), and many other things. We know from experience that a sudden fright, or in the case of nervous patients, even a "fixed idea" can produce a real paralysis, without any perceptible anatomical basis (see hysteria).

The duration, progress, and retrogression of a paralysis, depend entirely upon the locality and severity of the originating disturbance. Most peripheral paralysis, resulting from infection, chill, transient pressure, chemical irritation, *etc.*, can be easily treated. On the other hand, hemiplegia and paraplegia, particularly when serious degeneration in the centres is involved, present little prospect of cure, and require great patience on the part of both the patient and his friends.

It is most important from the first to watch the further behaviour of the paralysed region. As the nourishing ganglion cells of the peripheral nerves are situated in the grey anterior horns of the spinal cord, in all peripheral paralysis the muscles, after four or five weeks, waste perceptibly (because the muscle is disconnected from its nourishing centre), and efforts must be, from the first moment, made to combat this atrophy by appropriate treatment—for which the electric current is of primary value.

Exactly opposite to paralysis (which is the incapacity of the muscle to contract voluntarily), are *spasms, which consists in the muscle being contracted, either without or against the will.* This may be either *tonic spasm*, whichlasts for a certain time, or *clonic spasm*, which consists of a series of spasms, with short intervals interposed. Thus, then, paralysis amounts to an impossibility of conveying to the muscle the impulse to contract, on account of injuries of the means of communication; and spasm on the other hand, amounts to a continuous or intermittent impulse to contract, being conveyed to the muscle, even against the will of the individual.

Spasms occur either independently or as secondary disorders in the most different forms at every age. We find children even of the tenderest age attacked by violent clonic spasms. Cramps are generally occasioned by either transferred or reflex symptoms of irritation, which come about in the following manner:—an irritation caused originally in a sensory nerve on its way to the brain, by the

intermediation of reflex centres situated in the spinal cord glides over into a motor nerve, and so occasions the involuntary contraction.

Tonic cramp occurs in the shape of spasms of the muscles which last for hours and even days in tetanus, lock-jaw, traumatic tetanus, and in severe cases of hysteria. Clonic cramp (convulsions) occur in most various degrees of intensity, from the minute tremor of the muscles in a drunkard to the paroxysms of an epileptic.

Clonic cramps (convulsions) occur in paroxysms in cases of hysteria, epilepsy, Saint Vitus's dance, hæmorrages on the brain, *&c.*, generally in the form of general convulsions. But we find, especially accompanying chronic forms of disease, convulsions of particular limbs (for instance, in cases of alcoholism, and poisoning, and in the case of nervous patients).

As paralysis and convulsions must be always occasioned either by disturbances in the nerve tracts, or irritations in the brain, they demand the most searching medical investigation and diagnosis, in order that the disturbing cause may be recognised and if possible removed.

Acute and Chronic Inflammation of the Nerves.

Having explained the meaning of paralysis and muscular spasm, I proceed to the numerous forms of disorders of the nerves, beginning with inflammation of the nerves. These are often met with, arising from different causes, and in acute or chronic forms, and invariably produce more or less severe disturbances in the sensations or in the capacity of motion in the muscles affected.

The commonest causes to which inflammations in the course of the peripheral nerves can be referred are:—*mechanical irritation* (pressure, bruises), *chemical irritation* (alcohol, lead, mercury, arsenic), *heat and cold*. But apparently spontaneous inflammations of the nerves also arise, which (particularly when they occur in acute forms and accompanied by fever and by general grave symptoms) must be regarded as infectious diseases; as also infectious constitutional diseases in particular (diphtheria, typhoid, diabetes, mellitus, anæmia) can occasionally lead to secondary inflammation of the nerve filaments, consisting in an initial swelling, and subsequent decay of the medulla of the nerves and of the axis cylinders.

The symptoms of inflammation of the nerves are both in the course of the malady and during the period of convalescence dependent upon the cause of the malady, and very varied; and it is best to distinguish

an acute and chronic form.

Acute inflammation of the nerves is generally a result either of chill, or of mechanical irritation, that is to say pressure or bruises. It is, in consequence, generally limited to a single nerve; but it can, as an acute infectious disorder, affect several nerves at the same time—multiple inflammation of the nerves. It shows itself always by severe pains in the region of the affected nerves, after which a full or partial loss of power of motion in the corresponding muscles ensues. Increased or diminished capacity of sensation, swellings of the part affected caused by congestion, alteration in the appearance of the nails, and other symptoms almost always appear only after the symptoms of paralysis.

The commonest forms of these inflammations of the nerves are those which affect the regions of the nerves of the face and the upper and lower extremities. A favourable termination of the malady almost always ensues after some weeks or months, the disorder of the nerves becoming cured, and the symptoms of paralysis simultaneously subsiding, as the conducting communication is healthily re-established.

Chronic inflammation of the nerves. The chronic form of inflammation of the nerves generally arises from irritations of a general nature, that is to say, from injuries which do not so much affect single nerves as some large nervous region, and more especially the central nervous mechanism. From this it will at once be understood that in these cases we generally find multiple irritations, that is to say, such as affect many if not all the peripheral nerves.

Abuse of alcohol, chronic infectious diseases (tuberculosis, *etc.*), and chronic poisonings play a large part in occasioning these forms of inflammation.

In these cases the malady almost always commences with severe flashing pains which shoot through the body. Soon distinct symptoms of paralysis often affecting the most different limbs lead us to infer that several peripheral nerve branches are injured. In many cases, particularly when the cause is chronic alcoholism, in addition to general mental disturbance and extended paralysis, we also observe great uncertainty in walking and standing. Frequently a somewhat long observation is necessary to determine with certainty whether the uncertain staggering gait of the patient is to be attributed to chronic inflammation of the nerves, or to tabes of the spinal cord—which has nothing to do with the malady which we are now considering.

The treatment. The first aim in all cases, whether of acute or chronic inflammation of the nerves, is the removal of the cause of the malady. We find (to mention an example) that severe paralysis due to abuse

of alcohol disappears with striking rapidity and completeness, if the patient is got away from alcohol.

In addition it is advisable in all cases to secure the affected muscular tract a fortnight's rest, and to make an effort to mitigate the pain. Consequently if an upper extremity is affected it should be carried in a sling. Inflammation of the nerves of the lower extremities demands rest in bed, and a fixed position for the affected limb.

After the lapse of these fourteen days, if the form of the malady has fully declared itself, and it is possible to draw exact conclusions regarding both the locality and the gravity of the injury, a commencement must be made of regular luke-warm salt water baths, professional massage, and above all of the use of the electric current, not only to combat the possible atrophy of the muscles which has already been mentioned, but also to stimulate and hasten the recovery of the inflamed nerves.

Of course, in all secondary inflammations of the nerves the greatest attention must be paid to the primary simultaneous malady—whether it be an infectious disease, or anæmia, or what not else: as no permanent good effect can be otherwise anticipated.

Paralysis of the Facial Nerves.

The seventh cranial nerve, or facial nerve, is particularly exposed to injuries, partly in consequence of its superficial position and partly on account of its close relations with the interior organ of hearing. More or less distinct inflammations can ensue and lead to subsequent symptoms of paralysis, which in accordance with the anatomical distribution of the nerve, principally affect the muscles of the face.

The inflammations of this nerve, and subsequent paralysis are principally caused by chills (for instance, draughts in railway carriages, that is to say severe cooling of the facial muscles on one side), mechanical irritations (blows on the face, tumours, injuries of the bone), or the migration of infectious germs from the pururlently disordered middle ear into the facial nerve.

The plainest indication of an inflammation having attacked the facial nerve is the disfigurement of the features on one side, which is so striking that it seems really difficult to mistake the nature of the malady, The whole affected side of the face hangs flabbily. The eye stands open, and either cannot be closed, or can be only partially closed by the patient, and the corner of the mouth on the same side is lower than the other, and has an appearance of being drawn away

from it. On the affected side the whole musculature of the face is completely without folds; and when the paralysis is on both sides the appearance of the face becomes gloomy and fixed. If the inflammation of the nerve is not limited to its facial part but also passes into the part in the cranial cavity, disturbances of the senses of taste and hearing, as well as paralysis of the soft palate may be added to the other symptoms.

The treatment. Generally rheumatic paralyses of the facial nerve (as they are called) are cured in from four to six weeks by the use of hot fomentations, steam baths, and soft massage (to be used only after fourteen days); weak electric currents if added, distinctly shorten the duration of the malady. In many cases the primary disorder which has caused the malady (purulent inflammation of the middle ear, mumps, *etc.*) must be treated and cured, before it is possible to get rid of the paralysis.

Affections of the Radial Nerve.

A practically important inflammation, which in many cases must be regarded as a professional malady, namely the inflammation of the radial nerve which runs down the lower arm, deserves a particular mention.

The radial nerve is much exposed to all kinds of injuries of a rough mechanical kind on account of its superficial position. An inflammation resulting from pressure may ensue from the bad habit of sleeping with the head rested on the upper arm, or from the pressure produced by using an unpadded crutch, or from a fracture of the upper arm, or even from its dislocation from the shoulder joint, or from other similar cause, where pressure occurs on the nerve trunks high up in the arm.

But a distinctly definite form of paralysis of the nerves of the forearm often affecting both sides, merits particular mention on account of its certain relation to long trade occupation with lead, so that it must be regarded as a metallic poisoning, and is described as lead-poisoning paralysis. The malady makes itself externally visible in the flabby paralysis of the muscles of the outer side of the lower arm in consequence of which the hand hangs quite loose in a hollow position.

The treatment. In the first week rest is necessary and tight damp wrappings around the arm, which must be held up in a sling. Weak galvanic currents must then be tried, salt baths of the whole arm and careful stroking massage. Afterwards methodical selected gymnastic

exercises are a good means for effecting cure. That the patient should try, if possible, to disengage himself from work that involves constant dealing with lead need hardly be mentioned, as many painters, compositors, and plumbers (who are chiefly exposed to this malady) show a distinct tendency to repeated attacks of lead poisoning. The poisoning can have very serious consequences which will be mentioned in a future section. (See lead poisoning).

Tetanus—Lockjaw.

At the beginning of this work lockjaw of newly-born infants was mentioned, which we referred to pollution of the navel wound and invasion by a specific irritant, and also to too great heat or cold of the child's baths.

In a similar manner the malady may occur among adults in consequence of a severe chill, but is certainly more frequently the consequence of more or less severe injuries, which occasion a tonic cramp of the masseter (chewing muscle). The muscles may be drawn together with the rigidity of steel, and the cramp may extend to the muscles of the neck, so that the patient's head is drawn backwards with a great distention of the anterior portions of the neck. The phenomenon is a result of infection of often insignificant wounds, with the specific bacillus of tetanus, which, in the majority of cases, whether of children or adults, terminates fatally.

The treatment is confined to the mitigation of the often very severe symptoms. The question of diet must receive great attention, and, if necessary, recourse must be had to feeding with enemas. In addition to this, lukewarm baths of long duration must be tried, weak galvanic currents, and bromide of potash.

Facial Spasms.

The most different irritations that may affect the nerves of the face (chills), or reflex irritations (parasites in the intestines, excitement, hypogastric disorders in women) may occasion the by no means unusual malady of facial spasms, which consist in this, that the patients are compelled, against their will, to be perpetually making grimaces, to wink their eyes, twist their mouths—in effect, have the muscles of the face in a constant state of clonic cramp. This strange looking complaint may affect one or both sides of the face; and,

occasionally, the malady becomes tonic, fixing the face in some distorted shape.—It is an ascertained fact that (as in the case of St. Vitus's dance) the malady can be propagated by imitation, especially in the case of children and hysterical patients; but usually some definite irritation is at work, either in the nerve tracts or at their base, to which the tendency to this kind of malady can be referred.

The treatment. We have almost always to deal with a long lasting chronic malady, which must be principally treated by a method of training, the patient being persuaded and influenced quietly to strive against the habit with all his energies. Punishing children is a grave mistake, the grimaces being mostly the result of involuntarily movements. The diet should be simple, but generous, with a complete exclusion of alcoholic and all other stimulating drinks. A prudent cold water treatment frequently produces marked improvement (see hysteria). Galvanic currents should also be tried.

Writer's Cramp, and similar "Professional" Cramps.

Writer's cramp is included among what are called professional cramps, which must be referred to an excessive strain put upon single groups of muscles. These maladies occur almost in similar forms in writing, cutting, cigarette making, piano playing, violin playing, among telegraphists, and others, and generally at the time when they have first devoted themselves to their calling.

In all these cases we find an incapacity to make certain muscles work together in the usual way. I select writer's cramp for description on account of the frequency of its occurrence, and because it affords us a good example of all other similar professional cramps of the hand. The malady by no means involves, as one frequently hears asserted, a tonic cramp of the thumb, or of the first finger of the hand as a leading symptom; but rather a trembling of the fatigued hand as soon as it takes up the pen, and an incapacity to write a single word clearly, or else a sudden strong convulsion of the hand which jerks the pen across the paper.

It is perfectly certain that in very many cases the cause is a direct mechanical irritation and excessive strain of the nerves which control the muscles. But on the other hand central irritations proceeding from the brain can certainly be contributive causes.

The treatment. The general state of health must be taken into consideration.—For the rest it is advisable to treat the malady locally with luke-warm bathing, massage, and electricity. In severe cases very soft pens with very thick holders should be tried.

Cramp in the Calves of the Legs.

The extremely tiresome and painful malady of cramp in the calves of the leg consists in a sudden contraction of the muscles of the calf, which become as hard as a piece of wood. The attack usually occurs during the night.

The cramp is frequently caused by over-exertion of the muscles of the leg during military manœuvres or during mountaineering. But these cramps also attack particularly pregnant women, and persons with varicose veins.

The treatment, in its simplest and most effective form, consists in rubbing, stroking, and striking the contracted muscle in every direction. In very severe recurrent cases warm salt baths and the galvanic current should be tried. Pregnant women may during the day put on with advantage a well-fitting bandage, and during the night a damp compress.

2. Diseases of the Sensory Nerves.

General intensification and diminution of sensibility. We turn now to the sensory nerves, whose disorders produce an intensification or diminution of the normal sensibility. It will be remembered that the action of these nerves is centripetal—that is to say, they conduct impressions received from outside to the brain, where these impressions become sensations.

A number of different perceptions (based upon daily experience) are often united to form the recognition of the exact nature of an impression made upon the skin. For example, a drop of boiling water falls upon the face of a man in sound health. The man feels not only that the water scalds (sensation of pain), but also that it fell on his face (sense of locality), and that it is hot (sense of temperature). Similarly we possess a sense of pressure, which informs us with how much force an object strikes the head; and a sense of effort representing the amount of muscular labour necessary to overcome a certain resistance.

All these sensations which in health, even with the eyes shut, convey to the surface of the brain an approximately accurate notion of the nature and degree of impression made upon the nerves—that is to say, give us an idea of it—can, in case of a malady of the sensory nerves, be in various ways either intensified or diminished. Patients exist whose sense of temperature is so much affected that they can touch red hot iron without feeling any sense of heat. On other

patients an experiment, made by pinching their skin whilst their eyes are shut, shows that they can feel the pinch, but are unable to indicate the locality correctly.

Practically, the phenomenon of greatest importance are the *diminution of the normal power of sensation*, which may amount to complete loss of feeling (anæsthesia); and *intensification of the normal power of sensation* (hyperæsthesia), which, when it is limited to the province of a particular nerve, we call *neuralgia*.

In the case of the diminution of the normal power of sensation, there can be no doubt that the very fine extremities of the sensous nerves of the skin have lost their capacity of apprehending the impression rightly; that is, of course, presuming that the conducting tracts have not been broken or injured. On the other hand, hyperæsthesia and neuralgia must be explained by an exaggerated sensitiveness of the nerves.

What anatomical changes may lie at the base of neuralgia (which can occur both in paroxysms and continuously) is not at present known. But it is certain that in the superficial nerves irritation, occasioned by low temperature (rheumatic pains of the nerves), and mechanical irritation (pressure during pregnancy, or blows) play an important part. On the other hand, it is clearly demonstrated that certain infectious maladies (intermittent fever) and chronic poisonings (lead, arsenic) are undoubtedly connected with certain nerve pains.

Neuralgia may attack people of any age, but it is well known that those between thirty and forty-five are particularly exposed to this malady; which can be most easily explained by the fact that people are, about this age, most exposed to injuries.

To commence with some general outlines of the symptoms, duration, and issue of neuralgia (respecting which we will mention all that is practically of principal importance), we may begin by saying that it appears with severe pain, occurring either in paroxysms, or lasting for a considerable time. These pains are limited pretty fairly to the course of the nerve, and are frequently accompanied by an intensification or diminution of the sensitiveness of the neighbouring regions of the skin. The course of the malady, to a great extent, depends upon its cause; chill, pressure, lead, alcohol, tobacco, pregnancy, ulcers; and the principal aim of the treatment must be to remove this cause, whenever that is possible. The course is sometimes short and favourable, but frequently long and wearying, and accompanied by very severe pain, so that, in addition to electricity, baths, packs, massage, and other local appliances, it is often necessary to give the patient narcotics to enable him to support the pain.

Neuralgia in the Face (Neuralgia of the fifth nerve).

Next to sciatica (which will be discussed in the next section) neuralgia in the three branches of the trigeminal nerve is not only the most painful, but also the commonest. The superficial position of the nerve may be the cause of this. Accordingly, as the first, second, or third branch of the nerve is affected, the locality of the pain may be either in the forehead and neighbourhood of the eyes, or immediately under the nose and on the upper lip, or, finally, on the lower jaw and the chin.

The pains always come on in paroxysms, and are described as either piercing or tearing, and are always extremely severe. Radiation of the pain into the neighbouring regions, and symptoms of reflex irritations (twitching of the muscles and excessive watering of the eyes) are frequently observed. The duration of each several attack is generally short, and most attacks (something like spasms of the stomach) subside after a period of from half-an-hour to an hour. But the least incaution may suffice to bring on another attack as painful as the first.

Persons of nervous temperament, and of generally delicate constitutions are very prone to neuralgia of the face, and the attacks are generally attributed to severe chills, by which must be understood severe chills of the face, in cutting north-east winds and in draughts in railway carriages. But maladies of the jaw, the nose, and the middle ear can also induce neuralgia of the face.

The treatment. First of all an attempt should be made to procure the patient some alleviation of his pain (which is often so excruciating as to extort cries of agony, and to compel the patient to rush about the room holding his head in his hands) with compresses as warm as the patient can possibly bear. In all paroxysms of pain warmth affords the surest and simplest relief.

If in spite of the hot moist compresses the pain does not diminish, a narcotic remedy should be ordered without hesitation. Its effect in relieving the pain may be absolutely relied upon.

After the patient's recovery from the first attack, it must be remembered that the malady never lets him escape with only one, and the general treatment must be continued, first in an attempt to be certain of the cause of the neuralgia. The possibility of secret mischief in the jaws, nose, or middle ear must on no account be forgotten. After they have been remedied neuralgia often disappears.

In the case of nervous or delicate patients care must be also taken to provide a *generous diet*, and to *harden the body*. *Daily cold washing of the whole body* must not be neglected. These take time, but will be repaid in many ways.

As in most disorders of the nerves, galvanic currents are often very serviceable in neuralgia of the face. But I must not omit to mention that cases sometimes occur of such obstinacy and of such frequency that surgical aid must be called in (extension or section of the nerve).

Sciatica.

The principal causes of the dreaded sciatica are also chill (lying long on damp ground, in bivouacs, *&c.*), pressure (pregnancy, constipation, riding) infectious diseases (influenza), and constitutional complaints (diabetes mellitus).

With respect to the locality of the pains which are often the only (but very sensible) evidence of the disease, it should be remarked that in the majority of cases they are felt about three or four inches from the coccyx on one side near the sacro sciatic foramen, through which the nerve issues from the pelvis to proceed down the leg. But the pain may also make itself felt along the further course of the nerve on the posterior side of the upper thigh and down to the hollow of the knee. Indeed it not seldom extends even to the lower leg and to the foot, making itself felt either on the upper part or on the sole.

Unlike the pains felt in neuralgia of the face, which generally have a piercing or flashing, twinging character, the pain of sciatica is rather permanent, and continuous, so that the patient often for days together leads a miserable life. If a slight alleviation of the pain appears to be setting in, the least movement of the bone suffices to raise the pain again to the highest degree. In all severe cases increased or diminshed sensibility of the skin or twitchings of the muscles appear as accompanying symptoms of irritation.

It is important to observe that in chronic cases of severe sciatica, in consequence of the patient's instinctive efforts to spare the affected side, a curvature of the spine with the convexity towards that side may ensue. This, together with the marked emaciation of the affected leg, produces a difficult limping walk on the part of the patient.

It cannot be denied that the course of many severe cases of sciatica is most fatiguing, and demands great endurance on the part of the patient. Nor must I omit to mention that in all cases of sciatica on both sides due investigation may detect indications of tabes of the spinal cord. Procrastination is in sciatica particularly dangerous; and everything depends upon the malady being early recognised and immediately dealt with.

The treatment. First of all the patient should be relieved from the

excessive pain of the several attacks, which not only imprison him in his bed, and take him away from his work, but also allow him no rest, and break down his courage day after day.—In sciatica damp warmth in the form of partial packs around the affected part and the upper leg are to be strongly recommended. With these should be combined a strong *perspiration treatment*, to support which a few grains of salicylate of soda may be given. This works promptly in most cases where the sciatica has resulted from a chill.—Any particular results are to be expected from quinine in those cases only in which intermittant fever (malaria, ague) has preceded the sciatica. Above all the removal of the promoting cause, when rightly known, is the best aim of the treatment, but one often difficult of attainment.

In all cases of sciatica attention must be paid to the regular action of the bowels. This is best attained by massage of the abdomen. The massage may be also extended to the hip and extremities of the affected side. Not only is the pain often mitigated by the massage, but the emaciation of the limb combated.

In recent times much has been said about the benefit, particularly in cases of obstinate sciatica, of *electric light baths*. *Warm sand baths* are also lauded. And in fact in the severest cases no remedy deserving of consideration has been left untried to give relief in this painful malady. Finally must be mentioned *galvanic currents*, *gymnastic exercises* (it is best to use special apparatus) in mild cases, and only during the painless intervals, and in desperate cases surgical assistance in the form of what is called stretching of the nerve.

Neuralgia of the Coccygeal Nerve.

This extremely painful neuralgia, happily uncommon, is situated in the coccyx. The malady is limited almost exclusively to women in middle age. But we are ignorant of any reason why women should have a special proclivity to this neuralgia. It is possible that the cause is the frequency of constipation among women, and the small attention which they pay to it.—Every movement, the motions, and even coughing or sneezing, can bring on the pain, which comes on in paroxysms that radiate from the coccyx towards the rectum, the bladder, and the kidneys.

The treatment is the same as that of sciatica. Daily warm hip-baths should be taken. Medical examination of the anus is always indispensable, as it is necessary to be sure that no tumour exists.

Nervous Headache.

"Headache" might quite as reasonably be classed amongst disorders of the brains, as we are compelled in many cases of headache to assume a distinct irritation of the central nerve system. But there exist also a whole series of primary pains of the cranial nerves which seem to deserve mention here, seeing that they come on in the same paroxysmal manner as other neuralgias, and, under the name of nervous headaches, play a painful part in the lives of many men, and more particularly in those of many women.

We must distinguish plainly between these nervous headaches and migraine, which has no connection at all with maladies of the sensory nerves. The general pains in the head also, which accompany fever, catarrhs of the frontal sinus, acute infectious disorders, acute alcoholic poisoning, accompanied by vomiting, *etc.*, are of a different nature.

Where the exact locality of the pain is in the several cases of nervous headache may only be conjectured. Generally, one will not err in assigning it to the fine nerve branches of the *dura mater*, and, assuming the cause as a mechanical impression made upon the nerve filaments in consequence of alteration of pressure, either positively, in consequence of congestion in the direction of the head, in full-blooded patients, or negatively, in consequence of want of blood in the brain, in the case of anæmic patients.—The pains are very different in different cases. Some patients complain of piercing, stabbing pain, others that they feel "as if the head was bursting"; many that they feel "as if their heads were being crushed in by an iron ring."

A particular form of this nervous headache appears to be occasioned in the interior integuments of the skull, or, more correctly, in its nerve filaments. This malady attacks veteran soldiers with old wounds on the head, school boys often struck on the head for punishment, and, particularly, persons who suffer from injuries of the bones of the skull. In these cases also the pains come on in paroxysms, often with long painless intervals. It is an interesting fact that these patients are barometers to themselves, and can frequently foretell changes in the weather from their own feelings.

Anyhow, all these nervous and habitual headaches (particularly common among nervous, anæmic, and weakly developed women, and by no means rare among men, especially those who are engaged in severe intellectual labour) constitute a very burdensome malady, and one often severely felt. It is a matter of common observation that

the temper of those patients is often much affected by the constantly returning pain who distress themselves unnecessarily with an apprehension that they must in time become mentally affected.

The treatment. To cure a nervous headache is an extremely difficult task. It is often quite impossible to ascertain the cause of the malady, to say nothing of removing it. It may be freely conceded that in these cases experience is more helpful than research. One patient will discover from his own experiences that he is soonest quit of his pain if he betakes himself to a completely dark room. Another finds relief in the open air. One obtains relief after a few hours by placing a cold compress around his neck, and swears by his water cure. Another begs that he may " not be bothered with wet rags," as they invariably make the pain worse.

When the attack comes on, *rest in bed*, and the application of *cold* should always be first tried. If the patient finds that he cannot bear the cold compress on the head (which is always worth trying), an experiment should be made with *cold running water* in the manner represented in plate XIII.

As medicines to be taken internally, *antipyrin*, *phenacetin*, and *quinine* have very similar effects. One remedy affords more relief to one patient, and another to another. A tumbler-full of effervescing salts of bromium has a good effect upon the general spirits of the patient, which are often much depressed. Two or three may be taken daily without harm.

If there is reason to suppose that the attack results from anæmia, the general prescriptions given in their place respecting this disorder should be followed. The patient, who desires to be permanently rid of troublesome attacks of nervous headache, should also certainly not neglect to submit both himself and his manner of life to professional medical examination.

3. Diseases of the Spine.

General Remarks. For the better understanding of diseases of the spine it is necessary to repeat here that the spinal cord is to be regarded both as a central organ and as a conducting organ. As a central organ it contains a number of centres of reflex action. As a conducting organ, its white anterior columns, and white lateral columns (the pyramid columns) conduct motor impulses proceeding from the surface of the brain to the spinal nerves, and to the muscles under their control. The sense of touch in the skin, and the senses

Poisonous plants.

1. Deadly nightshade. 2. Foxglove. 3. Common thorn apple.

of taste and temperature are conducted to the brain by white posterior columns. Finally the grey substance contained in the centre conducts the feelings of pain and communicates the reflex movements.

It follows from this that disease of the sensory conducting tract in the spinal cord must produce disturbances of sensation, and disease of the motory tract symptoms of paralysis or of cramp or spasmodic action of the muscles. But as the different tracts in the spinal cord lie very near to one another, and as, in any serious injury of the spinal cord, or in the course of inflammations or degenerations, various contiguous parts of the spinal cord may be simultaneously involved, it will be at once understood that in most cases of injury to the spinal cord extended paralysis, disturbances of the power of feeling, and injuries of the reflex will either at once or in the course of time appear

Inflammation of the Spinal Cord.

Though the spinal cord lies so carefully protected, inflammations may occur in it from injuries in consequence of severe accidents (being run over, stabbing), pressure (tumours, hæmorrhages), concussions (railway accidents), and in a secondary form as consequences of inflammation of the spinal canal. In all these cases disturbances of the powers both of feeling and motion may occur, varying with the locality and gravity of the injury, of so many different kinds, that it seems impossible here to consider them all. But inflammations of the spinal cord occur principally as consequences of acute or chronic infections diseases.

These inflammations are to be, without exception, attributed to a direct migration of the infectious germs (in small-pox, scarlet fever, typhoid), or to a gradual injury resulting from poisonous products of decomposition of an unknown nature. In all these cases we find either an acute or chronic inflammatory degeneration of the spinal cord. This may attack the whole transverse section of the medulla, or only one or more of the tracts. It generally affects the posterior columns, and more rarely the lateral ones.

Externally, the inflammatory process (which is always a serious malady) shows itself in a general, rapidly increasing weakness, commencing with fever, headache, and pains in the back, and quickly leading, in all cases, to an extended paralysis, and to the most varied disturbances of the power of sensation.

In acute cases of a real inflammation of the spinal cord the course of the malady is always short, and must be considered hopeless. In chronic cases, the malady may extend over several years. Inflammations arising from pressure produced by hæmorrhages in the integument of the spinal cord are the cases that offer the best prospects of cure, as it may be hoped that the blood may be gradually re-absorbed.

The treatment. From the first day the greatest attention should be paid to the patient's bed. If possible water-cushions or air-cushions should be provided, as the patients get extended sores from lying without their being aware of their formation on account of the insensibility of the skin. The completest rest, and lying perfectly still, are absolutely necessary that the focus of inflammation in the spinal cord may not be irritated by the patient's movements. Should the patient be unable to evacuate the urine or fæces, the bladder must be regularly emptied with a catheter, and the intestine by injections. If after a time the opposite phenomenon presents itself proper appliances must be used.

Medicinal aid is impossible in acute cases. In chronic cases a carefully directed anointing may be tried to influence the mischief generally lying at the base of the malady.

The rule of absolute repose in bed applies only to the cases that take an acute course. In chronic cases protraction, in consequence of the movements of the patient, need not be feared. Luke-warm baths may be used with advantage, and best of all *carbonic acid baths.* These can be prepared at home without any great expense. *Galvanic currents*, gradually strengthened, are also beneficial if judiciously used. But all patients must be from the outset assured that their condition can only be very slowly improved, so that they may learn to bear their malady patiently.

Myelitis or Sclerosis.

The disease called myelitis is by far the best known, commonest, and most serious disorder of the spinal cord. To explain it as simply as possible, it consists in a degeneration of the posterior columns and the consequent disturbances.

Whether this severe malady is ever primary (a consequence of chill, alcoholism, excessive physical exertion, debauchery, *etc.*), is a disputed point. But careful statistics from the great hospitals demonstrate that in ninety per cent. of all cases of sclerosis some preceding infectious disorder has existed, often at a long previous date, and usually only

with very few general symptoms.

The malady consists in a grey degeneration and atrophy of the posterior columns of the spinal cord. In the course of time (often after a long period) an atrophy of the nerve cells in the grey substance of the posterior horns is associated with this. The focus of the disease lies at first, almost without exception, in the medulla of the lumbar region, but subsequently ascends to the dorsal and cervical regions of the spinal cord.

The course of the malady must be described as extraordinarily slow. It can spread over twenty years. Whether a perfect cure is possible I personally doubt; others appear to believe it possible. But proper treatment of the malady, accompanied by an appropriate régime can restrict the malady, often for a great number of years to a relatively harmless, though still painful form.

In accordance with an old usage the course of the malady is divided into three periods distinguished by the symptoms which they present. 1, The stage of shooting pains; 2, The stage of disturbances in muscular action; 3, The stage of paralysis.—It must not be supposed that these three stages, each one of which may last several years, can be sharply distinguished. They pass slowly into each other, and develop in accordance with the progressive degeneration of the spinal cord.

During the first stage the shooting pains are the principal symptoms; as in neuralgia they come on in violent paroxysms. They attack the lower limbs especially, and are often for months mistaken for rheumatism, until other symptoms (a peculiar itching in the fingers, a feeling similar to that of an iron ring compressing the abdomen, of the feet being "asleep," &c,) lead the patient to a medical man, who from three other symptoms (loss of the tendon reflex at the knee, reflex immobility of the pupil, and degeneration of the optic nerve) diagnoses the disorder with certainty.

The development of the disease is never interrupted, but the progress is slow, and years may elapse before the second stage is reached. New strongly marked symptoms now associate themselves with those of the first stage. These symptoms attack first the lower and afterwards the upper limbs. The patient walks with laborious precautions but with irregular movements, moving the foot to one side instead of forwards, and places it on the ground with unnecessary force. These are not symptoms of paralysis. The patient has rather lost the feeling of the muscles; he is also unable to stand still with closed eyes; and staggers about.

The third stage—paralysis—always presents a sad spectacle. The

patient is helpless and confined to his bed. As the malady attacks the pyramidal tracts the paralysis appear first in the lower and then in the upper extremities. Bladder and rectum cease to be under control. Sooner or later death comes as a release, often with symptoms of what is called softening of the brain, to put an end to the hopeless condition of the patient, who generally desires the end of his days.

The treatment. I shall begin my description of the treatment by saying that if it is taken in hand betimes, and if due regard is paid to all the remedies at our disposal, it can be by far more hopeful than the public in general holds.

It is absolutely preposterous at once to give up all hope of a patient attacked with commencing sclerosis, to suppose that death is merely a question of time, and to arrive at other conclusions of the same popular kind. A prudently conducted treatment—whose results lie very much in the patient's own hands, and depend upon his conscientious compliance with the advice given him—may secure the patient a protracted period of almost undisturbed physical and intellectual health; and I opine that this must be regarded as a great gain. For this reason I would appeal to all patients who have been discovered to be undoubtedly suffering from this malady to pluck up their courage; and this is most opportune advice because experience shows that the patients, often without reason, take a by far too despondent view of their case.

The aim of the treatment is to limit the malady to the first stage: that is to say, to bring the degeneration in the posterior columns to a standstill.

Next a few words on what is called the inunction cure. This is the first step in every initial sclerosis. But it must be carefully watched, because it must be admitted that in many cases the remedy fails, and must be given up as useless if it does not after three weeks make a great difference in the shooting pains. On the other hand it sometimes has excellent results, and great confidence may be placed in it, especially in cases where an infection was contracted some months or years previously, and we can assume that the virus has not yet transformed itself into the later forms in which it cannot be influenced by mercury.

Of other remedies iodide of potash, arsenic, and nitrate of silver have a high repute, and should at least be tried in appropriate forms.

Continued use of the electric current is also important. This, which is called galvanisation of the spinal cord, is conducted in accordance with special principles. Electric baths, and recently electric light baths and hot air baths have been much used for the degeneration process

in the spinal cord.

Water treatment is also beneficial. The warm baths and warm salt baths containing carbonic acid of various watering-places are celebrated. But such baths can also be prepared at no great expense at home, and enjoy an excellent and well-deserved reputation as remedies. Cold washing of the haunches, luke-warm douches, and luke-warm packs of the abdomen and back at night should be regularly used.

Special gymnastic exercises are also to be recommended: one of the best holding the hands up and throwing the central part of the body forward ten times in succession. In large towns various appliances for gymnastic exercises are procurable, especially suited for use in the first stage of sclerosis.

Naturally the extremest attention must be paid to the general care of health and diet. Care should also be taken to provide suitable intellectual interests so that the patient may not sink into morbid fancies and low spirits.

For the frequently fatal disturbances of the bladder and rectum the directions above given respecting them should be followed.

Even when the pains are very severe morphine should be used only sparingly, and with great caution in the first stage. The remedy is one to which the organism becomes habituated. In the final stage it may be given without hesitation, and will be of great assistance to the patient.

Spinal Paralysis of Children.

This malady attacks almost without exception only little children between the ages of two and four. It consists in an inflammation of the anterior horns of the grey matter of the spinal cord, from which spring the roots of the motor peripheral nerves, that is to say, those which control motion. That chills (as is often assumed) can so much affect the spinal cord, which is so well protected, as to produce these serious injuries I personally doubt: and we are no doubt right in regarding this malady as an acute infectious disorder. That opinion is emphatically justified by the sudden appearance and rapid course of the malady, which always begins with high fever, pains in the back, spasms, and convulsions. If these symptoms abate after a few days paralysis of one or more members immediately ensues; and it is remarkable that these at first widely-extended paralyses retrograde again in the course of the next forty-eight hours very considerably, and appear afterwards to affect only a limited portion of an upper or

lower limb.

The paralysis that remains is loose and painless. In the course of time a distinct atrophy of the muscles of the member affected sets in; in consequence of which the development of the paralysed part naturally remains in a general state of imperfect development.

The treatment. During the acute attack the little patient must be kept in bed. Cold, wet compresses should be placed upon the nape of the neck, and cold, wet wrappings around the back. Electric treatment, with weak galvanic and Faradic currents, should be subsequently used, as well as massage, and methodical gymnastic exercises, with special apparatus, calculated to combat the atrophy of the muscles and imperfect development. The best nourishment and careful attention to the person (regular baths) must be insisted on.—In conclusion, I must not omit to mention that modern surgery is applying its methods (formerly inadequate to deal with such cases) more and more to this kind of disorder, and is able, by a very simple and ingenious operation, to restore a considerable amount of mobility to the paralysed portions of the body.

4. Disorders of the Brain.

General remarks. Before beginning to treat of the most important disorders of the brain, I shall remind the reader that, under the general term of brain, we understand the cerebrum, the cerebellum, and the *medulla oblongata*, all of which are connected together, and connected (by the medulla oblongata) with the spinal cord.

The white matter of the cerebrum consists principally of nerve cells, and represents the conducting tract of sensations and voluntary movements. The grey matter, forming the covering of the brain, is rich in nerve cells, and not only the centre of voluntary movements, but also of the senses and emotions. The cerebellum contains the centre of co-ordination of the movements; and the *medulla oblongata* controls regular activity of respiration and circulation.

Although, in a number of brain diseases, we know accurately the locality of the malady, we are in a whole series of other cases (for example, in hysteria and migraine) completely ignorant, both of the locality and of the nature of the injury which the brain suffers; and are unable, even by dissection, to discover any anatomical alteration. During recent years, however, our knowledge of the structure and functions of the central organ (notwithstanding its immense complexity) has made so great a progress that the time is constantly

approaching which will prove mistaken the remark of the celebrated anatomist, Hyrtl, that "the inner structure of the brain is, and will probably always remain a seven times sealed book, and also one written in hieroglyphics."

Congestion and Anæmia of the Brain.

I have already mentioned, when speaking of nervous headache, that the charging of the vessels of the brain with blood was not the same in all individuals, nor at all times. On the contrary, it is possible that under different circumstances (of which the increase or diminution of the heart's pressure is the most important) either an increased or diminished charging of the vessels of the brain with blood may come about.

The congestion of the brain with blood must be distinguished from hæmorrhage on the brain. In congestion, the blood remains in the vessels. In hæmorrhage of the brain the wall of the vessel is burst, and the blood is poured out on the brain. Congestion of the brain can either take the form of a sudden attack, or be acute, or continuous. It is often said that, in the majority of cases, the patients are little, thickly built men, with short necks, and very corpulent. Often a single impulse of physical or mental excitement, a drinking bout, or some similar cause, suffices to produce an attack of congestion.

A feeling of general discomfort and oppression, and an indefinite sense of solicitude, almost always precede the attack. The patient has a sense of being hemmed in, and then the actual attack ensues. It comes on with a feeling of giddiness, singing in the ears, flushing and throbbing in the great vessels of the neck. The pressure on the vascular system is sometimes so severe that the wall of a vessel gives way, and the attack then takes the form of an apoplectic fit, which naturally implies an extremely serious malady.

The treatment. As soon as symptoms of the approaching congestion appear the patient should lie down. The upper part of the body and the head should be slightly raised, so that the flow of the blood downwards may be facilitated. Head and neck should be well wrapped in cold, damp cloths. Around the lower legs and feet, on the contrary, warm to quite hot cloths should be placed to draw the blood down from the head. A strong purge will be beneficial—the simplest and most rapid in producing an effect is an injection of warm soap and water, with two dessert-spoonfuls of oil. Quietness, as complete as possible, will do the patient good. He should not speak;

and, if he can, should breathe slowly through his nose with closed lips.

To guard against returns of the attack, a prudent cold water cure, with sufficient bodily exercise, is strongly to be recommended. Great importance attaches to regular digestion. Relaxation, of some duration, from intellectual exertions, avoidance, as far as possible, of excitement, and moderation in the use of alcoholic drinks must also be imperatively ordered. Frequently repeated attacks of congestion always imply the possibility of the chance bursting of a blood vessel.

Anæmia of the brain can similarly occur in the form of a sudden attack, and then coincides with what is called fainting, or it may be a symptom of general anæmia (which we shall discuss elsewhere), and then shows itself especially in long continued headache.

Respecting the occasional anæmia of the brain (which alone concerns us here) we may observe that this can result from an excessive charging of other organs with blood (pregnancy), the blood being then withdrawn from the brain; or it may arise from *sudden fright*, from *great weakness*, from *hunger*, and in all these cases in which the blood pressure and the tension of the blood vessels is diminished in consequence of loss of blood (*cuts* and *wounds*, *bleeding after parturition*, *etc.*) In these cases of acute anæmia (want of blood), which is by some taken for a spasm of the arteries of the brain, complete insensibility ensues, which we describe by the term fainting. The patient feels his senses gradually failing, a cold perspiration breaks out on the forehead, thin saliva gathers in the mouth, the patient sighs, yawns deeply, things turn dark and swim before his eyes; and, if he has not already sat down, he collapses, to fall on the ground, lying motionless, with closed eyes and a perfectly colourless face.

The treatment. The patient should be laid down carefully, so that the head is a little lower than the breast; a simple device is to lay a cushion, or a folded garment, under the shoulders. The sound of the respiration should be carefully watched for, and the pulse felt—generally it is but just perceptible. If no pulse is perceptible, and no respiration audible, medical help must be instantly procured, and respiration in the interim is to be artificially induced, as in the manner described in its proper place.

In the case of severe fainting, with great loss of blood, a deep injection into the intestines of lukewarm water, to which salt has been added (a tea-spoonful to a pint), should be given as soon as possible.

In cases of fainting produced by fright, weakness or hunger, none of these precautions are necessary. The treatment should rather be limited to washing the patient's forehead with vinegar, which is

almost always in the house, and giving some tea-spoonfuls of wine or spirits, or sal-volatile and water between the patient's teeth. After this, it will suffice to wait patiently until the fainting fit passes off. It will seldom last more than twenty minutes. The patient on re-awakening is generally surprised at the position in which he finds himself, and can remember only that he felt ill, and "that everything seemed to be turning around him." Frequently an evacuation of the bowels ensues, with which the attack ends.

Apoplexy.

The nature of this malady is, that from some cause or another an artery in the brain bursts, and the blood is extravasated either between the integument of the brain and its surface or within the brain itself. The malady is unfortunately common during the best years of life.

The facts that hæmorrhage on the brain occurs distinctly more frequently among men than among women, and that it happens most frequently about the age of fifty, justify us in regarding this malady as one to some extent resulting from organic deterioration. The vessels of the brain in time lose some of their elasticity and strength if the demands made upon them by the excitement of business, by severe intellectual labour, or by frequent indulgence in alcohol, *&c.*, are too great. Nor can there be doubt about the connection between a degeneration of the arteries and hæmorrhage on the brain. It is evident that a chronically disordered blood vessel will be less capable than a sound one of supporting the pressure of the blood contained in it.

It must be conceded that short men of the build mentioned in the previous section are more exposed to apoplexy than tall thin men. But the habits of life are by no means without influence upon the conditions of the blood vessels. Men who habitually take great quantities of alcohol, and are at the same time great eaters, are much more liable to apoplexy than those who live frugally.

The symptoms of a fully developed apoplectic attack are so marked that they can scarcely be mistaken. Sometimes very small bleedings from the capillaries precede the actual bursting of the blood-vessel. These small bleedings reveal themselves only in pressure in the head, slight dizziness, and a feeling of heaviness in the head, until the apoplexy itself suddenly follows, and the patient silently collapses under the "stroke." He lies unconscious, with closed eyes, pale face and a loud rattling respiration. In the severest cases (those in which

the extravasated blood exercises a pressure upon the *medulla oblongata*, which contains the centres of respiration and of the heart's action) a painless death may ensue after a very short time without the patient's recovering consciousness. In other cases, equally common, the patient may remain in exactly the same condition for fully a couple of days or more before death releases him.

But in the vast majority of cases the apoplectic "stroke" is not fatal. Consciousness slowly returns, and often on the second day it is generally possible to see what the consequences of the breaking of the blood-vessel will be.

Almost always the foremost of the symptoms is a paralysis on one side. Either an arm may be affected or a leg, or both limbs on the same side. This affords us a pretty certain indication of the locality of the bleeding. If the right side is paralysed the bleeding is on the left surface of the brain; and *vice versa*; the centres of voluntary motion being in the outer part of the brain, and the filaments crossing from right to left, and left to right at the pyramidal decussation.

I may mention at once that these paralyses slowly recover as the blood is re-absorbed, and in mild cases of apoplexy may be completely cured. But in many cases there is not only a pressure on the brain, but also an actual disturbance of its substance. And in these cases a certain degree of paralysis remains. In time the paralysed limb languishes and becomes emaciated. A harmless intellectual weakness also not seldom sets in, which must also be referred to the injuries done to the surface of the brain. In addition to the paralysis other permanent symptoms (dependent upon the locality of the bleeding) can naturally ensue, amongst which what is called aphasia may be mentioned. This is the incapacity of the patient to say certain words, and results from an injury of the centres of speech in the anterior part of the brain.

The course of the disease may be of very different duration. In mild cases after from eight to fourteen days all traces of the stroke have already disappeared; but in many cases the recovery is very slow, and not seldom interrupted by a recurrence of the bleeding.

The treatment. The first thing to be done after an apoplectic stroke is to prepare the patient's bed befittingly, carefully arranging it in such a manner that the head may be slightly raised above the body. In the meanwhile someone should go immediately to procure medical assistance. At the first moment medicine is of little or no use, but a searching examination by a medical man, and his opinion on the case, are often of the greatest importance, as only an experienced

practitioner, after observing all the symptoms, is able to form an estimate of the severity of the bleeding, to inform the patient's family whether distant relatives ought to be summoned to his dying bed, or whether a return of consciousness may be expected, or whether the patient will be capable of making his will, and to answer other questions of the same kind. Care should be taken to maintain the completest quiet in the sick chamber. Sympathising, or merely curious friends, should on no account be admitted. The patient's head should be surrounded with damp cold compresses, and nothing that could possibly disturb him allowed to approach him.

Medicines can at first do nothing to affect the bleeding or to arrest it; and it is also extremely difficult to administer any to the patient, who so long as he continues unconscious has no power of voluntary swallowing. Only as soon as consciousness reappears a cordial is to be recommended. The best are wine, camphor, or coffee.—During the first eight days the patient should lie upon a perfectly smooth bed in complete rest. After not less than eight days, gentle massage may be begun, the use of the galvanic current and luke-warm baths, in order not only to improve the general condition, but also to ameliorate the paralysis and to combat the emaciation of the affected limb.

To guard as far as possible against a recurrence of apoplexy attention must be paid to regular digestion. Strong drinks, not only alcoholic, but also strong tea and coffee, are to be as much as possible avoided; and the patient must avoid all physical and intellectual efforts on account of the danger of consequent overstrain of the vessels of the brain.

Migraine.

By migraine we mean a distinct sort of particularly severe headache which comes on in the form of a sudden attack, and often affects only one-half of the head. This extremely wearying and obstinate malady especially attacks the female sex between the years of sixteen and fifty; and is so tormenting that it deserves a section to itself.

If it be enquired why women should suffer so much more than men from this complaint, the reason no doubt lies partly in the inherited much greater nervous sensibility of the female sex, partly in a woman's smaller power of resistance, and partly in the influence upon the nervous system of the monthly period. Personally I have never met with cases of migraine accompanying gout, rheumatism, and myelitis, of which I have heard many medical men speak.

If anyone, desirous of forming an exact idea of the character, duration, and locality of the pain of migraine, asks one after another the patients suffering from the malady for a description of what they suffer, each one of them has something different to relate, so that practically the form of the complaint must be very variable. But all patients are agreed about this, that the headache commences with a heavy and then piercing and insufferable pain in the temples and the regions above the eyes. Many patients find the attack begin with choking, nausea, and a general feeling of ill-health. In the case of others the headache continues until vomiting concludes the attack and the headache. With some the attack does not last more than an hour; with others it may continue in full force for four-and-twenty hours.

One of the regularly accompanying symptoms is a shimmering before the eyes; another the incapacity to open the eye on the affected side quite so widely as on the other. Other secondary symptoms of an attack of migraine are disturbances of the sensory power of the skin, convulsive motions, which almost suggest epileptic convulsions, an abundant incessant flow of tears, and other symptoms of irritation.

The treatment. There are so many "remedies" for migraine that one is compelled to fear that none of them deserve as much confidence as one would be glad to feel in them. Here, too, perhaps, personal experience is of more help than anything else; for every patient who suffers from migraine has some remedy, helpful to herself if to no one else, which she may well be left to use in peace. One takes fifteen grains of migranin, another fifteen of phenacetin, others quinine, coffein, salypyrin, or a tumblerful of Sandow's effervescing bromide water. Any one of these remedies may be recommended as worth trying. They can certainly do the patient no harm if they are used judiciously; that is to say, if a powder be taken only from time to time, if the migraine really occasions serious disturbance of the general health.

Of other remedies water treatment deserves special consideration. But here also the results are so diverse that every patient must discover for himself whether a warm or cold wet compress will relieve the head. Almost all patients find complete repose, especially in a dark room, beneficial; and I would add the advice that a thin tightly-fitting band should be fastened around the head, as I have found it particularly helpful to many patients. Those who have discovered that vomiting and so relieving the stomach relieves or shortens the attack, should have no hesitation about bringing on vomiting by tickling the throat.

Respecting the general treatment it must be observed that in many

cases it coincides with that of anæmia and general nervousness, and depends upon the nature of the underlying malady, whose detection is generally more easy than its cure. In all cases hardening the body by regular bathing, gymnastic exercises (especially swimming), living in the open air, and the many other methods of natural cure already frequently mentioned, are to be recommended if the patient wishes to have a real prospect of being permanently free from migraine within a reasonable time.

Convulsions in Childhood.

I have already remarked that the convulsions which appear in early childhood are almost always of the nature of transferred irritations, and in all these cases have some connection either with an injury of the nerves and the convulsions which follows from them, or with irritations of the cortex of the brain (at present unknown to us) which we are compelled to assume in epileptic or hysterical convulsions. We must imagine that some irritation (the majority are irritations of the digestive canal or of the exterior skin) which should be conducted by the sensory nerve tract to the brain, is by means of some reflex centre transferred to the motor tract and so carried on to the periphery of the body there to appear as a convulsion.

Most convulsions in children (naturally with the exception of those which arise in consequence of injuries of the head, or at the beginning of infectious disorders, or in consequence of tumours on the brain, *&c*, which are limited to no age) attack children of about from two months to fifteen months old. I must add here that children suffering from rickets and those which suffer from the consequences of poor nourishment, are those most frequently attacked. At the same time flatulency, catarrh of the intestines, and constipation, in short all irritations of the digestive canal (teething, and even too hot milk) can produce convulsions.

To describe the different forms of this disease of childhood in a few words I may say that convulsions can occur in different degrees from the slightest and scarcely perceptible distortion of the eye to the clonic convulsions, lasting for hours, which have caused so many a mother the most painful distress, based upon a groundless fear that the case was one of epilepsy.

A fixed stare of the child's eyes almost always precedes a severe attack of convulsions. The stare is accompanied by a certain stiffness of the whole body. Soon this rigidity of the muscles gives

place to quick jerks, which not only affect the mouth, and bring the corners of the lips into rapid distorted action, but also extend to the limbs and the trunk which are tossed hither and thither in jerky movements. The fingers are always tightly closed upon the palms of the hands. The patient is unconscious, and at the end of the attack the urine is often involuntarily evacuated.

The duration of the various attacks is very varied. We see cases of children with mild convulsions that last scarcely half a minute. But on the other hand the convulsions can last for hours, and I must not conceal the fact that in these cases, a rapid death may ensue, either in consequence of the failure of the heart's action, or especially in consequence of the muscles of the larynx becoming affected. But in the vast majority of cases the further development of the malady is thus: the convulsions subside with a gradual flushing of the face and abundant perspiration, and the little patient awakens perfectly well after a sound sleep.

The treatment. The child attacked with convulsions should be laid in a warmed bed, and should be freed from all constraining clothes. An enema of luke-warm water should be given as soon as possible, and the child should be given valerian tea to drink. If the convulsions last for a long time an attempt should be made to depress the tongue with the handle of a spoon, as this often has immediate effect. A hot bath should also be prepared in which the little patient may be placed for a few minutes. He should then be wrapped up whilst still wet and be packed, well covered up in the warm bed.

In case of a frequent recurrence of the convulsions attention must be paid to the general treatment. Diet must be attended to, and the treatment of rickets, which is frequently present must be taken into consideration

Epilepsy (Falling Sickness).

Epilepsy, in its fully developed form, is an independent disorder that comes on with violent attacks of convulsions and unconsciousness. It must be referred to some yet unknown state of irritation of the centre of the brain. It can occur in early childhood; and a great number of observations have demonstrated that the development of epilepsy, and a predisposition for the malady, are, to a great degree, dependent upon hereditary taint, that is to say, upon birth from neurasthemic or hysterical parents, as well as upon alcoholism, and mental disease in parents and grand-parents. Sooner or later, some

accident, an injury of the head, a severe shock, or something else of that kind, then suddenly leads to an attack; and the patient once attacked is only in the rarest cases completely cured.

For practical reasons it is important to distinguish between two different forms of epilepsy; and I shall describe separately *the fully developed form*, or motor epilepsy (called the *haut mal* by the French), and the *undeveloped form*, or *petit mal.*

In fully developed epilepsy the approach of the onset very commonly announces itself with a "warning" called the *aura*, felt by the patient. This *aura* generally only last so long as just to afford the patient time to prepare himself for the fall—that is to say to lay himself upon the ground. The *aura* is sometimes a slight twitching of the limbs, a motor *aura*; sometimes a feeling of tickling in the fingers, a sensory *aura*; sometimes a disturbance of vision, seeing sparks; or of the hearing, rustling, or the sound of a discharge; or sometimes a taste. The actual attack (or fit) immediately follows. The patient, if he has not previously laid himself down collapses, *with a yelling cry* regardless of where he falls—whether on the top of a flight of steep steps, or before an advancing vehicle that must the next instant run over him. (Hysterical patients on the contrary generally manage to sink safely to the ground in some safe locality). The patient is completely unconscious, and at first lies motionless, with wide staring pupils, and interrupted respiration. In consequence of the latter, a blue colour of the face ensues in about a minute. This condition of tonic cramp lasts, however, seldom more than that time, and then passes into the form of violent muscular convulsions. The tension of the face relaxes; the breathing is jerky and rattling; all the muscles of the face twitch convulsively. The jaws are ground against each other—regardless of the injuries which they inflict upon the tongue by biting it. A white or blood-stained foam flows from the mouth. Meanwhile the trunk is tossed hither and thither, until at last, after several minutes all the symptoms slowly subside, often with involuntary evacuations of the urine and fæces. The breathing now becomes more easy. An abundant perspiration breaks out on the forehead. The patient seems to recover consciousness slowly and regards the bystanders with wonder; but then generally sinks down again, to fall into a quiet and sound sleep. From this he generally awakes without having any suspicion of the attack that preceded it—apart from the fact that his stained clothes, and the injuries that he has done himself, and a certain feeling of heaviness in the head, prove that something must have happened.

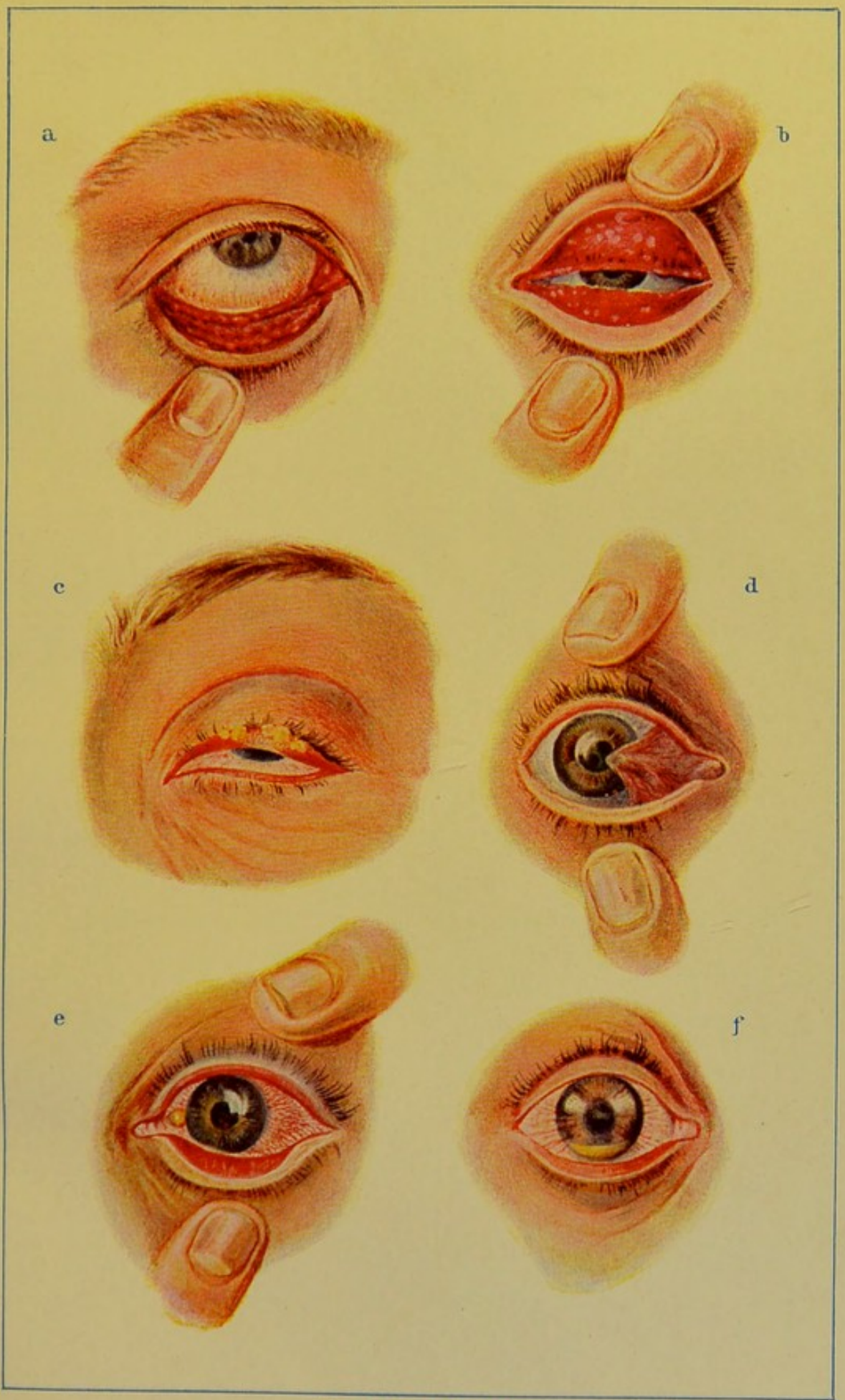
The undeveloped or preliminary form of epilepsy is essentially different

from that already described. The convulsions are completely absent, and the loss of consciousness is often so short and transitory that the patient himself and those about him often have no suspicion that the occasional dizziness and inclination to faint are really very small epileptic attacks—until a suddenly and fully developed attack of severe convulsions reveals the true character of the malady.

In this modified epilepsy, as we might call it, we have, however, a compensation for the actual attack of convulsions in the shape of more or less developed attacks of momentary mental derangement. Thus, for example, a school-boy whilst reading aloud suddenly stops reading. For a few moments he stares before him as if absent-mindedly; not seldom he at the same time mumbles some incomprehensible words. The teacher looks up, bids the reader to attend to what he is about, not to go to sleep, and so forth. But the boy returns to his senses, and continues to read on without any further interruption. Or, to give a different example of this modified epilepsy; a child at dinner suddenly lets fall the spoon he was raising to his mouth. His face becomes pallid, and his eyes are staring and wide opened. But before either parents or others have realised that something must be amiss the child comes to himself, picks up his spoon, unable to understand how it comes to be lying on the floor, and goes on eating his soup with an excellent appetite. If anyone asks, "What made you drop your spoon, boy?" he has absolutely no explanation to give.

Other patients have, as compensation for the severe attacks of convulsions, peculiar delusions, in consequence of which they may become dangerous to those about them. They suddenly become criminals, incendiaries, or murderers, or they are attacked with a mania for wandering which compels them to quit their homes and families, even in the middle of the night. A case of this recently came under my own observation. The patient was a plumber of five-and-thirty, subject to epileptic fits alternating with attacks of modified epilepsy. On two separate occasions, under the influence of the latter, he quitted his home in the North to stray over 200 miles South, each time returning as soon as he realised the aimlessness of his journey.

It seems very important to recognise this modified epilepsy, and not to suppose that the violent convulsions must always accompany the malady. These forms of the disorder must be also completely distinguished from hysteria, since hysteria and epilepsy often occur in the same patient, and can then lead to a peculiar mixed form of the two maladies. Recent decades have affected a great advance in the comprehension of the whole province of what are called cere-



Disorders of the eye.

a) Granular catarrh of the conjunctiva. *b*) Trachoma of both eyelids. *c*) Eczematous inflammation of the edge of the eyelid accompanied by falling off of the eyelashes. *d*) Ptexygium. *e*) Catarrh of the conjunctiva of the eye, and ulcer on the edge of the Cornea. *f*) Inflammation of the cornea and effusion of pus into the anterior chamber of the eye.

bral functional disorders—a name we give to a number of disorders for which we have hitherto found no anatomical foundation. Unfortunately statistics seem to prove not only that all mental maladies are increasing with an alarming rapidity, but also that our hurried excited modern way of living favours the development of epilepsy, hysteria, neurasthenia, and softening of the brain, and gives all these maladies new forms not previously observed.

Respecting the age at which epilepsy appears, and the duration and termination of the malady, I have already observed that it can appear in childhood, and it may be distinctly termed a malady of youth, but it may continue into advanced age, as only very few cases of real epilepsy are ever cured. The number of the attacks is very various. Some patients suffer from an attack only every two months, or even every two years, and in the intervals feel perfectly well. But in some cases the attacks follow one after another (sometimes to the number of twenty and more in one day), and in these last cases of severe epilepsy the mental condition almost invariably passes into idiotcy, if the excessive fatigue does not put an end to the lives of the patients.

The treatment. Whether it is possible to cure an epilepsy so that it shall never reappear may remain an open question. Many deny the possibility. But we do not know the anatomical base of the disorder, which must certainly be something very slight, or it would have been recognised before now. At present the most important thing is that epilepsy should be recognised as such from the outset, and a proper treatment applied. Under these circumstances the malady can be so influenced that the attacks may be rare and mild. This is of the highest importance for the patient, whose only hope of retaining his senses is that the intervals between the several attacks shall be of considerable duration.

What we call nervous taint or hereditary predisposition is decisive in the development of epilepsy. The malady itself appears in consequence of determining circumstances. This shows that above everything else children with a hereditary nervous proclivity should be sheltered from intellectual strains and excitements, as it has been observed that these distinctly favour the appearance of the attack.

A wholesome education in childhood, and one that keeps its special aim of saving the child from intellectual strain always in view, and the choice of a calling suitable to the child's condition, are also important matters. Parents are disposed to regard both far too lightly. Delicate boys are unfitted for fatiguing labour; and nervous ones should follow a calling that can be pursued in the open air. Delicate and anæmic girls should, at critical epochs, be exempted from severe

exertions instead of being sent out early to service or to work in factories. The passion for amusements (which is taking possession of the masses, and must be regarded with misgivings for their future) is distinctly dangerous to all exposed to nervous disorders.

If, however, in spite of precautions epilepsy declares itself, we have to deal first of all with the epileptic fit itself, and afterwards to aim at making the intervals between the fits as long as possible.—Regarding the fit the patient should be advised, as soon as he is conscious of the warning, to lie down on the floor, and, if the circumstances permit it, to give a word of warning to those about him to crave their assistance.

During the fit the patient needs only to be watched to see that he does himself no harm. It is a mistake to restrain the convulsive movements, to open his hands by force (as is often done), or to stretch out a limb straight, thinking that it shortens the attack. It is by far better that the convulsions should play themselves out; and patients who are subjected to artificial restraint during the attack lose their reason more rapidly than those whose convulsions are allowed full play without any hindrance.

Of medicinal remedies the salts of bromium are the most to be recommended. All three salts (bromide of potash, bromide of sodium, and bromide of ammonia) are best mixed in the form of Sandow's effervescing salts of bromium. A satisfactory result depends solely upon giving a sufficient quaintity of the remedy, which should be given rather in frequent than in strong doses, but so that no deleterious effect upon the nerves need be feared. The strength of the dose will, of course, be proportioned to the number of the attacks and to the age of the patient; and the circumstances of each individual case must determine how long the use of the remedy is to be continued, and how much the patient should on each occasion take.

In the interval between the attacks efforts must be made to keep the patient out of the way of excitement. Some patients suffer from attacks at night only; the reason of which may be ascertainable by a medical man.

The diet should be generous but simple. Vegetable is preferable to animal food; but nothing is to be said against the patients taking a little well cooked meat. Alcohol and all stimulating drinks (strong tea or coffee) are absolutely forbidden. Condiments should be avoided, as they merely produce useless stimulation. Water treatment in a mild form, particularly luke-warm baths, are strongly to be recommended.

In conclusion, an important point must be mentioned. Two reasons exist why epileptic patients should not marry. They are

personally unfitted for a married life, which produces an increase in the number of the fits, and they are incapable of having healthy children.

Neurasthenia.

Neurasthenia, or weakness of the nerves, is a malady of the nervous system resulting from a wearing out of the nerves. It has been recognised as an independant malady only during the last twenty years. It is classed with epilepsy and hysteria as a neurotic complaint, that is to say a complaint of the central nerve system of which no anatomical basis has yet been discovered.

In consequence of the hurried life of modern times, and of the great demand made upon mental activity, especially in large cities, neurotic diseases (that is to say hyperirritations of the nervous system) have unfortunately assumed enormous dimensions. Deplorable as it is, even school children already begin to exhibit symptoms of a generally developed weakness of the nerves, so that we are compelled to reflect anxiously upon the possible future developments of these symptoms.

Neurasthenia warns us as plainly as possible that our modern mode of existence, with its hurrying and driving, its struggles and competitions, with its avidity of wealth, its excitements and amusements, is on a wrong course; that our nerves are unable to endure without detriment the perpetual stimulation to which they are exposed, and that the interests of general health imperatively demand a simplification of education, of instruction, of commercial activity, and not least of all of the riotous amusements which, at least in great cities, are assuming alarming dimensions.

As in epilepsy and in hysteria, hereditary taint plays a large part in the development of neurasthenia in childhood. Very likely the bad example which young children of neurotic parents have daily before their eyes is of no small importance in the development of this malady in childhood. But the offspring of quite healthy parents may also succumb to the general nervous weakness (which embraces young and old, poor, and rich) under the pressure of constantly recurring anxieties, deprivations, and disillusions, and of a general excessive mental strain.

In describing the symptoms of true neurasthenia, I am purposely brief. My reasons are the same that will presently allow me to give only the simplest description of hysteria. I am of opinion that

reading of all the possible forms of their malady is more likely to do hysterical and nervous patients harm than good. So I shall say merely that the malady begins with slight fatigue, distaste for mental labour, headache and weakness of memory. Nausea follows, disturbances of digestion, and loss of appetite. After that, frequently palpitations of the heart, excitability, and the imagination of all possible diseases become more and more prominent. At one moment the patient imagines that some spinal disease must certainly lie at the base of his malady, next cancer, mental debility, and diabetes mellitus stand on the programme; and the patient is always furious when it is made perfectly plain to him that he is physically as sound as a bell, and that it is only his nervous disturbance that has inspired him with the fear of all kinds of diseases. A number of other symptoms of the malady might be mentioned, amongst which imaginations about things that the patients are compelled to do play a large part, but are passed over in the patient's own interest.

Regarding the duration and issue of the malady, I must not omit to mention that the cure of inherited weakness of the nerves gives by far less satisfactory results than the cure of weakness produced by over-exertion. For the consolation of anxious patients and their friends, I further add most emphatically, that all forms of nervous weakness are capable, if not of complete cure, at least of very much successful treatment if the patient himself has a solid resolution to get better.

The treatment. When the patient does all that he is advised to do, treating neurasthenia is an enterprise of a highly satisfactory kind, leading to remarkable improvement in the health of the sufferer. But experience has long ago shown that, to put it quite plainly, neurasthenic patients consider themselves by far cleverer and better informed than their medical men. In consequence, they conform only in the most superficial manner with the advice given them; wish however, in spite of that, to feel much better very soon; run from one remedy to another, and punish both themselves and their families.

For this reason one piece of advice must be given to every neurasthenic patient plainly and quickly—and the patient will please consider that I am here giving it—that if he wishes to get well rapidly, he must for a time completely give up his own views and his own will, and follow the medical regulations which I am going to give, but with an explanation that my counsels can of course be only of a general kind, and will need to be supplemented by others according to the age, character, strength, *&c.*, of the patient.

First of all every neurasthenic patient should investigate the cause

of his malady. In all maladies the discovery and removal of the cause of the mischief is the first step towards cure.

If the patient is a child attending school, the parents are urgently advised to consider whether a proper proportion exists between lessons at school, work at home, and recreation for body and mind, and, if it is possible, to make the child's life somewhat easier.

It is a great mistake, when a child is already by far too heavily burdened with the performance at home of the tasks set him at school, to shorten his play time with additional lessons, music lessons, dancing lessons, and so forth, particularly when the child in question is not either physically or mentally in perfect health. It would be far better for him, instead of spending his time after school in studies of this kind, to play in the open air, which will strengthen his lungs and limbs, and give him the necessary appetite for a simple and wholesome supper.

If the patient be an adult practically the same thing must be placed before him: or, in other words, after he has performed his really necessary day's labour, he should not burden himself with ever so many other unnecessary tasks which prevent him from spending his leisure hours at home, and from affording his nerves a chance of repose. In these days a man supposes that he is not of sufficient importance, and is not making a sufficient use of his life if he does not occupy six honorary appointments, and is not also member of a number of societies, associations, institutions, clubs, and so forth. But herein lies the difficulty—we have forgotten how to enjoy ourselves simply, we have strayed too far from nature, and are seeking the remedy in boisterous, intoxicating, physical, and intellectual pleasures, which are in reality poisons.—The great remedies for neurasthenic patients are *water*, *fresh air*, *and modified exercise*, with ample rest.

Well-to-do patients must be strongly recommended, before the mischief has advanced too far, to pack their portmanteaux and to be off somewhere where they can live in the fresh air, and on a simple or milk diet, or else to betake themselves to a sanatorium.

If the patient's resources forbid that, or if the circumstance in which he finds himself situated render his taking a holiday impossible, after a proper regulation of the proportions of work and rest, a great deal can be done at home for the cure, or at least for the amelioration of neurasthenia.

First of all a light, simple, and easily digestible diet should be arranged. A regularly conducted milk-cure often produces wonderful results. The patient should take at least five meals daily. At first the quantity of food to be taken at each meal need not be great; but after a

short time the meals agree so well with the patient that he himself asks for more.—The meals may be arranged somewhat as follows :—

Early in the morning, one pint of milk warm from the cow and a roll well buttered.

10 a.m., a cup of cocoa or meat broth, with white bread.

12.30 p.m., a simple mid-day dinner of soup, meat, vegetables, and fruit.

4 p.m., a pint of warm milk and buttered roll.

7.30 p.m., an evening meal of soft-boiled eggs, and bread and meat sandwiches, and a pint of warm milk.

Of course, this bill of fare must be regarded merely as a rough guide, particularly with respect to the hours of the meals. In general the nervous patient does not suffer from maladies of the stomach, and may confidently allow himself a mixed and generous diet.

Of medicinal remedies iron, taken in connection with quinine or peptone, is often very beneficial to individual patients, particularly in youth. There are very many excellent modern preparations of iron in combination with various other drugs, essences, &c.

Alcoholic drinks and tea and coffee are best used as little as possible, though they need not be entirely forbidden. The same rule will apply to the indulgencies of life (smoking concerts, theatres, *etc.*), which need not be given up, but should be brought within reasonable limits.

Water treatment is excellent for neurasthenic patients if rightly applied. But the patient must be strictly cautioned to begin only with the milder forms of the treatment, and not with cold water. Experience proves that many neurasthenic patients can only slowly accustom themselves to water treatment; but afterwards become so attached to it that they seem to themselves to miss something, and to feel uncomfortable all day if they have not had their morning douche or cold rubbing down.

Hysteria.

It was often said, some years ago, that hysteria was nothing else than the malady known in the male sex as weakness of the nerves (neurasthenia), which we have just described. But this is only approximately true of those quite mild cases of nervous excitement, which may be every day observed in girls or women physically or intellectually overtasked. This, however, is not hysteria, but is to be regarded in any case only as a preliminary stage of hysteria, and to be

treated in accordance with the principles set down in the last section.

It has for many years past been made perfectly certain that hysteria (under the influence of heredity, and the incredible increase of the strain placed in these days on the nervous system) has assumed the form of so characteristic and independent a malady that it must be completely separated from neurasthenia, and no longer regarded as a disorder limited to the female sex.

The people who shrug their shoulders and laugh at hysterical patients are under a complete misconception about the nature of the complaint. Hysteria is a serious nervous malady, based upon a disordered over-excitement and irritability of the central nervous system ; from which both men and women suffer.

As in epilepsy and neurasthenia, so also in hysteria, hereditary taint is of great importance, and we consequently feel no surprise when "nervously disposed" children, especially girls, whilst they are still at school present cases of fully-developed hysteria.

Hitherto no pathological changes in the nervous system have been anatomically discoverable in hysteria ; and we are fully justified in assuming that we have to deal only with a disordered increase of irritability, affecting principally the cortex of the brain, in consequence of which it is impossible for the patients to give expression to their thoughts, feelings, and movements in a normal manner. But in hysteria we have also an increased reflex irritability (such as we observed in the convulsions of children of tender age), which is shown not only by the manifold forms of convulsions which are amongst the commonest secondary symptoms of hysteria, but also by the ease with which all possible irritations of the skin, the digestive canal, and the sexual sphere, are translated into reflex convulsions.

Though, as I have already said, hysteria is generally inherited, and comes to light sooner or later under the influence of a generally erroneous bringing up, it can, like neurasthenia, be contracted in later years. The causes which bring a patient who has a constitution insufficiently capable of resistance into a hysterical condition are principally misdirected lives, unfortunate proclivities, unhappy marriages, childlessness, worries, anxieties, severe maladies (particularly of the lower abdominal regions), deleterious literature, unsatisfied ambition, association with other hysterical people, and other such circumstances.

I have now on the one hand taken the part of many misunderstood and ridiculed hysterical patients by pointing out that hysteria is a malady which ought to be seriously regarded. But I must describe the very manifold symptoms of hysteria as briefly as possible, because

(as in the case of neurasthenic) I hold it a mistake to give nervous or hysterical patients an opportunity of dwelling upon the phenomena of their "interesting malady," or of extending their programme (seeing that all hysterical patients are prone to imitation) from the hints afforded them by my descriptions.

I shall only point out that hysterical patients, in all that they do and feel, are under the influence of their own excited brains; so that the variability of their dispositions, their moodish temperament, their exaggerated descriptions, and their often incredibly heightened or lowered impressions must be interpreted by that phenomenon. If any accidental irritation (the recurrence of the menses, or an attack of flatulence, *etc.*) is added to complicate the always exaggerated excitability, that generally suffices to induce the hysterical attack.

The disturbance of the senses of the hysterical often show themselves in a heightened sensibility to any irritation of the skin. Often the tiniest needle-prick is felt as severe physical pain. On the contrary, we sometimes find so great a diminution of feeling that a needle may be driven deep into the muscles without the patient feeling anything. Similarly, in some cases, sight, hearing, and taste are essentially dulled; in others, so intensified as to cause astonishment.

The disturbance of the powers of motion reveal themselves sometimes in paralyses, that occasionally appear gradually, but more often suddenly, after some excitement, so that an arm or leg becomes useless, the patient in the latter case being confined for a long time to his bed. Sometimes cramps and convulsions appear. The cramps may be of long duration, and lead to the distortion of a limb. The convulsions may, in the form of quick jerks or tremors, affect only one part of the body, or may appear as general convulsions, coming on in attacks, not unlike the convulsions of epileptics, and often, on the occasion of the first attack, mistaken for epilepsy. In general, however, we may observe, as a distinction between the two maladies, that the epileptic falls unconcerned about the danger of his situation, and often incurs serious injuries in consequence; also, that during the convulsions, he is completely unconscious. The hysterical patient manages to fall with circumspection, pays attention to his clothes, and to not hurting himself, and to being seen when he falls. His consciousness during the convulsions may be confused, but it is not suspended.

Of all the other innumerable symptoms (by far more widely developed and more varied among the Latin than among the Teutonic races) I shall here mention only that the patients complain of the most varied, and often most preposterous disturbances in the sexual sphere, and in the organs of digestion (a feeling of a dumpling in the

throat), and that groundless and evidently exaggerated complaints of this kind must always awaken suspicions of hysteria.

The treatment. In hysteria, as in neurasthenia, much must depend upon the goodwill of the patient, who can himself do much to ameliorate, or to aggravate, his own condition. It must, at the same time, be admitted that most hysterical patients please themselves with considering their condition very interesting, and require to be seriously and quietly assured of the foolishness of this opinion. It is also generally necessary to provide the patient with some occupation, to put some aim before him which he may exert himself to attain.

The patient's complaints should be at first listened to quietly and sympathetically. A careful examination should follow, to be quite sure that some other malady does not lie at the base of the hysteria; for a functional disorder of the digestive canal, or the sexual organs, often causes it. The greatest care should be taken that the patient carries out conscientiously all the directions of the medical man. These will be generally so arranged that they will keep the patient occupied throughout the whole day—a device that much assists the treatment, because, in this manner, the patient is kept occupied and has no time for worrying over his maladies, or pouring them into the ears of his neighbours, a well-known foible of all hysterical people.

During the hysterical attack itself, the patient requires absolutely no assistance. After it is over too much should not be said to the patient about it; and much importance should not be attached to it in mentioning it. Even the sympathy felt for the patient should not be too warmly expressed; as that will be very likely to occasion another attack.

As for the paralyses, the patient can be relieved from them if he chooses, if only electricity, cold water, exercise of the affected limb, strong massage, and similar remedies are applied from the outset. Promising the patient the gratification of some cherished wish often produces a wonderful effect in the way of curing the paralysis or averting a threatened attack—if it is not hinted that the attack or the paralysis is pretended in order to compass the wish.

The general directions given in the sections on neurasthenia and anæmia for strengthening the constitution and averting nervous trouble also deserve fullest attention in hysterical cases, and I refer the reader to them.

Chorea, commonly known as Saint Vitus' Dance.

Saint Vitus' dance is a peculiar malady connected with irritation of

the cortex of the brain. It affects, with the rarest exceptions,* young people from six to fifteen; and shows itself chiefly in an involuntary movement of very different groups of muscles.

Hereditary nervous disposition is considered primarily responsible for the appearance of the malady, as in the case of the nervous disorders previously described. But this does not alone suffice to produce Saint Vitus' dance. Some accidental cause must also concur, and in many cases rheumatism of the joints has been found to be one. On the other hand it has been observed that nervous children need to be but a few hours with playfellows suffering from Saint Vitus' dance to exhibit all the symptoms of the malady, in consequence of the powerful instinct of imitation possessed by all children and particularly by those of the female sex.† I remember a few years since attending three sisters in one family all suffering at the same time from Saint Vitus' dance. The mother informed me that the eldest had previously suffered from the disorder, and she had no doubt influenced her sisters. Scarlet fever and measles also frequently induce the malady, but we are still completely in the dark respecting the connection of these infectious diseases with Saint Vitus' dance, and the various scientific speculations on the subject would not interest the reader.

Saint Vitus' dance hardly ever appears at once in fully developed form. It generally begins gradually with a constantly increasing development. Not rarely a morose, peevish humour, and rheumatic pains in the limbs seem to predict the malady. Almost always we find during the first days a jerky movement of the hands, or of the eyelids, or of the corners of the mouth, *&c.*, alone. The patient, chided by his parents, cannot restrain them, even when he exerts himself to do so. On the contrary, the movements become constantly more serious, they extend to wider and wider groups of muscles, and not seldom, after a few days become so violent that all the muscles of

---

* Cases of true Saint Vitus' dance have been observed in pregnant women, always during a first pregnancy.

† Some ten years ago I had a remarkable experience of the strong imitative instinct of children. I had undertaken about fifty revaccinations in a village, and used the spacious school-room. In accordance with my directions, the children who had been vaccinated sat together on a bench. When I had nearly completed the vaccination, one of the children who had just been vaccinated was suddenly taken ill, and fell on the floor close to me in convulsions. But what was my surprise when during the next minute five or six others of those I had vaccinated, who up to that moment had been quite merry, fell from the bench in convulsions, and had with difficulty to be got from underneath it. A few minutes later they had all recovered, and asserted that they had never before suffered from convulsions.

the face, the tongue, and the limbs are involved, and in constant motion, resulting thus in a malady of serious form which demands constant watching and attention.

Respecting the duration of this curious disorder I may remark that a duration of at least from six to eight weeks is to be anticipated. The duration may be a full month longer; and cases of true St. Vitus' dance have been observed which appeared to be completely healed in a fortnight. In general, the length of duration is shorter in proportion as the attacks are sharper.

The treatment. First of all, the child should be kept from school, and at home, as soon as the first involuntary movements are observed. The further development of the malady should be watched before rest in bed is enforced. The child should not be allowed to guess the nature of his complaint, as experience shows that this may aggravate the malady.

At this point a lukewarm bath, followed by wet complete packs for half-an-hour, is often very beneficial. In general, water treatment in a mild form should occupy a foremost place in the cure. As medicines to be taken internally, valerian tea and suitable doses of effervescing salts of bromide almost always produce the desired result. Both remedies act soothingly on the nervous system, and can certainly do the patient no harm.

The misgiving of many parents that after St. Vitus' dance "something may remain" is ungrounded. It is true that mostly children of a nervous temperament are attacked; and, in consequence of this nervous temperament, hysteria, neurasthenia, or epilepsy may, of course, be subsequently developed. For that reason, all parents are to be advised, after a child has completely recovered from St. Vitus' dance, to guard him, as far as possible, from all excessive strains, either physical or mental, and to prepare him for the hardships of life by a good and sound bringing up.

Basedow's Disease.
Better known as Grave's Disease.

Before quitting the equally important and interesting subject of nervous maladies, I shall call the reader's attention to a not uncommon and very singular malady, known as Basedow's disease, discovered by a Mersburg medical man of that name in the middle of the last century.

Grave's disease, which must be regarded as a general nervous

disorder, shows itself chiefly in three symptoms, a *striking acceleration of the pulse*, *protruding eye balls*, and a visible and palable *enlargement of the thyroid gland.*

Accordingly, as all these symptoms are fully developed, or only one or other of them, and, perhaps, only insignificantly, we speak of a "greater" or "lesser" Grave's disease.

Respecting the promoting cause of this certainly striking complaint we are, it must be confessed, still completely in the dark. The malady is assumed to consist substantially in a state of irritation of the sympathetic nerve system, and supposed to be a consequence of nervous taint, hysteria, anæmia, long continued anxiety or vexation, family financial difficulties, or sudden shock of the nervous system—injury, fright, joy.

It is certain that irritation of the internal sexual organs (disorders of the ovaries, pregnancy) sometimes give the first impulse; and this coincides with the fact that chiefly nervous, anæmic women, between twenty and forty, show, more or less, evident signs of this disease.

Proceeding to a brief examination of the three symptoms mentioned above, we find that the *acceleration of the pulse* is always the first and most certain evidence of the chronic and slow development of the malady It is not necessarily always observable, but at the beginning of the malady occurs upon any, no matter how small, irritation of the nervous system, and shows itself particularly in the fact that the patient himself feels quite distinctly the rapid working of his heart—subjective palpitation of the heart.

The *enlargement of the thyroid gland* is not always so evident and invariable as the increased activity of the heart. I remember cases of a girl of fourteen and of a youth of about eighteen, in which the formation of the swelling on the throat, at first very plain, after some months completely disappeared, whilst the acceleration of the pulse and prominence of the eyeballs continued to increase.

The third symptom, *the prominence of the eyeballs*, always affects both eyes, which appear to be almost set upon pedestals. The face assumes in consequence a peculiar appearance, the opening of the eyes seeming unnaturally wide.

In addition to these three symptoms of the malady the patients almost always complain of a whole series of other disturbances which must all be referred to an irritated condition of the nervous system. I mention here only a *paroxysmal tremor* (especially of the hands), an *excitable disposition*, with a special proclivity to sudden convulsive weeping, *quickly changing sensations of heat and cold*, general *muscular weakness*, with evident *emaciation*, and multiform *disturbances of the lower*

abdominal organs.

The treatment of this disease, which almost always takes a chronic course, and requires to be combated seriously, has a prospect of satisfactory results only in the case when the patient is resolutely determined to get well. Patients suffering from a commencing Grave's disease must be plainly told that to "let themselves go" is the very worst thing they can do. They must not excite themselves about every trifle. They must learn to master their excitable temper. They must learn to look at life from the bright side—which is just what many of them can with difficulty resolve to do.

With medicine little can be done except to improve perhaps a general anæmia, or to assist with a medicinal stimulant a feeble digestion, or a loss of appetite.

On the contrary, water treatment in a mild form deserves great attention. Nothing could be more mistaken than to begin immediately with an energetic cold water treatment. The case would certainly be made worse instead of better. But luke-warm water baths and circumspect rubbing down may very well be tried.

When circumstances allow it a regular visit of a month to the seaside at some locality medically recommended is strongly to be advised.

All excitements, not only stimulants such as tea, coffee, alcohol, tobacco, etc., but also intellectual excitement, exciting plays, concerts, and balls continuing late into the night, are for such patients poison.

Physical exertions (gymnastics, dancing, mountaineering) are also dangerous. Members of the family should also lay it seriously to heart that they must treat the patient with great consideration, and on no account provoke or irritate him. It is only under these circumstances that the situation can remain tolerable, and perhaps change for the better.

CHAPTER XII.

Diseases of the Eyes and Ears.

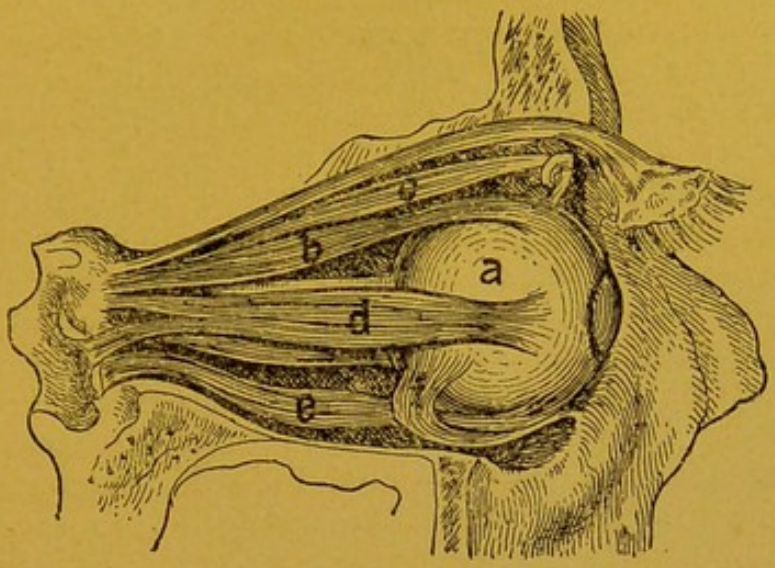
General remarks. The present work is intended to be a practical useful guide to invalids, and not a treatise on anatomy; and it would take me beyond my limits were I to attempt to explain to my readers the extraordinarily ingenious and delicately constructed structure of the smallest portions of the organs of sight and hearing. But I consider it absolutely necessary to make some preliminary remarks respecting the simplest elements of the structure and functions of these organs. It would be perfectly useless to wish to give the reader some notion of the nature of conjunctivitis, or of catarrh of the middle ear, when we had no notion what the *conjunctiva* or the middle ear were.

At the same time, I consider it my duty strongly to urge all readers of the present chapter never to regard disorders of the eyes or ears as of small importance; and on no account to suppose that, after they have read the following instructions, they will be in the delightful position of being able at once to recognise correctly, and even to cure all the diseases of the eyes and ears. The aim of such books as the present can never be to say to the patient, "cure yourself." The aim and use of popular scientific works is rather this, that they instruct the reader and show him how to be able to judge for himself when he is in a position to cure a commencing malady for himself with simple means, and when, on the contrary, he must place it in the hands and under the treatment of a medical man.

Structure and functions of the organs of sight. The eye, a transparent hollow sphere, lies in the bony cavity of the orbit, and can be voluntarily moved in every direction by six muscles. We distinguish, attached to each eyeball a superior, inferior, interior, exterior, and two oblique muscles.

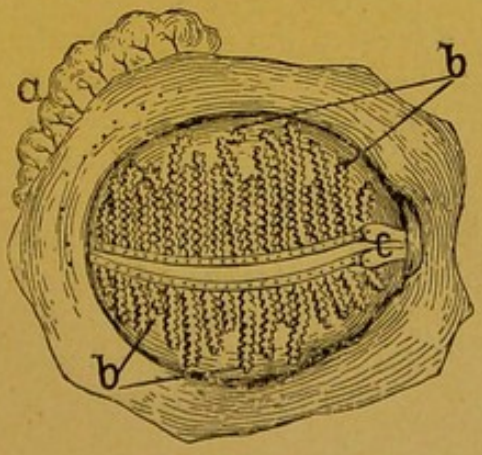
As the anterior surface of the eye is completely bare, it is protected

by a moveable covering of skin, divided in the middle, forming the eyelids. These, in addition to protecting the eyes, keep the anterior



The muscles which move the eye.
a, eyeball; b, right superior muscle; c, great oblique muscle; d, exterior muscle; e, inferior muscle; f, lesser oblique muscle.

portion constantly clean and bright by their closing and reopening. The eyelids are two thin folds of skin supported on a cartilage placed between them. They bear eyelashes on their edges, which like the eyebrows placed above the eye serve to protect the eye from dust.



The eyelids viewed from within. A. Lachrymal glands.
B. Meibomian glands. C. Puncta Lachrymalia.

The inner surfaces of the eyelids, which rest upon the ball of the eye, are covered with delicate mucous membrane, which is called the

conjunctiva.—Upon the free edges of the eyelids, close behind the eyelashes, are the discharging outlets of a series of small glands, the meibomian glands.

In order to prevent the eye from becoming dry it is constantly moistened by the secretions of the lachrymal gland, spread over it by the motions of the eyelids. The lachrymal gland is situated above the outer corner of the eye, behind the upper eyelid. It is about the size of a bean, and has glands arranged in bunches, like the salivary glands. The lachrymary gland discharges its slightly salt secretion through a series of delicate ducts, under the upper eyelid, whence the tear-fluid is, by the motions of the eyelids, distributed over the eyeball, and lead towards the inner corner of the eye. Here it is gathered and drawn through two plainly visible small orifices (the puncta lachrymalia) into the lachrymal canals. The latter discharge into the lachrymal sac, from whence the fluid is further conducted by the nasal duct into the nose, where it mixes with the mucus.

We will now turn to the structure of the eyeball itself. We may describe it as a hollow sphere, consisting of three layers, placed one within the other, and containing in their centre a partly fluid and partly solid refracting nucleus.

The first or external layer, which contains the whole eyeball, consists of two sections of very different size. The larger, called the *sclerotic*, covers not only the whole posterior eyeball, but also forms the white of the eye; the much smaller circular transparent section, called the *cornea*, is placed in the centre of the front of the eye like a round glass.

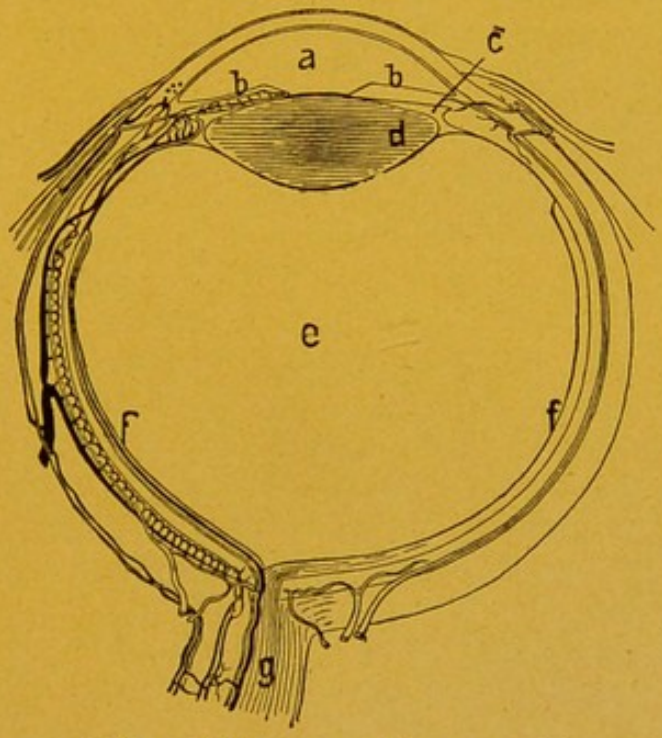
The second or middle layer of the eyeball is called the *choroid*. The greater part of it lies in close contact with the sclerotic, and, by means of its numerous blood vessels, nourishes the inner eye. In front it forms a circular disc, placed perpendicularly behind the sclerotic. In the middle of this disc is an aperture, the *pupil*, through which the rays of light pass. This perpendicular portion of the choroid is the *iris*. It serves to regulate the entrance of light from outside, as the pupil can be either enlarged or diminished according to need, it serves also as a screen for what are called the side rays. According to the colour of the colour cells placed in the iris we speak of blue, brown, *etc.*, eyes. In albinoes there is a congenital absence of these cells, in consequence of which they have, like white guinea pigs, clear irises, through which the blood vessels show.

The third and innermost stratum of the eyeball is called the *retina*. It is formed of an expansion of the fibres of the optic nerve. This nerve, after cutting the orbital cavity enters the eyeball at the back,

Poisonous plants.

1. Hemlock. 2. Henbane. 3. Meadow saffro = Autumn Crocus.
4. Monkshood.

spreads itself, in the form of an integument abounding in nerve cells and consisting of ten several strata, over the interior of the eye in such a manner that all the rays which fall into the inner eye through the pupil must be received upon the retina. It encloses the posterior and larger part of the vitreous humour. The retina is most important for the sight. I shall not fatigue the reader with a description of all its ten strata, but will mention only that the most important of them is the stratum of *rods* and *cones* which must be regarded as the terminations of the optic nerve. These are influenced by the light falling upon them, and conduct the impression through the optic nerve to the brain, where the impression takes the form of the sense of sight.



Section of the eye. Diagrammatic.
a, anterior chamber; b, the iris; c, posterior chamber; d, lens; e, vitreous humour; f, retina; g, optic nerve.

The contents or refractory nucleus of the eyeball consists of the *vitreous humour, the lens, and the aqueous humour.*

The vitreous humour is a perfectly clear, gelatinous, and perfectly transparent liquid. It fills the whole cavity of the eyeball and gives it its tension. In its anterior part it has a small depression, in which the lens supported by the suspensory ligament rests.

The lens consists of a gelatinous transparent mass, which towards the centre assumes a certain degree of solidity, and is enclosed in a firm

elastic equally transparent capsule. It lies directly behind the pupil, and in a slight depression of the vitreous humour. The space behind the iris is called the *posterior chamber of the eye*, and contains the vitreous humour, that between the iris and cornea the *anterior* chamber. The lens, held in its place by the suspensory ligament of the retina, is strongly convex in *front*. It can, however, by means of most delicate contracting and relaxing muscles become either more or less convex, as the eye desires to see distinctly nearer or more distant objects.

We call this power of altering the convexity of the lens accommodation, and shall presently return to it. I shall only mention here that with advancing years the power of altering the convexity of the lens at pleasure is gradually lost, as with age the lens becomes, from the centre outwards, more and more solid, and loses its elasticity.

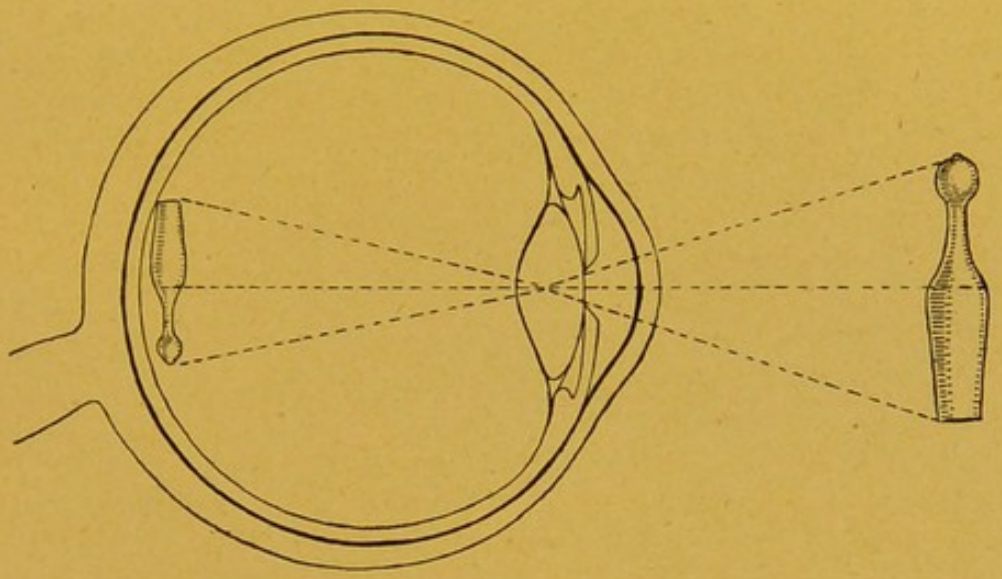
The aqueous humour is a clear transparent fluid which fills the anterior chamber of the eye.

We may now say a few words on the subject of normal and disordered sight before we proceed to speak of the principal disorders of the eye.

If any object is placed before our eyes, for instance, a child's ninepin, the rays of light which proceed from every part of the ninepin must, in order to reach our retina, pass through the cornea of the eyeball, the aqueous humour, the lens, and the vitreous humour. Now, as all rays of light proceeding from a point spread out on all sides, the rays proceeding from the ninepin could never be united on the retina, so as there to produce an exact image of it, unless they were collected and refracted. This, however, is effected in an extraordinarily exact manner by the refracting substances of the interior of the eye, the aqueous humour, lens, and vitreous humour; but more particularly by the lens, which so collects and passes on the rays of light that they produce an exact image of the ninepin on the retina. But the image is inverted! The upper rays proceeding from the head of the ninepin fall on the lower part of the retina, and those from the lower part of the ninepin fall on the upper part of the retina. Only the central rays fall unrefracted in a central position.—Yet we *see* the object in the position in which it actually stands. Yes—and that must be thus explained, that the brain is capable of feeling the object as it actually stands, and not as its image is cast upon the retina.

Returning for a moment to the power of increasing or diminishing the convexity of the lens (accommodation), we must observe that this is of importance, because it enables us to form a distinct image of an object, whether it be near or distant from the eyes. By the increased convexity of the lens its thickness is increased, but its focus shortened.

The effect of this is that the rays proceeding from the object are more rapidly brought into convergence than if the focus had been longer. In other words, when we desire to see distinctly an object that lies near we exert the muscles of the eye so as to make the lens more spherical. When we look at an object in the distance we relax the muscles, and the lens becomes flatter.



The inverted image on the retina (diagrammatic).

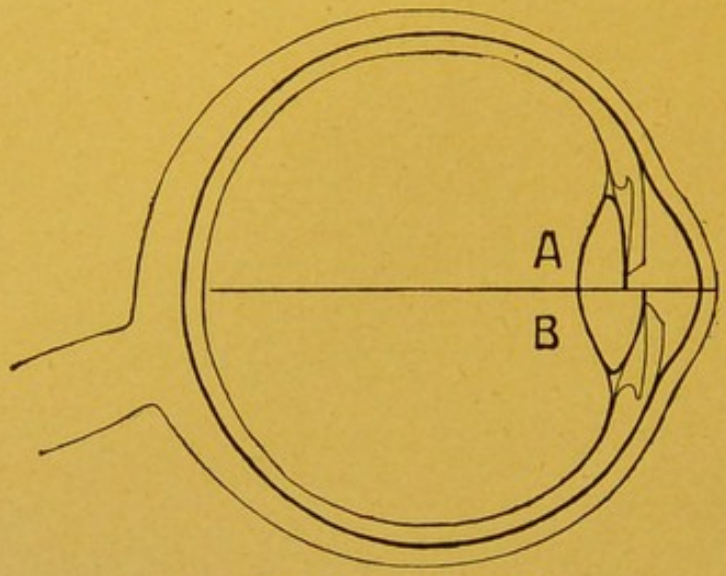
Of course sight both at a distance and near has its definite limits, as every one knows or may ascertain for himself. It is interesting to observe at what distance what is called "the near point" lies, that is how near an object may be brought to the eye and yet be seen distinctly. The "near point" varies even with an eye in perfect health according to age.

The furthest distance at which a human eye in sound health can see distinctly is, theoretically, infinitely remote. The interval between the furthest and nearest point of distinct sight is called the range of vision.

Short sight and *long sight.* The condition of clear sight is that the rays proceeding from the object regarded should, upon entering the eyes, focus themselves on the retina. This is possible only when the axis of the eye, that is the distance from the cornea to the retina is of the normal length.

Short sight is an expression used to describe that state of the eye in which the rays focus themselves *before* they reach the retina, or in which, in other words the true image is not upon the retina but in

front of it. In these cases the depth of the eye from front to back, or the axis, is too great. This too great length of the axis is often congenital, but it can be produced at school in consequence of continuous accommodation—that is to say in consequence of constantly



Accommodation of the eye.
a, lens adapted for seeing distant objects; b, for seeing near objects.

reading and writing with the eyes too near the page. It may be produced also in trade, particularly in callings in which the eye is much strained. It is self evident that the short sighted person, who is able to see without spectacles only things quite near the eye, can be assisted by a concave lens. The effect of such a lens is to disperse the rays. These after passing through it do not focus themselves quite so soon, and so are focussed upon the retina instead of before it. Short sighted persons must however be strongly warned to spare their eyes, and in reading and writing not to hold them too near the paper. Short sighted girls should not engage in delicate work.

Long sight. This is the exact opposite, the axis of sight being too short, so that the rays entering the eye have their point of focus behind the retina. Indistinctness of sight follows, the "long sighted" eye not being capable of "accommodating" itself sufficiently to form a properly focussed image of near objects.—Long sighted people require the assistance of convex lenses which cause the rays to converge.—In the choice of spectacles for either long or short sight it is important to choose lenses which shall merely correct the error of the eye and make the sight clear.

The long sight of old people arises from the gradual loss of the

elasticity of the lens, its hardening, and consequent incapacity of being made at pleasure more convex. In other words, with the advance of years the "near point" moves constantly farther and farther from the eye. At thirty it is about nine inches distant; but aged people often have to hold a book eighteen inches from the eye to be able to read. The long sight of old age must, of course, be assisted with properly selected convex spectacles.

In choosing spectacles it is important to take care that the glasses may be at a proper distance from the eyes; so that the eyes may not be compelled to make a perpetual compensation, which would be very injurious to them. It is also important that the spectacles should "sit" well, as the spectacles sometimes press the bridge of the nose.* This may not only produce erysipelas, but also a permanent redness of the nose resulting from congestion of the blood caused by the pressure of the bridge of the spectacles.

The most important disorders of the eye. Proceeding now to speak of the commonest disorders of the eye, I will begin with an accident that has no doubt befallen everyone. A man is walking at his ease, and thinking about nothing in particular, when a sudden feeling of burning in the eye, and the impossibility of holding it open makes him aware that "something has got into his eye"—to use a colloquial expression. The case is one of a *foreign body* in the eye, a thing very common with smiths, founders, stone-cutters, and in other trades.

If the foreign body is merely a small morsel of dust which is situated in the folds of the transition of the conjunctiva of the eyelid to the conjunctiva of the eye (or as we say lies in the sack of the conjunctiva), it is best not to rub the eye—which the patient feels naturally disposed to do—but to get some other person to examine the eye whilst the eyeball is turned in every direction. The foreign body can often be removed with the corner of a clean handkerchief.

If the foreign body is a splinter which has been driven with some force into the eye, and (whether it be of iron or other substance) is visible on the cornea as a dark point, a cold wet compress should be immediately placed over the injured eye, and the nearest medical man

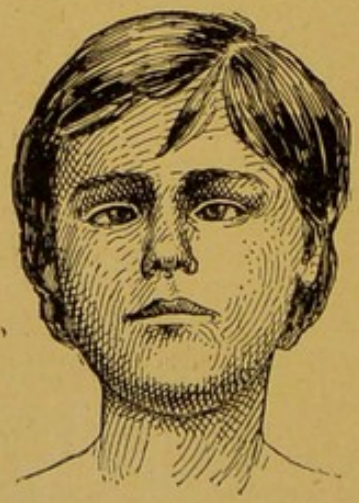
* Some years ago I treated a case of an artisan of thirty-three, who in the course of one year, after buying himself a new pair of spectacles, had three attacks of erysipelas of the face, and those so serious that during the third attack he was for some days in great danger of death. Though I from the beginning suspected his narrow-bridged spectacles, and spoke about them, he could not make up his mind to get others. During the third attack I, with his wife's consent, broke his spectacles, and took care that the new ones should be constructed in accordance with my directions. The man has never since suffered from erysipelas of the face.

summoned to remove the body without any previous attempts being made to deal with it.

It may be here once more said that universally in all cases of severe injuries, such as too often result from careless shooting, from flying splinters in cleaving wood, and from other accidents, immediate medical aid is necessary, as often the other uninjured eye is exposed to peril. No advice to the contrary should be listened to, but a well-fitting damp binding be placed over the eye and medical aid immediately sought.

Squinting. It will be remembered that the movements of each eye-ball are controlled by six voluntary muscles. They so adjust the eyeball that when the look is directed straight forward the two pupils are situated exactly in the centres of the openings of the eye. Causes, however, exist (which we will presently examine) that occasion fairly often, and generally in childhood, a defective position of the eyes, the axis of sight of the several eyes being so directed that they tend towards different points. This defective position of the eyes we term squinting. The squint is almost always *towards the side;* seldom upwards or downwards, and it may be a *squint inwards* or *outwards.*

Inward squint is generally developed in quite young children, of from three to four years, in consequence of the children's straining their accommodation to see objects quite near their eyes. It may equally easily be developed in children attending school during their second school year, that is to say when they begin to learn to read and write, in consequence of their placing their eyes too near their books or their desks, with the result that fatigue of the eyes must ensue.



Double inward squint.

As soon as it is perceived that a child begins to squint all fatigue of the eyes, and particularly looking at things from a short distance, must be forbidden.

An excellent method of curing a commencing squint, consists in the very simple expedient of binding up the unaffected eye for an hour in the morning and in the afternoon, so that the child may accustom himself to use the eye inclined to squint. As hypermetropia (too short axis of the eyeball) is almost always present, this may be corrected by suitable spectacles.

Operation for squinting may be, in the case of inward squinting, safely postponed until the fourteenth year. The operation occupies but a few seconds, and is accompanied by no danger.

Outward squint (which is generally found to be accompanied by short sight) usually develops itself gradually, in consequence of a weakness of the inner muscles of the eye; which permits the outer muscles to draw the front of the eyeball to one side.—Outward squint, especially when it is on both sides, is treated first with concave spectacles, which permit the eyes to work at a greater distance. In obstinate cases, prism-shaped spectacles, with the thicker side inwards, may be used. If the object is not thus attained, the operation for squinting must be performed—about the eighth year. As this operation can be performed only by a medical specialist I need here say nothing about it beyond this, that it is of a very simple nature, consisting merely in the separation of a muscle, and is completely healed in a few days.

Acute catarrh of the conjunctiva. This is one of the commonest disorders of the external eye. It announces itself by swelling and reddening of the inner eyelids, but the inflammation often extends to that part of the conjunctiva which covers the front of the eyeball, so that what is called the white of the eyes also appears reddened. Burning pains in the eye, a feeling of heat, and shyness of the light, are almost inseparable symptoms of simple catarrh of the conjunctiva. During the earlier days a feeling of dryness generally prevails, but increased secretion of the fluid soon appears as a true sign of the malady. The eyes begin, as we say, to water, and in the morning, on awakening, are often so closed by the dried up crust that the patient can only open them after softening it.

If the cause of catarrh of the conjunctiva be enquired into, it occurs frequently in children, either after very different infectious diseases of childhood (particularly after measles), or in consequence of chills (draughts), dust, *etc.* In adults it is occasioned principally by smoke, raw winds, chills, and similar causes.

The treatment. A few days' rest, and frequently changed wet compresses soaked in strong solution of boric acid, generally suffice to cure the inflammation.

But particular care should be taken to observe whether the increased

secretions of the eye remain clear or assume a purulent character. In the latter case an infection is present, that is to say an invasion of the inflamed mucous membrane by purulent microbes. We observed at the beginning of this book the most important of these purulent inflammations of the eyes in recently born children, which must be treated with the greatest care to preserve the child's sight (see p. 18).

Chronic catarrh of the conjunctiva. Persons who are exposed day after day to smoke, dust, cold air, &c., often develop a chronic inflammation of the eyelids which we describe as chronic catarrh of the conjunctiva. This inflammation shows itself particularly in the eyelids always appearing slightly stuck together in the morning, in their watering easily, in the corners of the eyes showing small collections of the *sebrum palpebræ*, and in their becoming easily tired and smarting in artificial light in the evening. In many cases symptoms do not stop here. Gradual shedding of the eyelashes ensues, the exterior corners of the lids swell, the lower eyelids sink, the eyes become hollow, and other symptoms appear, which make this chronic catarrh of the conjunctiva a very troublesome and disfiguring malady.

The treatment. In simple cases in early stages of their development washing the eyes several times a day with luke-warm clean water, and afterwards dropping a few drops of a one per cent. solution of zinc into the sack of the connectiva, and finally rubbing the rims of the eyelids with a little white vaseline may be attempted. In advanced cases regular pencilling with solution of nitrate of silver must be used, which can be prescribed only by a medical man.

*Egyptian ophthalmia**. This is another extremely infectious purulent inflammation of the conjunctiva which is fairly well known.

The conjunctiva is always swollen with inflammation, and the whole of its surface covered with small pearly grains. From the latter the malady has been named also granulating or follicular catarrh of the conjunctiva, many also call it trachoma. After some days of more or less abundant excretion a mucous purulent mass is formed which works very infectiously upon the other eye, the upper eyelid swells considerably, and appears to hang somewhat over the lower. Great shyness of light always accompanies the malady.

These purulent inflammations of the eyes (respecting which we do

* This infectious disease owes its name to an historical incident. Napoleon's troops were epidemically attacked by it when he undertook his victorious expedition to Egypt in 1798. It was afterwards held that the French had first introduced the malady into Europe.

not know whether they are all to be referred to the same kind of infection by purulent microbes) must be from the outset be entrusted to professional medical treatment. The least neglect or loss of time may not only lead to the eyes being seriously endangered in consequence of serious ulceration of the cornea, but also may in more advanced stages lead to contraction of the eyelids and to the most various changes in their condition—for example, the eyelashes may become turned directly upon the surface of the eyeballs.

The treatment, which, as I have already said, must be entrusted to a medical man; aims at limiting the purulation as much as possible, and if possible at the eradication of the small granulations or lymph follicles, this being the surest way of averting the contraction of the eyelids.

Stye. Scrofulous children, and children who do not pay proper regular attention to keeping their faces clean, and also boys and girls about the time of puberty, are often troubled with a painful inflammation and purulation of the edge of the eyelid, which we describe as a stye. This originates from a stopping up of the small sebaceous glands which lie embedded in the eyelids, whose fatty secretion serves to keep the edges of the lids and the eyelashes soft.

It is almost always the tissue of a plugged up gland that is attacked. With pricking pains, reddening and swelling of the whole eyelid attacked (and not rarely also with violent general symptoms), a small yellow point is formed some forty to fifty hours after the commencement of the inflammation. The spot indicates the locality of the purulation. It increases rapidly, and soon discharges a small quantity of slightly fluid yellow pus. After this has been discharged the pain ceases, and the small wound rapidly heals.—Unfortunately, some patients exhibit a remarkable proclivity to suffering again and again from this disagreeable but not dangerous malady.

The treatment. As the purulation can very seldom be checked by cold, it is best to hasten it from the first day by frequently changed boric acid fomentations, as warm as can be borne. As soon as the pus has been discharged a bandage soaked in clean water (that has been boiled) should be laid over the eye for a day or two.

In the case of weakly developed scrofulous children generous diet and the closest attention to care for the body and skin is to be imperatively recommended.—Often a daily careful washing of the face with soap and water alone suffices to prevent the stoppage of the sebaceous glands. We shall meet with the same malady again under the name of acne, in other parts of the body.

Inflammation of the cornea. This may be either secondary, that is to

say a consequence of a purulent inflammation of the conjunctiva (as has been mentioned in a previous section), or may occur primarily in consequence of an injury, or as a symptom of the presence of scrofula. It reveals itself in the formation of small pimples, pustules, or ulcers on the more or less dulled cornea, which is in health so smooth and bright.

As serious injury of the eyes is invariably possible, the best advice that can be here given is to get medical advice as quickly as possible. Not only may deepening ulcers break through the cornea and penetrate into the interior of the eye, but delay and mistaken treatment often result in dim spots remaining in the cornea, which, as they are not transparent, prevent the light from entering the eye.

Inflammation of the iris. This also can be here only briefly sketched. The inflammation arises sometimes in consequence of severe injury of the eyes, sometimes in consequence of preceding purulent inflammation of the cornea, sometimes after severe chills, but also often at the conclusion of certain infectious disorders. It shows itself in severe piercing pains in the eyes, in distortion of the pupil, discoloration of the iris, excessive shyness of light, continual watering of the eyes, and particularly in a redness of the white of the eye around the iris.

The treatment. This must, from the first day, be entrusted to a medical man, who will take steps, by dropping belladonna into the eye, to enlarge the pupil, so that no coalescence may ensue between the iris and other parts of the eye. Several weeks in a dark room, and regulation of diet and digestion, are in these cases always necessary.

Glaucoma. The essence of glaucoma, an extremely malignant and dangerous disorder of the eye, consists in a periodically returning disordered increase of the pressure in the interior of the eye occasioned by the increase and insufficient removal of the fluid contents of the eyeballs. In the majority of cases we find a whole series of increases of pressure coming on in attacks which *gradually* lead to the destruction of the optic nerves, and consequently to blindness. But sometimes a *single sudden* attack of glaucoma can in a few days destroy for ever the sight of a previously sound eye.—We must accordingly distinguish between acute and chronic glaucoma.

Acute or inflammatory glaucoma always appears suddenly, and at first with all the symptoms of a severe inflammation of the iris. It is accompanied by severe headache resembling migraine, and patients not seldom complain of seeing everything as it were in a cloud, and surrounded with coloured circles. Other indications accompany the symptoms of glaucoma. A single look at the eye suffices to see that

the pupil is much enlarged, and has an appearance of being thrust forward, and that the iris is pressed almost against the cornea. The power of vision is much disturbed, and the whole eye seems hard and rigid. This can be at once felt if, for the sake of comparison, the finger is passed over the other sound eye of the patient.

This acute disease is so serious that immediate reference to a specialist is necessary or the sight may be lost.

Chronic glaucoma consists to a certain extent in a series of slight attacks of glaucoma. It always extends over a number of years, and, though it presents no such clearly defined symptoms as we have just seen in acute glaucoma, it generally ends in complete blindness in consequence of the gradual perishing of the optic nerve, unless timely measures are taken for relieving the pressure in the interior of the eye.

If the causes of glaucoma are demanded, acute glaucoma is generally attributed to severe emotions of a depressing nature, to bleeding of the retina, to hereditary predisposition, and to other causes, without our being able to state their exact relation to glaucoma. Chronic glaucoma is generally connected with former inflammations of the iris, continued insomnia, and small bleedings of the retina.

The treatment of both acute and chronic glaucoma affords hopes of cure only when the malady is recognised as soon as possible, and rightly combated by a diminution of the internal pressure in the eye.

As a matter of course a diminution of any prospect of cure is the only result of the patient's attempting to do anything for himself. For this reason I must strongly urge that in any case of sudden pain in the eye, accompanied by diminution of the power of sight, the patient should immediately place himself in the hands of a medical man.

Cataract. This term indicates an opaqueness or dimness of the lens of the eye—whether the capsule containing the lens is affected or its contents. As many different causes may produce a dimming of the lens (although it might have been supposed that it was in a very well-protected place, and out of the reach of injury), we distinguish according to the cause, and the time when the dimness occurs, congenital cataract, senile cataract, traumatic cataract (occasioned by a wound), and, according to the locality, cataract of the capsule, nuclear cataract, etc.

The most important to us is senile or old age cataract. This develops itself gradually and slowly first in one eye and almost always afterwards in the other, and is a fairly common malady of advanced age. This dimming of the lens can be referred directly to an irregularity in its nourishment. It has been already mentioned that

in old age the lens becomes inelastic hardening from its nucleus outwards.

We find generally that the dimming of the nucleus proceeds first from a single point in the centre of the lens. This, however, soon spreads, but very slowly, in a space of from one to five years or more, to the rest of the substance of the lens. It can be understood from this what sort of disturbance of vision the patient experiences. At the beginning of the dimming the patient sees everything indistinctly, as it were through a mist. As the opacity of the lens increases the power of sight in the affected eye becomes constantly smaller, the light being prevented by the dimmed lens from reaching the retina.—When the opacity of the lens has become complete the cataract is said to be ripe.

The treatment. The only way of curing cataract is by an operation, which consists in removing the opaque lens from the eye. The operation can be performed only when the cataract is ripe. There is no such thing as overripeness; and it only remains, of course, for every man suffering from cataract to betake himself to a specialist when the right time comes.

The operation is to be strongly recommended from a general point of view. After a few days of repose it is almost invariably successful. After the wound is healed, the patient uses a very strong convex glass which compensates the loss of the lens in the eye.

In conclusion, it must be understood that blindness may result from other causes besides glaucoma and cataract, all of which cannot be here discussed. Hopeless loosenings of the retina, atrophy of the optic nerve, brain diseases affecting the vision, chronic poisonings, and other maladies affecting the back of the eye may destroy the sight.

Some of these mischiefs can be instantaneous, such as violent excitement of the optic nerve—for instance when a flash of lightening passes immediately before the eyes. The sight may be also lost in consequence of long exposure of the eyes to brilliant sunshine, or from looking at snow.

In other cases small hœmorrhages on the retina, excessive smoking, *diabetes mellitus*, gout, or diseases of the spine may produce blindness. In these latter cases the causes of the mischief must be removed if any small hope that may exist of saving the sight is to be realised.

Structure and Functions of the Organs of Hearing.

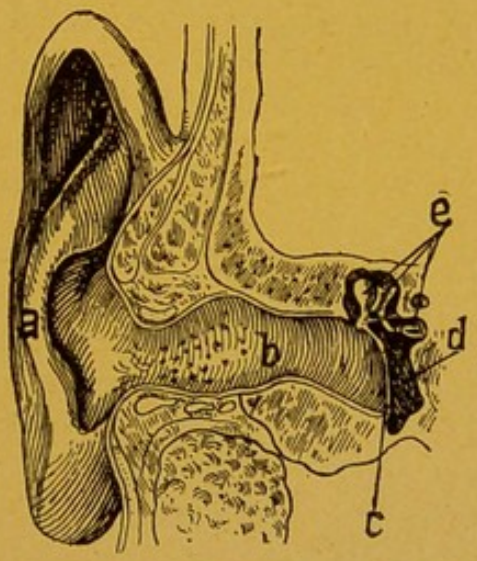
The human organs of hearing, of which the external ear is visible

on the side of the head, lies well protected within the side of the skull. The ear is divided into three sections, the *external ear*, the *middle ear*, and the *internal ear*. The first and second sections serve only for receiving and conducting the waves of sound. In the internal ear, which contains the ends of the auditory nerves, these waves of sound produce effects, which are conducted by the nerves to the brain, where they produce the sensation of hearing.

The external ear consists of the shell of the ear and the external auditory canal, which is separated from the middle ear by the membrane of the tympanum.

The external shell of the ear, with the exception of the lowest part called the lobe, is lined with an elastic cartilage, which maintains its shape, and prevents it from collapsing.

The external canal must be divided into a cartilaginous and a bony part. The shorter, cartilaginous section is, as has been already said, a direct continuation of the shell of the ear. It forms, to some extent,



The external ear. A. The shell of the ear. B. The exterior auditory canal. C. The membrane of the tympanum. D. The tympanic cavity. E. The ossicles of the ear.

a funnel-like entrance to the bony part of the auditory canal. The skin covering the cartilaginous canal is set with many fine hairs (excessively developed in some individuals), which should protect the internal ear from dust and dirt. It is also provided with a number of glands, which secrete the yellow wax of the ear (we shall presently have occasion to speak of the excessive accumulation of this wax). The bony section of the external auditory canal has a length of about

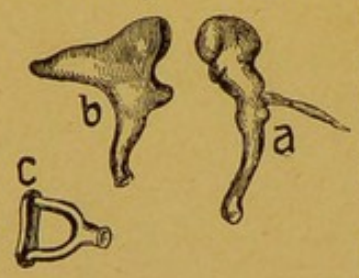
three-quarters of an inch, and lies in the temporal bone of the skull.

The membrane of the tympanum forms a division between the external ear and the middle ear. It is an elastic membrane, standing obliquely, with its hollow turned outwards, of elliptic shape, and is stretched in a groove of the bony walls.

Directly behind the *membrane of the tympanum* lies the *middle ear*, which consists of the tympanic cavity. It is a small, open space, of irregular form, in the *pars petrosa* of the temporal bone, and is connected inwards with the pharynx by means of what is called the eustachian tube of the ear. This explains how so many infectious diseases of childhood, especially those which affect the mucous membrane of the mouth and pharynx, can be accompanied by purulent inflammations of the middle ear.

A regulation of the pressure of the air before and behind the membrane of the tympanum is effected by the connection between the air in the tympanic cavity and that in the pharynx.

On the inner wall of the tympanum are some very small bones, delicately connected with each other, they extend obliquely across the tympanic cavity, from the inner towards the outer wall, to conduct the waves of sound further. They are called the hammer, the anvil, and the stirrup. What is called the handle of the hammer is attached to the membrane of the tympanum. The head of the hammer lies on the anvil, and this connected below with the stirrup, whose base conducts the sounds to the fluid in the labyrinth.



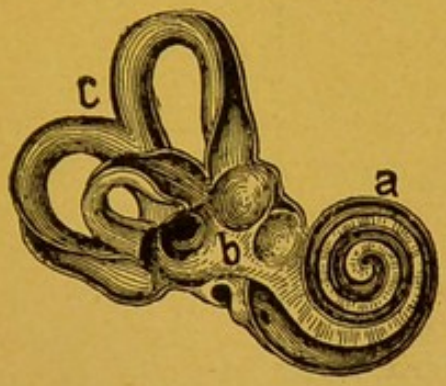
Ossacles of the ear. A. The hammer. B. The anvil. C. The stirrup.

The inner ear, or the labyrinth, lies hidden in the thickest portion of the *pars petrosa* of the temporal bone. It is a completely enclosed bony hollow of a peculiar shape difficult to describe, is covered on all sides with a delicate thin integument, called the membraneous labyrinth, and is connected with the tympanic cavity by the round and oval windows. Its principal parts are called *the vestibule*, *the semicircular canals*, and the *cochlea*.

The vestibule is a small space in the centre of the labyrinth filled with fluid. It is situated between the semicircular canals and the cochlea, and separated from the tympanic cavity by the oval window.

The semicircular canals, three in number, are distinguished as the superior, posterior, and external canals. They are so placed that their planes are perpendicular to one another. They form the superior portion of the labyrinth, are filled with fluid, and in direct connection with the vestibule.

The cochlea lies against the anterior wall of the vestibule, and is openly connected with it. It takes its name from its shape resembling a snail's shell. It is divided by what is called the *lamina spiralis* into two stages, lying one above the other. Of these the upper opens into the vestibule; the other is directed towards the round window of the tympanic cavity. The cochlea is also filled with fluid.



The inner ear.
A, cochlea; b, vestibule; c, semi-circular canals.

In order to enable the reader to form an idea of how the sense of hearing is produced, it now remains only to describe how the auditory nerve is extended in the inner ear.

The auditory nerve (whose origin and course we have elsewhere described) divides itself in the inner ear into two branches, namely, the nerve of the cochlea and the nerve of the vestibule. The nerves of the cochlea end as the organ of Corti (so named after its discoverer Corti) in extremely delicate hearing cells and hair cells in the interior of the cochlea. The vestibule nerve finds its terminations in the vestibule and in the semicircular canals, where it ends in what are called auditory filaments.

If we now wish to realise how the waves of sound translate themselves into the sense of sound in the brain, we can do so most simply by following the course which the waves of sound take; and we shall see that they reach and stimulate the extremities of the auditory nerve in a most ingenious manner.

The waves of sound collected by the external ear are first conducted by the external auditory canal to the membrane of the tympanum, which, being an elastic membrane, is by them set in vibration. As the handle of the hammer is connected with the membrane of the tympanum, not only it, but the anvil and stirrup connected with it participate in the vibrations of the membrane. The result of this is that the base of the stirrup, which presses against the membrane of the oval window, causes a movement of waves in the fluid of the labyrinth lying behind the membrane. This produces a stimulation of the extreme ends of the nerve of the cochlea, and of the nerve of the vestibule, which lie in the walls of the membranous labyrinth. This stimulation is communicated with immeasurable rapidty to the brain, where it is translated into the sense of hearing.

The most important disorders of the organs of hearing. The number of maladies of the organs of hearing, if compared with the number and

variety of those of the organs of sight, is comparatively small. The majority affect the exterior and middle ear, which may be explained by the extremely sheltered situation of the inner ear. But it is a very great mistake to imagine that maladies of the ear need not be so seriously regarded as those of the eye. It is, however, a matter of daily experience to find parents, who watch carefully over the health of their children, indifferent for weeks about a purulation of the ear, and indisposed to regard the malady seriously. "The child," they say complacently, "feels perfectly well, and hears nearly as well as usual." This indifference is altogether unreasonable.—Neglect of apparently simple disorders of the ears has frequently lead to severe suppuration of the bones, and permanent deafness; which prompt treatment could certainly have obviated.

Though the means and remedies at our disposal for the treatment of maladies of the ear may at first sight appear to be very inadequate, their use is often very great. It is of course necessary to be certain that no malady of the inner ear exists, respecting which only an experienced specialist is able to form an opinion. But in the case of external maladies, and particularly of the maladies of childhood, the father or mother can frequently do all that is necessary to effect relief and cure. I shall only remark here that injections into the ear must be always made gently, so as not to injure the membrane of the tympanum; also that the syringe should have a blunt, not a shard point, and that, finally, too great heat and too great cold must be carefully avoided, whenever washing the ear or pouring drops into it are attempted.

Hardening of the ear-wax. This trouble is common not only in childhood, but also particularly with men who work in dusty air. We find an obstruction of the outer auditory canal by a hard accumulation of ear-wax, which not seldom collects in such quantities in the passage that it makes an absolutely solid column. The patient almost always feels singing in the ears, headache, and dizziness, and more particularly dullness over the whole affected side of the head, and, as the waves of sound are necessarily stopped by the hardened column of wax, difficulty in hearing is the first result of the malady.

The treatment. The aim is first to soften the obstruction before attempting its removal by injections. The simplest manner of softening the wax is to place in the auditory canal a small plug of cotton wool soaked in oil. For the injection luke-warm water should be used. The injection should be made very gently and continued for some time. The accumulation of wax almost always comes out after a little perseverance.

Foreign bodies in the ear. The cases are generally those of children who have in play or out of perversity thrust beans, peas, buttons, and similar objects into their ears. But living creatures also creep into the human ear (when men are sleeping out of doors, &c.) without its being easy to remove them with the finger. Whenever it is possible removal by means of luke-warm injections must be attempted, and a strong warning is here necessary against thrusting hair-pins, tooth-picks, or any similar sharp-pointed things into the ear. Experience proves that if the foreign body has penetrated so far into the ear as to be situated close to the membrane of the tympanum, attempts to remove the body made by inexperienced hands frequently result in injury to the membrane followed by serious inflammations. If attempts to remove the foreign body by injections do not succeed, medical aid should be procured without delay.

Furuncles in the auditory canal. Furuncles in the exterior auditory canal are an independent disorder developed, in consequence of very small injuries (particularly in youth), by scrofulous and anæmic children, also by girls about the period of the first menses, and such persons as have an "impure skin," or, in consequence of a poor supply of blood are liable to "gatherings" in the case of any small wound. All these ulcerations and inflammations are the direct consequences of an invasion of purulent microbes.

The first indication of the beginning of the inflammation is a slight reddening and a sense of pain in the part affected. If the focus of inflammation is near the entrance its further development can be easily watched. In these cases not only is the treatment easy, as the spot can be reached, but the pain is also tolerable. If on the contrary the infection is further in and concealed, a serious swelling of the whole canal may ensue in a short time with excessive pain and fainting fits which, if the temperature also rises, may present the form of a severe malady.

The more severely the inflammation sets in the more rapidly also the purulent dilapidation of the tissue follows, and the patient remarks at the end of the second or the beginning of the third day by a regular beating in the ear, that the pus has formed and is about to discharge. With the discharge of the furuncle the pain generally disappears, the swelling decreases, and the malady would soon be forgotten were it not that the furuncles in the outer ear have a tendency to follow one after another, which must be referred to a migration of the infectious germs.

The treatment. Of all remedies, that which gives the most relief, and has the most satisfactory results, is hot fomentation of the

whole ear. If the inflammation lies near the orifice of the canal, so that the yellow focus of the purulation is visible, a small incision may be recommended, as it not only diminishes the pain, but also increases the probability that all the pus will be discharged and no recurrence of the malady occur in a few days.—For some days the diet must be entirely fluid, as the patient cannot chew on account of the pain. Care must also be taken that the food may be easy of digestion, as every exertion induces insufferable headaches, and an increase of pain in the affected ear.—Injections are not to be used unless specifically prescribed by the medical man.

Inflammations of the middle ear. As the middle ear is in direct communication with the cavities of the nose and with that of the pharynx by means of the eustachian tubes, it will not occasion any surprise that all maladies which affect the mucous membrane of the cavity of the nose and pharynx (whether acute or chronic catarrhs or purulent inflammations) may also affect the mucous membrane of the tympanic cavity.

And we find that purulent inflammations of the middle ear ensue not only after a whole series of infectious diseases, and especially after scarlet fever, diphtheria, influenza, etc. (which must be referred to a migration of the infectious germs), but that also catarrhs proceeding from chills and other non-infectious irritations of the mucous membrane sometimes extend themselves through the eustachian tube to the tympanic cavity, and there occasion tiresome maladies in the form of acute or chronic catarrhs of the middle ear corresponding to the degree or frequency of the irritation that produces them.

In a simple continuous catarrh of the middle ear we find, as in all catarrhs, first a swelling of the mucous membrane and an increased excretion of fluid, which, when the eustachian tube simultaneously swollen has no exit through it, accumulates in the tympanic cavity behind the membrane of the tympanum.—Singings in the ear, dullness of the head, dizziness, difficulty in hearing, and very great pains in the ear accompany the malady.

If this catarrh subsides in a few days, together with the primary disorder (catarrh of the nose, pharynx, etc.), which has occasioned it, and the mucus of the tympanic cavity in consequence finds free outlet through the eustachian tube after the swelling of the latter has subsided, the malady implies no further danger. But in many cases the catarrh becomes either chronic, and then in time permanent changes in the mucous membrane of the tympanic cavity ensue, or a purulation arises in consequence of the arrival of infectious germs, as we have already seen in various diseases of childhood.

Acute purulent disorders of the middle ear in childhood always show themselves by most acute pain in the ear, to which the children are constantly putting their hands. The thermometer also always shows a rise of temperature by bounds until the pus discharges and comes out through the exterior auditory canal, from which moment the fever and pain diminish strikingly.

The treatment Acute, non-infectious catarrh of the middle ear always disappears in a few days under proper treatment, particularly if the patient remains in his room (still better in his bed), uses packs, compresses, and gargles, and has some free perspirations. On the contrary, chronic catarrh of the middle ear (even when it is not purulent, but shows itself by a congestion of mucus in the tympanic cavity) requires always a long and careful treatment, which consists principally in regular douches, and cannot be treated without medical aid.

In acute purulent inflammations of the middle ear nature generally assists herself. The pus breaks the distended membrane of the tympanum, and thus obtains egress. If this does not take place it is absolutely necessary to open the membrane by the very simple operation of puncture (paracentesis), as if this is not done the pus attacks the bones. The medical man must do this.

Purulation in the mastoid process of the temporal bone (the protrusion immediately behind the shell of the ear) is in such cases particularly to be feared, as it can only be reached and removed by cutting the bone.

Naturally, the danger does not end with the moment when the pus escapes by piercing through the membrane of the tympanum. The principal point is to prevent the purulation from becoming permanent. To effect this it is absolutely necessary that the ear should be several times daily washed out with lukewarm water, for which a clean ear-syringe must be used. The auditory canal must be also always gently dried with cotton wool, and then plugged, but quite loosely, with a wad. Attention should always be given to noticing whether the patient exhibits any signs of difficulty in hearing. If he does, medical aid is absolutely necessary, in order that examination of the ear with an ear speculum may show how far the malady has advanced.

Warmth is the simplest, and almost always an effective remedy against the acute pains which often aggravate, particularly at the beginning, acute disorders of the middle ear, and sometimes occur, without any attendant catarrh, under the name of ear-ache. A bag filled with hot mashed potatoes may be placed against the affected ear

and the whole side of the head; or a hot camomile compress, which should be frequently changed. Dropping in oil may also be strongly recommended as a remedy for mitigating pains in the ear. A small quantity should be warmed in an iron spoon over a lamp. Admission of steam into the auditory canal may also be tried to alleviate pain.

Inflammation and injury of the membrane of the tympanum. As the membrane of the tympanum is far from lying protected like the inner ear, and as it is not exposed only to wind and weather, but to violent shocks of pressure from vibrations of the air, it is no wonder that inflammations and injuries of the delicate membrane, abounding in blood vessels, are among the commonest maladies of the ear.

The causes of inflammation are almost always severe chills of the head (draughts in railway carriages, mistaken use of cold douches, protracted cold baths, etc.) The inflammation shows itself by severe straining pains, and abnormal sounds in the ear, difficulty in hearing, feeling of dizziness, sleeplessness, and general dulness of the head. But both acute and chronic irritations of the membrane of the tympanum can arise from other causes, and these are generally inflammations resulting from pressure, and these generally follow either hardening of the ear-wax, or the presence of foreign bodies in the ear.

Inflammations of this kind almost always show themselves by a running from the auditory canal. They frequently lead, in consequence of some momentary severe tension of the membrane of the tympanum (such as may occur in sneezing, coughing, blowing the nose, etc.), to a sudden bursting of the membrane of which the patient is made aware by an explosive noise.

The treatment, when the membrane is uninjured, consists, in acute cases, of luke-warm washing of the auditory canal. Out of doors the canal may be softly closed and protected against the cold by a wad of cotton wool; but remaining in the house for a few days is preferable.

In chronic cases, the first aim must of course be to remove the cause of the malady. Examination by a medical man is indispensable. A number of medicines capable of limiting the inflammation exist, some of which must be dropped, and others blown into the ear, which cannot be applied except by a medical man.

Laceration of the membrane of the tympanum results from many causes. We have already met with it as the result of a natural effort to liberate accumulated pus, and have mentioned it as a possible disagreeable consequence of inflammation of the membrane. But laceration of this delicate membrane can be produced also by violent boxing of the ears, and sudden violent vibrations of the air (firing canons), also by

injuries done the middle ear by pointed foreign bodies, careless probing the ear with hair pins in attempts to remove the wax or foreign bodies, and, in fact, by the most different accidents.

The usual symptoms of laceration of the membrane of the tympanum are a certain degree of difficulty in hearing, loud noises in the ear, frequently bleeding, and some days later, purulation.

The treatment must first aim at keeping the ear clean, so that no matter capable of producing purulation may reach the inner ear. For this reason all injections must be avoided, and the introduction of anything into the ear. The auditory canal should be kept constantly closed by a clean wad of cotton wool. If no further injury of the ear exists, the small wound heals generally in about fourteen days without any harm resulting. Much importance attaches to care that the wound which is in the course of healing should not be again torn open by sneezing, coughing, pressure, jumping, or any other shaking.

CHAPTER XIII.

Constitutional Disorders.

By constitutional disorders we understand a limited number of maladies resulting from either a faulty condition of the blood (chlorosis, anæmia), or from some disturbance of metabolic changes, which, in consequence of causes generally unknown, do not break up the substances taken into the organism into the proper final chemical products (see p. 137 &c.), but either deposit them in various forms in the tissues (gout, corpulence), or evacuate them from the body (*diabetes mellitus*, rickets).

Anæmia and Chlorosis.

Although it is an error to regard anæmia and chlorosis as one and the same malady (the former, consisting in *an insufficient supply of blood*, and the latter in *a deterioration of the blood*) the two have in the course of time become so closely associated, and present symptoms and consequences which run so much into one another, that it seems practically impossible to disassociate them, particularly as the treatment is almost exactly the same.

It is evident that a diminution of the normal quantity of blood (in an adult the average is about thirteen pounds) may arise from very different causes. I may mention only the loss of blood in consequence of wounds or of bleeding from the nose, lungs, and stomach, or from the menses, or from childbirth. But want of blood must also necessarily ensue when the blood-forming organs are not in a condition to replace in equal quantities the blood which is being constantly used up.

This simple explanation will also at once make it clear why young people in particular, and more especially the female sex, suffer so much from the disturbances of nutrition known as chlorosis and

anæmia; and why in the case of young girls the time of the appearance of the first menses is decisively connected with these maladies. Important changes take place in the female organism just at this epoch; it develops itself much more than in previous years, and for that reason requires distinctly more blood. But as at the same epoch the appetite is generally small, and both body and mind are taxed both by the demands of school and those of the home, it is inevitable that the balance between the expenditure and supply of blood should be lost, in other words, anæmia must ensue.

But anæmia is also an every-day phenomenon in the male sex, and particularly in boyhood; and shows itself in poor physical development, pale features, want of appetite, headaches, etc. The insufficient formation of blood in these cases results principally from insufficient or wrong diet, and physical and mental over-exertion; but many other causes may contribute—for instance, any protracted malady accompanied by fever may, in consequence of decomposition of albumen in the body, produce a serious condition of anæmia.

Chlorosis, which often appears along with anæmia, does not arise so much from a diminution of the quantity of blood as from a deterioration of its quality, which is especially characterised by a diminution of the number of blood corpuscules containing iron (see p. 238). It is never rapidly developed—as anæmia may be in consequence of severe bleeding in the stomach, but comes on only gradually and slowly; and we are compelled to suppose that the blood-making organs (liver, spleen, and medulla of the bones) exert themselves to comply with the demands of the organism, and are not capable of supplying in addition to the necessary quantity of blood the necessary quality, as they have not a sufficiency of the raw material—albumen and iron.

The attention of parents is often first called to the malady by the child's disinclination for exertion, and the way in which small physical efforts fatigue him. After a short time other indications appear—loss of appetite, pains in the stomach ("heart-burn"), headache, and general debility. Little attention is generally paid to these, as during these years of rapid growth the general condition is, as all parents are aware, liable to be a little irregular. Things continue thus for some time until an acquaintance remarks upon the appearance of the child—it being a matter of every-day experience that those who are living in the same house with anyone are the last to observe a gradual change in his appearance.

Anyhow, it is now at last perceived that some malady must exist. And the waxen, pallid, white, or greenish-white hue of the face, and

the pale colour of the lips and gums, together with the other symptoms already mentioned, leave no possibility of doubt that the malady is anæmia or chlorosis.

A whole series of other symptoms now ensue. The patients feel chilly, and shiver at the slightest draught. They cannot go upstairs without a violent palpitation of the heart, and, after a few rapid steps, their breath fails.

It is important to remark that *in addition* to these symptoms of anæmia and chlorosis, which generally follow one after another, in very many cases symptoms of excessive nervous excitability also appear. These must be assigned either to commencing hysteria or to neurasthenia.

It is evident that both the general nutrition of the body, and also the mental power of resistance must in time suffer seriously from anæmia and chlorosis. In consequence we find that not only does a poor state of health gradually ensue (which exposes the organism to other disorders), and not only marked irregularity in the menses, but also that hysteria begins to encroach upon the chlorosis, stamping itself upon the moral and emotional life of the young girl, and spoiling the best years of her life.

The treatment. I am not going to begin with the praises of various preparations of iron. What is the use of the iron to the patient if he has not the means of forming abundant albumen, which is the first necessity for the blood?

The first step towards improvement and cure lies in proper dieting. All other remedies, whether medicinal or natural, that enter into the treatment of anæmia and chlorosis must be regarded only as supports to the diet.

It would demand more space than I have at my disposal were I to attempt to draw up a long bill of fare for anæmic patients; so I shall insist only that milk, eggs, butter, easily digested meat, cocoa, and vegatables are to be recommended, and, on the other hand, preparations of meal, brown bread, stimulating drinks, and especially all articles of diet difficult of digestion, or highly spiced, must be for a long time avoided.

After the diet has been regulated, medical treatment has its value; because there can be no doubt that it can afford substantial assistance in supporting the diet. Which particular preparation of iron is used may for the moment be indifferent, as all are prepared on the same principles, which culminate in this, that the iron is supplied in the form in which it can be most easily assimulated by the organism. Various excellent preparations can be procured at any druggist's.

Naturally, a regulation of the whole manner of living must go hand in hand with the other remedies. It should so distribute the patient's time that a prudent proportion may exist between work and recreation. Water treatment, plenty of fresh air, and regular exercise, are indispensable in the treatment of chlorosis. It is important, however, here, as in neurasthenia and hysteria, to vanquish a certain amount of resistance on the part of the patient. A beginning should be made with lukewarm and generally gentle use of water (lukewarm salt baths), and with walks of moderate length, until the patient perceives how advantageous the water, fresh air, and exercise are to him.

Leucœmia and Pernicious Anæmia.

In good health the number of red corpuscules in the blood is six hundred for every white one. In leucœmia a white corpuscule occurs for every few red ones. In pernicious anæmia, a disease which leads inevitably to death, we find an excessive destruction of the red blood corpuscules.

Both maladies run very similar courses. They principally attack middle age, and much oftener women than men, and generally follow after preceding chlorosis.

Leucœmia essentially results from a disordered condition of the blood-forming organs, and is generally connected with an alteration of the spleen and the medulla of the bones. The spleen and lymphatic glands are excessively swollen, and the medulla of the bones is changed into a thickly-fluid, reddish, glutinous mass.

Respecting the origin of leucœmia, I have already remarked that severe chlorosis often lies at its base, but some accident appears to be generally necessary to bring the blood-forming organs to this insufficient production of red blood corpuscules. Injuries of the spleen in consequence of contusion, general insufficient nourishment, infectious disorders, alcoholism, and other things have been made responsible for it.

Foremost among the symptoms of the malady are all the indications of a severe chlorosis, accompanied by fainting fits, enlargement of the spleen, swellings of the glands, and especially severe bleeding of the nose, lungs, intestines, the retina, and the brain. In many cases, high fever sets in during the course of the complaint, which leads rapidly to death from exhaustion. In other cases the patient's condition may drag on for several years, until some organic disease happens to come to the front and puts a fatal conclusion to the

patient's malady.

Too sanguine hopes of cure must not be entertained; as, though recovery is not impossible, it is rare. In most cases the blood-forming organs are so seriously affected that the patient has to pay the last penalty.

Pernicious anæmia. This form of anæmia is happily rare. It consists in an extraordinarily extensive destruction of the red blood corpuscules in consequence of which the blood becomes thin and pale. The disease, unlike chlorosis, generally attacks people in their best years without its being possible to assign any definite ground for this degeneration of the blood, which we might almost suppose to be an infection. It has certainly been shown that intestinal worms, infectious disorders and pregnancy may occasion the malady. But some poisonous product must certainly get into the blood to be able to effect the destruction of the red corpuscules.

The disease almost always develops itself gradually, and with the symptoms of a severe chlorosis which have been already described. But it is very soon plain from the severity of the malady and the increase of all the symptoms that we have to deal with something more than chlorosis. After a few weeks the patient is so weak, and fainting attacks, bleeding at the nose, giddiness, palpitation of the heart, and shortness of breath follow so fast after one another that the patient is compelled to take permanently to his bed.

Accumulations of water in the bones frequently occur, and spread over the whole body, so that death, which is a release, takes place after some two months during which the advance of the disease has been permanent.

On the other hand sudden changes for the better occasionally occur, and I remember a case of a factory hand of thirty, in which the destruction of the red corpuscules which had certainly been recognised suddenly ceased. The patient recovered, after having been certainly very near death, and seemed to be again perfectly well, when, apparently without any cause, a relapse ensued, which ran a violent course, and ended in death in three weeks.

The treatment. Both maladies are to be treated in exactly the same way. It is of primary importance to support the patient's strength; and for this reason the chief thing needful is a diet easily digestible, and rich in albuminous substances. Of medicines, what is known as Fowler's solution deserves special recommendation. It is a weak solution of arsenic, one portion of arsenic to one thousand of water. It is frequently given in ordinary chlorosis, as it stimulates the formation of blood. Other medicines may be necessary to influence

the symptoms accompanying the malady—pain, bleedings, fainting fits, etc.

Little can be hoped from water treatment. And, as has been already said, death is generally merely a question of time. The use of water should be limited to washing the body with luke-warm water, to compresses, and other mild forms of water treatment, to afford the patient relief.

Diabetes Mellitus.

This malady is a disturbance of nutrition in the simplest sense: as it consists essentially in the sugar which is found in the liver not being used for the nourishment of the body, but evacuated, often in large quantities, unused in the urine.

To what extent the nervous system or the sugar-forming organs (particularly the liver) take part in the disease is a question about which opinion is not yet decided. Nor is it yet settled whether in this peculiar form of evacuation of sugar we have to deal rather with an insufficient combustion of the sugar into hydrocarbons and water, or with an increase of the normal formation of sugar. For these reasons I shall prefer here to omit all speculations on these questions, and mention only that the blood of patients suffering from diabetes mellitus contains always more or less sugar, and that this sugar is excreted in the kidneys as urine-sugar, leaving the sugar in the urine in a state of solution.

Diabetes mellitus is a malady with a chronic course belonging to middle age, and attacking principally the male sex. The credible evidence of patients (of which I have had many) points to diabetes mellitus arising from hereditary taint (parents having suffered from the same malady, or from hysteria, epilepsy, alcoholism, mental diseases, etc.), or from injudicious habits of life (frequent heavy meals), or from gout, injuries of the brain, and infectious diseases. But every thoughtful reader will agree with me that these very various possibilities may be merely accidental coincidences, and cannot be relied upon. In fact, diabetes mellitus frequently attacks persons descended from perfectly sound parents who have never been previously seriously ill, so that we need have no hesitation about saying that the cause and nature of this disorder are still very obscure.

Diabetes mellitus almost always appears gradually and slowly. It first shows itself in an increasing general weakness of the muscles, in disturbances of the digestion, lassitude and proneness to fatigue, and

more particularly in emaciation and loss of weight in spite of undisturbed and even increased appetite.

A more important symptom, and the one that generally first arouses a suspicion of the nature of the disorder, is the increase of the quantity of urine daily passed, which may rise to five, six, eight quarts, and even more—being, in fact, so remarkable that the most unobservant man must be struck by it. The urine is pale yellow, sometimes even as clear as water, and has not seldom a pleasant somewhat acid aromatic smell like fruit. If it is chemically examined it is found to contain a quantity of sugar, varying from two to five per cent. In rare cases this may rise to eight, ten, and even twelve per cent. This amounts to at least 7,700 grains per diem; in ordinary average cases some 1,500 to 2,300 grains of sugar are daily lost; which sufficiently accounts for the emaciation.

The other most important symptoms of the disease are the following, which generally appear somewhat later.

The patients suffer from great thirst, and eagerly drink quarts of liquid to quench their tortured longings. They suffer also from great hunger, occasioned not only by the waste of hydrocarbons, but also not less by the increased destruction of albumen in the organism, which is proved by the generally large increase of urea evacuated.

The various organs of the body give evidence of a diminished power of resistance. Thus, for example, many patients develop tuberculosis of the lungs, others inflammations of the kidneys or severe neuralgia, others induration of the vessels with weakness of the heart. Most patients ultimately succumb not to the diabetes mellitus itself, but to some disorder of organs induced by it.—That in many patients cataract is developed in one or both eyes deserves not to be forgotten.

The condition of the external skin deserves particular attention. Apart from the itching, and wet abrasion of the skin in the vicinity of the sexual organs, which occur particularly with women, and must be due to the dripping urine strongly impregnated with sugar, the skin in all parts of the body exhibits a striking proclivity to forming boils and carbuncles.

One more very important factor remains to be mentioned. This must be referred to the implication of the nervous system, and must in a number of cases be called the cause of death. This is what is called the coma* of persons suffering from diabetes mellitus. It may

* By coma, we mean a diseased condition of suspended consciousness.

be developed at any time, so that every patient must take it into account.

This coma amounts to a kind of self-poisoning in consequence of at present unknown metabolic changes, which strongly affect the brain in particular. The patient is first of all seized with headache, giddiness, sense of oppression, and general indisposition. After this ensues a stage of great mental distress and disquietude, so that the patient can be with difficulty kept in bed. This is followed generally by a state of deep unconsciousness, which leads imperceptibly to death.

The most important particulars regarding the duration, course, and final conclusion of the malady are these; we may confidently call diabetes mellitus a chronic disorder. We do indeed meet with cases that lead to death as rapidly as miliary tuberculosis (which brings the strongest man to his grave in six weeks); but these are rare exceptions. I know, on the contrary, patients who have for seven years had five per cent. of sugar in their urine, and still go about their business and enjoy their lives, observing a strict régime.

It would seem that diabetes mellitus is not so dangerous in later years as during earlier manhood, and that the cases which occur in later years should be referred to disturbances of nourishment different from those of severe cases at the age of thirty. This, at least, is certainly demonstrated, that many aged patients have suffered from diabetes mellitus for over fifty years, without finding their health particularly disturbed, until finally some organic disease supervening, or the coma already mentioned puts an end to their days.

The treatment. Most methods of treatment of diabetes mellitus amount to depriving the patient of all articles of diet containing starch and sugar; so that it may be possible to say to him, "To-day the urine contains no sugar: and the malady is, consequently, distinctly diminished." I wish to say plainly that I consider that inference distinctly suspicious, and directly dangerous. Whilst we are contending with some single symptom of the disease, the disturbance of nutrition within the body itself is making unhindered progress. Our attempts should be rather aimed at enabling the body once more to burn, that is to say, to use the sugar which it contains. When we have done *that* it is time to speak of improvement.

For this reason our first step must be to provide for an adequate movement and exercise of the muscles. Because increased movement presupposes increased development of heat, or in other words, use of the sugar contained in the body. Here hygenic gymnastic exercises are of importance.

At the beginning of this new century we stand at the turning-point of a momentous change in our views of medicine. We are now beginning to see that therapeutics and the sum total of the art of medicine do not consist in combating the several symptoms of disease with prescriptions, but that what we have to place before ourselves is the problem of how by physical and dietetic methods to bring the organism into such a condition that it may be sound from within, whereupon the external symptoms of disease generally vanish of themselves.

Of course, a patient suffering from diabetes mellitus should take little sugar and hydrocarbon. But not because they are dangerous to him, but because they are useless, merely leaving the body again in the urine; and because they satiate him and leave him too little power to assimilate more appropriate nourishment.

The most important articles of diet for such patients are all kinds of meat, ham, butter, milk, and cheese, because the diet should be particularly rich in fats and albumens; also green vegetables, such as cucumbers, salad, and spinach, are to be allowed without hesitation. The following may be eaten with caution—that is, not in large quantities—rice, light bread, fruit, and vegetables containing sugar (carrots, parsnips, brocoli, and asparagus). To be as much as possible avoided are—sweetmeats (cakes, honey, sugar in drinks, sweet dishes and puddings), potatoes, dumplings, leguminous fruits (peas, beans, lentils), and sweet wine.

Small lumps of ice are to be recommended to quench the great thirst of the patient. They should be taken into the mouth and allowed to melt slowly. Prohibition of certain drinks must not be overlooked. Bavarian beer is particularly injurious, and coffee drunk in large quantities harmful, the latter chiefly on account of its stimulating effects. Thin tea, with a little brandy or red wine added, is a drink that may be strongly recommended the patient, and is taken willingly.

The patient must be warned against, and as far as possible avoid any excessive exertion—such as carrying the physical exercise recommended him to any excess—and mental effort. He must, of course, be plainly informed of the nature of his malady; but I consider it a mistake to provide the patient with the means of daily testing for himself the percentage of sugar in his urine, as is often done. It excites him to no purpose, and does him harm. In addition to which it renders him fidgetty about the rules of his diet, since it may happen that the proportion of sugar increases, even when the diet is frugal.

Good care of the skin should be one of the patients chief concerns. A

daily luke-warm bath is best; and it is well twice a week to rub the whole body with vaseline. The last precaution is best taken in the evening. This is not so superfluous as it may sound. The skin is not only in consequence softer, but also better protected against the boils which have been mentioned.

Of medicines to be taken internally only opium and salts of bromium are to be recommended. The tincture of opium which should be taken by drops, not only diminishes the patient's thirst but also the excretion of sugar. The salts of bromium do the patient good service in all conditions of nervous irritation.

The alkaline mineral waters of certain watering places have a good reputation for being very beneficial to patients suffering from diabetes. There is of course no reason why a patient should take an expensive tour to one of these resorts (though that may be recommended to those who can afford it), as the equivalent salts will enable anyone to have an alkaline bath at home at a small cost.

In coma (which generally precedes the painless death of the patient) lukewarm baths with cold douches are the only thing that can afford relief.

Simple Diabetes.

Simple diabetes is distinguished from the diabetes mellitus which has just been described by being simply a great increase of the amount of urine normally passed. The urine, however, contains no sugar.

Respecting this simple diabetes we are also so uncertain of the locality of the malady and of its cause, that it is useless to expend words upon them. I shall, accordingly, limit myself to saying that simple diabetes is a disorder of metabolic changes arising from unknown causes commonest at middle age, revealing itself principally in an increased production of urine not containing sugar.

In most cases the peculiar malady develops itself gradually and slowly. But it occasionally appears quite suddenly, and that in consequence of some accidental cause, such as a big drinking bout, long marches during military manœuvres accompanied by much water drinking, or an injury of the head occasioning irritation of the *medulla oblongata*, &c., afterwards becoming permanent.

An increased feeling of thirst goes hand in hand with the increased activity of the kidneys, which in a simple diabetes results in an average of six quarts of a perfectly clear, scentless, and water like

urine. Even during the night the patient will be drinking quantities of fluid, by preference cold water, to replace the great loss of water from the body, and to guard against drying up of the tissues.

All the other symptoms of diabetes mellitus (disorders of the skin, increased appetite, coma, &c.), do not appear in simple diabetes. But I must not omit to mention that sometimes a simple diabetes which has existed for some years, suddenly passes into diabetes mellitus, and then generally terminates fatally within some months.

The course of simple diabetes is (with the exception of a few rapid cases) always distinctly chronic, and can extend over a whole series of years. It is not a rare thing for the organism, under the influence of the general weakness, induced by the continuous loss of fluid, to develop some organic disease (tuberculosis or cardiac affection) in consequence of which, the incurable diabetes leads the more quickly to a death from exhaustion.

The treatment. Direct medicinal cure for simple diabetes there is none. Tincture of opium and decoctions of Valerian root are given, it is true, but these combat only a symptom of the disorder—the thirst—and not the malady itself.

It appears to me to be most essential to aim at a general strengthening of the body by regular care of the skin (baths), an easily digested and generous diet, and physical exercise in the open air. Anyone who follows this régime has every prospect (if he has no additional organic complaint) of being able to bear up against simple diabetes for a number of years. Quenching thirst with water, weak tea, aërated waters, beer, etc., if tiresome is an endurable evil.

Rickets.

This is a general disturbance of nutrition in childhood. It is extraordinarily common, and particularly so in large towns, where it may be asserted that a very large proportion of the children show more or less evident symptoms of rickets.

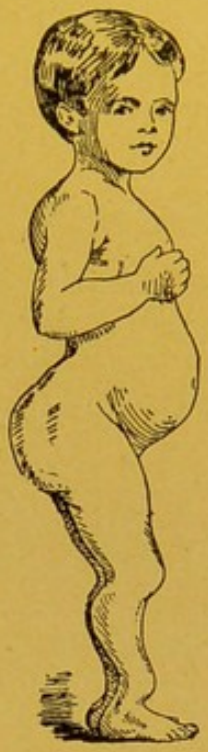
Formerly rickets was regarded simply as a disease of the bones, and held to consist in this, that the bones in consequence of an imperfect deposit of salts of lime remained weak and became crooked. It has now, however, been certainly proved, and is universally acknowledged, that the disease of the bones so often observed is only one of the many symptoms of this insidious complaint of childhood, and that in addition to the bones all the other organs can be injured and hindered in their development by rickets.

Poisonous plants.

1. Laburnum. 2. Mezereon. 3. Black nightshade. 4. Herb Paris.

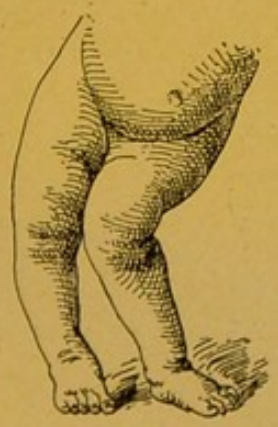
It is very important that rickets should be regarded from this point of view, as a general constitutional disorder: and there is too great a tendency to conclude that no suspicion of rickets need be entertained if the joints of the hands or feet show no symptom of being thickened.

Opinions differ respecting the origin of rickets. Some observers believe that the blame must be laid either upon heredity or infection. Others hold that the cause must be a diet containing too little lime. But I believe that we may confidently say that at present we have got no further than conjectures; conjectures, however, which make it probable that *improper diet* and *unfavourable atmospheric conditions* (damp, cold dwellings, ill-ventilated rooms both by day and by night, want of light, air, care of the body, and exercise) lay the first germs of this commonest of all children's complaints.



Boy of three years old with rickets. The position of the abdomen and the alteration of the bones of the lower leg are most striking.

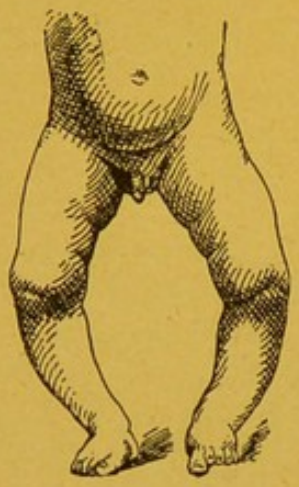
In order to place before all mothers the numerous symptoms of rickets, I shall first of all speak of them in groups, and then conclude with describing the manner of their first appearance and the peculiarities of their development. But I must not omit to say that we rarely find all the symptoms of rickets united in one child. Sometimes one organ and sometimes another appears to have been more affected.



Alteration of the joints in consequence of neglected rickets.

Foremost must be mentioned the disordered alterations of the bones. These are sometimes so extended that scarcely a single bone has its proper shape. We may first consider the long tubular bones of the arms and legs. Their extremities appear swollen into clubbed shapes, which can be particularly seen and felt at the wrists and ankles. The tubular bones are also not so nearly straight as they should be, but show a distinct proclivity to curvature (bow-legs), or to be twisted about their axes. The bones of the head also show distinctly abnormal forms. The whole head assumes something of an angular character;

and both on the forehead and at the back of the head protruberances of bone are visible. The behaviour of what are called the fontanelles (see p. 42) is also striking. They close with a thin covering of bone very late; whilst in healthy children they are fully covered soon after the completion of the first year.



Bow-legs resulting from rickits.

Coming to the formation of the teeth, it is universally known that dentition is most unfavourably influenced when the child suffers from rickets; and we must always suspect latent rickets when an otherwise healthy child is very slow in developing his teeth, or if the teeth which have appeared so late are poorly formed and grooved.

Neither the chest nor the pelvis escape. The malformation of the pelvis often comes to light only many years afterwards inconnection with a severe confinement. But the malformation of the chest appears in the earliest years of childhood as a direct consequence of rickets, in the shape of what is called a "pigeon-breast"—a pronounced protruberance of the breast bone with a sinking in at the pit of the chest. Finally must not be forgotten the vertebral column, the malformation of which may lead to most serious consequences which will be discussed under *spinal curvature* in its relation to rickets.

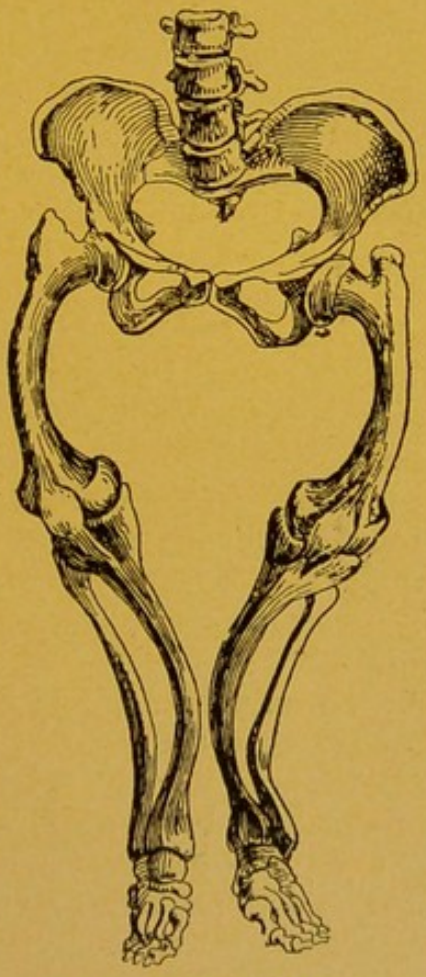
But in addition to these prominent malformations of the bones, many other symptoms appear which must be directly referred to rickets, and it is interesting to observe that it is the *lymph glands*, *liver* and *spleen* (that is to say organs all of which are directly connected with the normal or abnormal preparation of the blood) which are often particularly affected with swellings. This circumstance alone shows plainly that a general disorder of nutrition must be present.

If we now proceed to the disturbances which *the organs of respiration*, *the digestive canal*, and *the nervous system* suffer in consequence of rickets, we shall at once remember that in a previous chapter on the maladies of childhood it was pointed out that rachitic children show a strong proclivity to catarrhs of the larynx and bronchi, and to inflammations of the finest branches of the latter accompanied by fever.

Disturbances of the digestive canal show themselves often in the form of violent diarrhœa, but more frequently in chronic constipation; and rachitic children frequently present an abdomen protruding far

in front of the ribs and marked with blue veins: the abdomen having become swollen in this manner in consequence of accumulations of gas in the intestinal loops.—The extraordinary proclivity of these children to *perspiration of the head* is striking as a nervous symptom, and an experienced observer will immediately conclude a child to be suffering from rickets from the fact of his perpetually trying to rub his head on the pillow, on account of the itching of the back of the head occasioned by the excessive perspiration.

In addition, all children suffering from rickets are fretful and irritable. The least touch appears to give them pain, and the very tone of their crying in shrill, piercing notes might awaken a suspicion of their malady.



Portion of Skeleton of a Man affected with Rickets.

The great proclivity of these children to convulsions generally, but more especially to spasm of the glottis is another indication of the

exaggerated irritability of their nervous system.

As to the beginning of this many-sided malady of childhood, no one can ever say that a child on this or that day sickened of rickets. We must never forget that we have here to deal not with a feverish malady with an acute course, but with consequences (showing themselves gradually) of long-standing mischief, of which we had no suspicion. In addition the general health of the little patient, who has already, perhaps, reached his third year, often for weeks shows no disturbance—this is particularly true of children as distinct from babes—so that many cases of distinct rickets go on entirely unremarked until later, and, perhaps, only after years, the malformation of the bones is made evident by some other malady, and recognised as an evidence of the child having suffered from rickets.

In most cases the disease sets in during the second year: it may be that the slow general development attracts attention to it; or that great indisposition to walk or stand is exhibited, so that every attempt in this direction is followed by loud crying on the part of the child; or it may be that bronchial catarrh, convulsions, or disturbances of the digestive organs make the malady prominent, and render treatment necessary. Rickets are dangerous to life only in so far as they lower the general condition, and with it the capacity of the organism to resist the assaults of the many diseases of childhood. But the malformation of the bones alone (which in the form of narrowness of the pelvis may in childbirth prove extremely dangerous to females) make the earliest possible treatment desirable.

The treatment. The treatment of rickets has been almost indicated in advance, in the enumeration which I gave at the beginning of this section of the causes which may be suspected of producing the malady —wrong dieting, bad atmospheric conditions, want of fresh air, of light, of exercise.

To begin with diet. Examination of the bones of children who have died of rickets shows that the mineral contents of the bones (phosphates of lime) is too small. But we must not immediately conclude that the children received too small a supply of these salts of lime: we ought rather to say that they were not in a condition to take up into their blood and to use for forming bone the salts of lime contained in their food. And this is confirmed by the fact that both the urine and fæces of rachitic children are rich in these salts. If, n spite of this, improper diet is placed foremost among the causes of the malady, in most cases (in my opinion) the mistake lies in feeding the children too soon, when they were very young, with preparations of meal difficult of digestion—against which I have already in so many

places entered strong warnings. *The diet must be accommodated to the age of the child*; and as soon as any suspicion of rickets arises I strongly advise that what I have written about the diet of young children should be read over carefully.

The very best diet is not, however, alone a certain protection against rickets. We find children fed at the mother's breast attacked by rickets as frequently as those brought up by hand when proper care is not bestowed upon them. For this reason attention should be paid from the beginning to giving the child ample opportunity of being in the fresh air, also that the child is not hindered by tight clothes from free breathing and refreshment of his blood, also that he is properly protected from cold, and *particularly that he shall not have to sleep at night in a room in which the air is "used up," and so unfit for a sleeping room.*

Regular attention to the skin is particularly calculated to combat rickets. The child at least until the end of the first year should at least every other day, and certainly not less than twice a week, be allowed to splash about in a bath. Additions to the bath of decoctions of herbs (thyme), or of malt (about three pounds for a child's bath), are much used for these children, and I beg the reader to refer to what is said on this subject in the chapter on baths.

A particularly effective medical remedy is phosphorus, best used together with cod-liver oil. It is wonderful how rapidly the symptoms of rickets disappear under the influence of this medicine when given in quite small doses—one teaspoonful of phosphorated cod-liver oil three times a day. *All parents must be strongly recommended to try this remedy first, as it never fails.*

Cod liver oil is one of those medicines which children often take unwillingly and only under compulsion; but recently cod liver oil has been combined with maltine or with phosphate, added in the form of an emulsion. This is willingly taken by children, so that I can strongly recommend all parents to try this excellent remedy.

Gout.

Gout is essentially a disturbance of metabolic changes, and may be briefly described as a condition in which the uric acid existing in a state of solution in the blood, instead of being evacuated in the urine by the kidneys, is precipitated in the tissues in the form of salts of uric acid, much as we have already seen it precipitated in kidney stones.

By far the most frequent locality of this deposit is the joint of the great toe, but the finger joints, the knee joints, or the shoulder joints, are also affected by the malady. In consequence, we often hear of "gout of the joints" mentioned as a specific disease, whilst deposits of salts of uric acid in the brain, kidneys, the external skin, and in all other possible localities are spoken of simply as gout.

What may be the definite cause of the peculiar disturbance of metabolism is at present unknown. We are ignorant whether it arises principally from such an excessive production of uric acid—a product of the decomposition of albuminous substances—that the blood cannot hold it in solution; or from some disturbance that diminishes the solubility of normal quantities of uric acid, so that these become deposited at those points of the body where the blood is far distant from the heart, and moves only slowly through the very minute arteries of the joints.

It has, indeed, been asserted that luxurious living, in other words, a diet rich in albumen, combined with the free use of alcohol, increases predisposition to gout; and that, for this reason, well to do people sicken of "rich man's gout." But this opinion is based rather upon bold conjectures than on facts; and I have myself treated for true gout a great number of poor fathers of families, who certainly could not be accused of taking a rich flesh diet and a great deal of alcohol. —Only one thing is certain that a direct heredity from father to son exists, so that we may assume an inherited disposition of the blood to form uric acid; but lead poisoning also stands in direct connection with gout.

Gout generally attacks well nourished men in middle age, and more easily in cold, cloudy, and damp weather than in summer. This may be the reason why gout is common in certain countries, for instance, Friesland and England.

The commencement and course of the commonest form of gout is as follows.—In the middle of the night, either without any warning, or after general pains in the muscles, and disturbances of digestion, have preceded it for some days continuously, a painful swelling of the joint of the great toe presents itself. Shivering fits and fever, with severe piercing pains, combine to make it a malady of a very intolerable kind.

If we examine the affected foot we see at once that the joint which has been attacked is inflamed and swollen. The shiny skin is stretched over the joint, and has lost every trace of a fold. The pain and also the fever almost always diminish after some hours, and the patient falls into a pleasant sleep, to find himself on the following

day distinctly poorly. In the night the same symptoms again present themselves, and more acutely. The bed clothes become a burden which the foot cannot bear. The patient sits sometimes on the bed, sometimes on a sofa, or limps hither and thither about the room ; storms at all doctors and apothecaries, keeps his wife in perpetual motion, though it is impossible for her to do anything that can please him, and finally falls asleep worn out, as the pain diminishes towards morning.

This goes on for six or eight days, or rather nights, until a distinct diminution of the attacks of pain improve the condition and temper of the patient. Strange to say, after recovery from a fit of gout, it is not rare for a state of general sense of good health to ensue, one might say of high spirits ; but one not unreasonably damped by fear of recurrence of the malady.—For it must be mentioned that the gout almost always re-appears, particularly if the manner of living is not regulated ; and it is not always the same joint which is in the course of time attacked. The gouty changes of the joints, which arise during the attack, do not completely retrograde, in consequence of which it is possible, after many years, to recognise from the condition of the joints a patient who has suffered from gout.

Though gout is not of itself by any means a dangerous disease, it is not to be lightly regarded, and is by no means the laughing matter some people suppose who feel very certain of the connection between the malady and the luxurious life of the patient.

Frequently observed secondary diseases are frequent eruptions on the skin, disturbances of the stomach and intestines, and affections of the heart. Their connection with gout is not explained. *The most important and most dangerous of the secondary diseases is certainly inflammation of the kidneys with subsequent chronic changes of the kidneys.* This, however, generally occurs only after many years ; gout being a disorder that usually extends over a number of years, and in old age frequently makes itself burdensome only in consequence of the alterations of the joints, particularly when these are developed on the feet, and make walking difficult.

The treatment. The attack of gout is by far best borne by complete rest in bed, or on a comfortable sofa, with the leg laid up and warmly wrapped in cotton wool. It is absolutely useless to be constantly undoing the wraps to look at the joint. In an attack of gout rest is the first duty, and the stiller the leg can be kept the sooner will the patient be again on his feet, also, the longer the patient can keep the affected joint still, the sooner will the disordered swelling of the joint be reabsorbed, which may in later years be of great importance.—

During the attack salipyrin (15 grains three times daily) gives most assistance, and Carlsbad water.—Damp compresses or foot baths are useless during the attack, but may be used with advantage afterwards. Hot fomentations often relieve the pain.

Physical and dietetic rules form the most important part of the general treatment of gout, and the best means of avoiding recurrence, as in diabetes mellitus, and generally in all disorders of metabolism.

To begin with the diet of the gouty patient. He must not be forbidden to eat and drink reasonably as much as he wants, but be rather warned to avoid any *excess in eating and drinking*. Especially he should limit the amount of meat diet, and of foods rich in albumen, so that the stored up fat in the body (which is generally abundant) may be so far as possible used up. It seems also important to avoid all acid articles of diet, as the pressure of acids favours the formation of uric acid.

A great many medical men warn their patients against any use of meat diet, and advise a vegetable diet, especially one of green vegetables. But this advice is not good in all cases. Poorly nourished delicate gouty patients (and such exist) succumb under so restricted a diet, and to escape from gout run into the arms of phthisis—certainly a change for the worse. Nor should alcohol be absolutely forbidden. The patient need not be instructed that he is never to touch a drop of wine or beer. But the patient should be warned against the *regular use of alcohol*, also against the use of drinks of *great alcoholic strength*, and against *cheap acid wines*.

The different alkaline waters, and water mixed with cooking salt, are approved drinks, and have the reputation of mitigating even the most severe attacks in a few days. In particular Carlsbad water and Vichy water may be taken both during the attack and after it.—It has been found that salts of lithium are powerful solvents of uric acid; and, for this reason, continued use of these in some of the well-known forms is very advantageous.—It is hardly necessary to add that water should be used not only thus internally, but externally also, in the form of regular washing, douches, and baths, it produces excellent effects upon the body of the patient.

In the treatment of gout, or rather for avoiding its recurrence, exercise is of great importance. The physical condition of the patient must, naturally, in each individual case dictate what exercise shall be recommended, with the aim (as in diabetes mellitus) of stimulating metabolism in the tissues by activity of the muscles. Riding or cycling may be recommended to one patient, gymnastics to another, to another walking or mountaineering, to another (who is engaged

day after day in a sedentary occupation conducive to obesity) a change of calling, if possible with plenty of fresh air.

Corpulence.

Before closing my remarks upon metabolic diseases I shall devote a few words to unhealthy fatness. This, like diabetes mellitus and gout, results from a disturbance of the normal use made of the nourishment taken into the body.

In the former maladies we observed a misuse by the organism of hydrocarbons and albumen. In corpulence fat is misused. In mild cases it is accumulated on the anterior wall of the abdomen as what is called reserve fat. In severe cases it penetrates all the organs as a disordered excretion. It is not only an annoyance to the patient, but can also become dangerous to life by affecting the organs of circulation and respiration.

To what point exactly the deposit of fat must have advanced before a man can rightly be considered to be unhealthily corpulent—that is to say, where we begin to encounter disease—cannot be said off-hand. The question cannot be decided by weight, because not only must the development of bone and muscle be taken into consideration, but also age, sex, and height.

Of course, a certain degree of stoutness which begins to develop itself about the age of fifty, or sometimes earlier, must not be regarded as unhealthy. Our attention should be much rather drawn to such cases as those of young people, and even children, or those of later years, in which a constantly increasing accumulation of fat is perceptible, and can be recognised in the loss of the normal proportions of the person, and in a laboured gait.

It is difficult to ascertain what can be the cause of the enormous accumulation of fat in the cases of certain individuals. It is entirely erroneous to suppose that corpulence is *invariably* a consequence of excessive eating and drinking. Though this is true, as we shall see in the majority of cases, there are, on the other hand, persons who on frugal fare show a proclivity to an excessive and distinctly unhealthy accumulation of fat, because the fat which they eat is not properly burned.

That heredity, temperament, and racial habit have a close connection with physical development, and also with tendency to corpulence, is an indisputable fact. Whole nations bear witness to it.

But whilst it is demonstrable on the one hand that the development

of fat *need* not be dependent upon the quantity of food taken; there can be no doubt, on the other hand, that in by far the greatest number of cases obesity is a direct consequence of a copious diet. The reader may refer to page 141, where the average quantity of food necessary to balance the daily waste is discussed, and shown to be, for a healthy man, daily 1000 grains of fat, 2000 of albumen, and 5000 grains of hydrocarbon.

Now it is plain that the various food-stuffs taken day after day cannot always stand exactly in this relation to one another. They take each others places, and run over into one another. But exactly as the organism cannot be for a long period deprived of one or another of these three elements without becoming emaciated, so accumulation of fat must inevitably ensue if any one of the three is taken in too abundant quantities. In other words any one who eats daily more than 1000 + 2000 + 5000 = 8000 grains of food stuffs, deposits the superfluous quantity as fat; just as any one who takes less must draw upon his reserve of stored up fat.

In particular, the disturbance of respiration which, during bronchial catarrh, shows itself in shortness of breath and difficulty in breathing (especially in a lying position), and the interference with the heart's action, revealed in palpitations, irregularity of the pulse, and attacks of dizziness, are not to be lightly regarded, and are distinctly dangerous to the corpulent.—In addition must be mentioned that abnormal stoutness is connected with proclivity to hardening of the arteries, gout, degeneracy of the muscles of the heart, diabetes mellitus, and chronic inflammation of the kidneys.

The treatment. Before I enter upon the various "cures," of which the reader has no doubt heard, very likely without knowing on what principles they are based, I wish to mention the great dangers to which people are exposed who set about curing themselves of corpulence, without being assured of the perfect condition of their hearts, lungs, and kidneys.

Many a man has before now succeeded in curing himself of corpulence, and immediately afterwards died of a severe disease of the heart, which would not have ensued had he not embarked upon the cure, which no doubt some friend recommended. I have no hesitation in saying that any cure of fatness, which is to produce a permanent result without danger to the organism, must be conducted upon some method of treatment suitable to the individual, with due regard for his general physical temperament and manner of life.

Whilst every cure must be based upon a particular plan, according to the attendant circumstances, all cures can be conducted only upon

one of two general principles, inasmuch as we have first to prevent the constantly continuing accumulation of more fat, and then to burn up the superfluous fat which has been already accumulated.—A proper regulation of diet corresponds to the former point, to the second a treatment of the body in accordance with what we call the natural method of healing—that is to say development of the natural forces by means of exercise, massage, and the use of water.

To begin with the regulation of diet, I am completely opposed to all those cures which are based upon a one-sided diet—that is to say upon limiting the fats and hydrocarbons (Banting's cure), or the hydrocarbons and albuminous substances (Ebstein's cure), or fat and fluids (Ortel's, or the Scheninger cure). These cures are not only directly dangerous, because the organism cannot be deprived for a long time of any one of the three elements of nutrition; but are effective only until the patient, after a few weeks, becomes disgusted with them, as he discovers that the loss of weight aimed at is followed by a numbness of the muscles, if not by dizziness, palpitations of the heart and sleeplessness, all of which must be referred to the destruction of albumen.

In my opinion—the correctness of which I have found supported in many cases of corpulence—the great point is not the interdiction of any one element of food, but that a relation shall be established between the quantity of nutriment taken and the quantity used by the organism. The patient need not distress himself about eating fat, albuminous bodies, and hydrocarbons in a mixed diet so long as he does not exceed the daily measure of 8,000 grains of food, and is moderate in the use of alcoholic drinks.

The greatest attention must be paid to a good, that is to say, regular digestion of everything that is taken. Opening diet (fruit) may also be taken in conjunction with opening waters (Apenta, Hunyadi Janos), or with bitter waters like Friedrichshall—for which the crystalized salts may be taken at home—and this often diminishes the corpulence quite remarkably, particularly at first.

But as in so many other disorders, so also in this, physical treatment must support the dietetic treatment. And an increase of the activity of the muscles must be especially recommended in order to favour the burning up of the fat in the body.

The patient suffering from corpulence has no taste for exercise. He perspires easily; he is easily tired; and shortness of breath sets in after a very short walk. But all these symptoms vanish day by day if he will only continue his exercise in a reasonable manner. After a certain time he finds that all his movements are distinctly freer, that

he can bend himself and turn himself more easily, and that his weight—which should not be measured oftener than once a fortnight —shews to his gratification a diminution of several pounds.

Next to exercise, which can naturally be of all different kinds, riding, cycling, mountaineering, gymnastics, &c., water is of the greatest service, particularly in the form of steam baths, of hot air baths, or of perspiration baths. Other uses of water (swimming, douches, washing, &c.), which will be more fully discussed at the end of this work, may also be strongly recommended, as they influence metabolism in the most favourable manner.

Massage also, not of the abdomen alone, but of all the muscles, much assists to the using up of the fat in the body.

In conclusion, I must not omit to mention the very efficacious thyroid tablets which for some years past have been frequently recommended in England against highly developed corpulence, and have been taken with good results. These are small white pellets of a slightly sweet taste. But this remedy should not be used without competent medical advice, which must be strongly recommended in every case of corpulence, as frequently symptoms present themselves during the cure which demand medical diagnosis.

CHAPTER XIV.

The External Skin, its Preservation, and its Disorders.

Structure and Functions of the Skin.

The external skin which covers the whole body with an enclosing integument, and possesses the sense of touch, consists of three layers immediately connected with one another, and distinguished as the external skin (epidermis), the *dermis*, and the subcutaneous connective tissue.

The *external skin* or *epidermis* is the outermost covering visible to the eye. It is completely without vessels or nerves, and consists of two strata of which the outer horny layer is nothing but an aged state of the malpighian or mucous layer. The mucous layer consists of broad juicy cells, which are nourished by the blood-vessels of the *dermis* lying beneath it, and are to some extent provided with processes, and branches by which they bind themselves closely together to fill up all the inequalities of the *dermis*. The cells of the malpighian layer are to be regarded as the locality of the colouring matter in consequence of which different races have skins of such very different colour. They are in a state of constant change both as regards their form and their position. They become continually smaller and less moist, and constantly advance towards the surface until they become a part of the outermost skin. Here the once large moist cells become mere horny dry scales lying one over the other. They are being continually rubbed off the surface, and replaced by other cells pushed outwards from below.

The dermis, or middle stratum is the most important of the three strata, being the seat of the sense of touch. It consists of a very stout tissue of connective tissue fibres with elastic fibres, which are more closely and uniformly woven together as they approach nearer the surface, whilst the lower looser tissue layers pass without any definite division into the connective tissue. The *dermis* is everywhere obliquely penetrated by innumerable branches of nerves and blood

vessels. These push out towards the equally numerous protuberances of the *dermis*, which stand close together in countless numbers upon the *dermis* and are called the *papillæ* stratum of the *dermis*. These *papillæ* are of two kinds. Some are called nerve papillæ, because the finest branches of the nerves enter them to terminate in what are called the tactile corpuscules. These represent the terminal apparatus of the sensory nerves. The other papillæ are named vascular papillæ. Very minute vascular loops of the blood vessels are found in them, which have previously wound around the hair follicles, sudoriparous glands (sweat exuding glands), and sebaceous glands.

The subcutaneous connective tissue, the third and lowest stratum of the skin is nothing more than a connection, more or less abounding in fat, between the dermis and whatsoever happens to be beneath it. It consists of a loose connective tissue inlaid with fat cells. In certain places, for instance on the anterior part of the abdomen, and about the nape of the neck the fat cells can be so thickly accumulated as to give the skin a thickness of more than an inch. The subcutaneous connective tissue gives a healthy well developed body its agreeable rounded form, protects the parts beneath it from the influences of weather, and, to a certain extent, serves as a protecting buffer against pressure and blows.

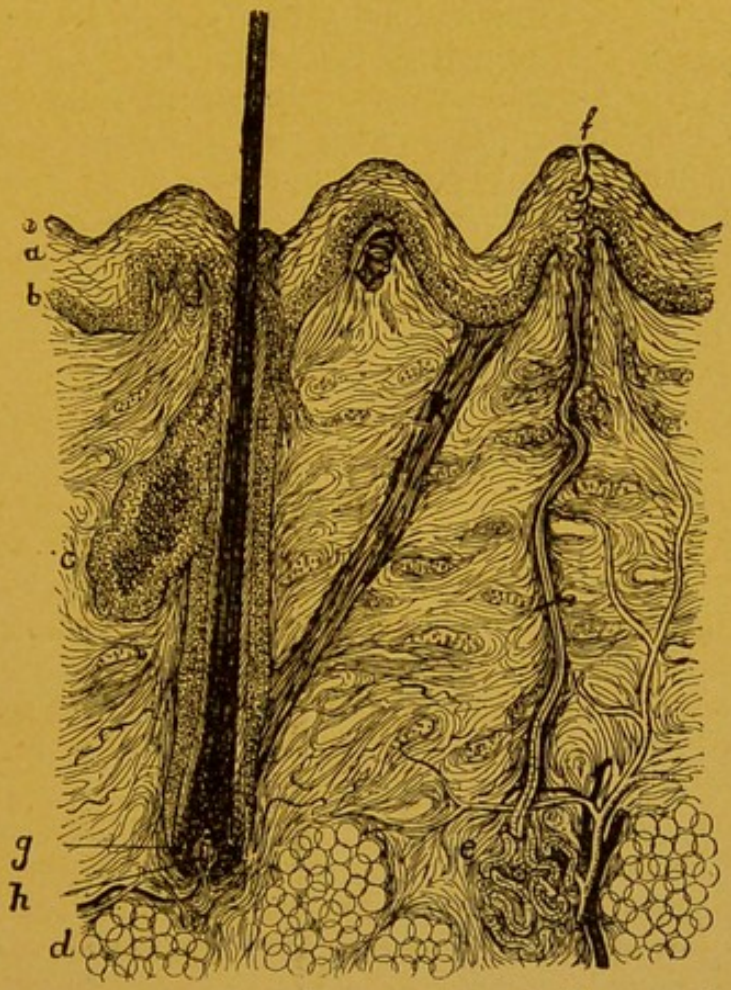
It remains now to give a brief description of the hair, nails, sudoriparous glands, and sebaceous glands, which are closely connected with the exterior skin.

The hair consists of elastic and very flexible threads of horn. The lower extremity of the hair, the root of the hair, rests in a bag-shaped socket in the skin, called the hair follicle. The upper end, or shaft of the hair, extends beyond the surface of the skin to a lesser or greater length.

The root of the hair, a bulbous enlargement rests with its broad lower end upon a papilla supplied with vessels or nerves, which must be regarded as the growing place of the hair, as it supplies the cells, out of which the hair is formed. If the shaft of a hair of the head of a grown man is examined under the microscope with a sufficient magnifying power, the hair is seen to consist of various strata, and an interior *medullary substance* can be distinguished from an external *cortex*. The external *cortex* contains the colouring cells, and determines the colour of the hair, which, as is well known, may be of the most different shades. In old age the colouring cells disappear, and the hair becomes grey or white. Men are, however, born without any colouring matter in the hair, whom we call albinoes: these have white hair and red eyes, with which they can see only with the greatest

difficulty in twilight.

The hair follicle, out of the base of which every hair grows by division of the cells, reaches into the dermis, and, in many places, even into the subcutaneous connective tissue, so that the hair has to pass through some distance in the skin before reaching the surface. In order to give the hair a certain degree of flexibility, the hair follicle



Section through the skin (Diagrammatic). A. The exterior skin. B. The malpighian layer. C. Sebaceous gland. D. Fat-cells. E. Sudoriparous gland. F. Excretory duct of a sudoriparous gland. G. Bulbous base of a hair. H. Hair-germ. I. Hair-shaft. K. Hair-muscle.

is in direct connection with several, and generally with two neighbouring sebaceous glands, which fatten the hair, and keep it from drying.

To add some general remarks on the hair, it may be mentioned, that with the exception of the palms of the hands and soles of the feet, the whole body is covered with hair. In most parts the fine hair,

or down, is so slightly developed and so thin as to be perceptible only upon close inspection. But the hair is thickly developed upon certain parts of the body, and known according to its situation as the hair of the head, beard, eye-brows, eye-lashes, &c., serving either as a protection or as an ornament. There exist hairy people of both sexes, who are completely covered with a thick hairy fur.

The idea that the growth of the hair can be made more abundant and stronger by frequently cutting it short, and that early and frequent shaving promote the growth of the beard is distinctly false. The growth of the hair proceeds, as we have seen, from the base of the hair deeply embedded in the skin. From this we may also conclude with certainty that the many vaunted preparations for stimulating the growth of the beard and hair are based upon a delusion. Even if they are powerfully rubbed into the skin they cannot penetrate into it sufficiently deeply either to stimulate or influence the papilla, from which the growth of the hair proceeds.

The length of individual hairs depends principally upon the rapidity of its growth, and upon the length of its life. The latter is reckoned at about five years. The luxuriance and abundance depend upon the greater or smaller number of the hair papillæ, and their nourishment.

The cultivation of the hair, which, when it is finely developed, is a special pride and adornment of the female sex, depends principally upon keeping the skin, upon which it grows, clean and well nourished. Much more can be done thus, in the simplest way, to maintain a fine growth of hair, and to promote the replacement, by new growth, of the hair lost in consequence of sickness, than by the most expensive preparations.

The best means of maintaining the growth of the hair is regular cleansing of the skin on which it grows, so that this may not become clogged with pomade and dust, nor the scurf rubbed off the external skin. Combs with very sharp teeth, or very hard brushes, should be avoided; and the hair should be treated from time to time with clean grease, which keeps the hair soft, elastic, and bright. Washing it with water, and especially with soap and water, makes it hard, dry, and brittle if it is not afterwards greased.—As most of the diseases of the skin that produces the hair are of a parasitic nature, the use of other people's brushes and combs should be avoided, as well as having the hair brushed by machinery. Many people have, in consequence of the last, lost their hair in a short time.

It is well known that violent perspirations of the head, pressure of the hat and helmet, exhausting diseases, and irregular life can so influence the skin upon which the hair grows that the hair falls off.

In treating of the diseases of the skin we shall have occasion to allude particularly to the loss of the hair; but I should like to conclude these few hints respecting a right cultivation of the hair with a very simple home remedy, which has most excellent effects, this is *rubbing the skin of the head with a beaten-up egg.* This remedy is best applied in the evening. Afterwards a night-cap should be put over the hair; and on the following morning the skin should be washed with luke-warm soap and water. After it is dried a little olive oil should be rubbed on it.

In conclusion a warning must be given against washing the hairy portion of the head with too cold water, and from cold water douches of the same part. I have on many occasions seen this followed by the falling off of the hair; and it is easy to imagine that continued excessive cooling may act injuriously upon the hair-germs.

The nails are horny elastic plates, altogether twenty in number, which cover the upper portions of the extremities of the hands and feet. The base of the nails is called *the bed of the nail;* the edge, which surrounds the nail on three sides in the form of a horse-shoe, the *ungual fold.* The growth in length of the nail proceeds from the root of the nail which is situated in posterior section of the bed of the nail, abounding in vessels. The growth, like that of the hair, varies at different times, and is distinctly more rapid in summer than in winter.

Cultivation of the nails consists chiefly in regular cleaning, cutting the nails at regular epochs, and, on the feet, to avoid the tiresome as well as painful "growing in" of the nail, comfortable shoes. If the last advice comes too late, that is to say, if the nail has already grown into the skin, a foot-bath should be taken every evening, and clean stockings put on every morning. The nail must be cut as short as possible, and a clean wad of cotton wool should be daily placed between the nail and the inflamed tumid ungual fold. Under this treatment the annoyance generally subsides. In severe cases the nail must be removed by the hand of a specialist. This should not be too long put off, as at first assistance can be given much more easily and with much less pain than when a severe inflammation of the bed of the nail has been already set up.

The sudoriparous glands are distributed to the number of some millions over the whole surface of the skin. They are situated in the deepest strata of the dermis, where they produce their slightly salt secretions. They are glands of very small size, whose intricately contorted duct first forms what is called a gland glomerate, and then proceeds in a direct line as a sweat duct to pierce through the dermis,

finally to emerge, with spiral involutions, at the outermost skin where the sweat duct ends in a sweat pore.

The sebaceous glands are small gland tubes, either single or collected into bunches, distributed over the whole skin, and numerous in all parts of the body covered with hair. As has been already mentioned, they are in direct connection with the hair follicles, and secrete a fatty substance known as the *sebum cutaneum*. With this they lubricate both the hair itself and the surface of the skin, upon which they open either freely with a very small orifice or immediately at the side of a hair. Their obstruction, and the consequent congestion of the *sebum cutaneum* in the excretory ducts of the sebaceous glands, constitutes what is called *acne*, to which I shall refer again later.

The care of the skin. The simplest way of placing before my readers the importance of a proper and regular care of the skin will be to explain what the skin has to do. From this will be concluded most clearly and most certainly what injuries to health can, or rather must ensue, if the skin is damaged in consequence either of neglect or disease.

The most important function of the skin is certainly its action as an *organ of respiration.* As has been already mentioned in several places it assists the lungs in their task of removing the injurious carbonic acid from the tissues, and of supplying oxygen in its place. How important this uninterrupted exchange of gases in the skin-respiration is may be most simply realised from the fact that a man who, in consequence of burns, has more than one-third of his external skin destroyed, after a short time shows all the symptoms of over-charging of the blood with carbonic acid (with which we became acquainted when discussing diphtheria of the larynx), and almost always dies in consequence of the disturbance of the skin-respiration.

As a *protecting organ* the skin defends the body from intrusive pressure; but in its sound state it more particularly hinders the penetration of injurious substances into the circulation. How important the service is which it does the human body in this way can be perceived from the consequences of the smallest injury of the skin, which by permitting the entrance of substances that provoke purulation may often lead to severe symptoms of blood-poisoning. To mention a case of a definite disorder it may be remembered that in our discussion of erysipelas it was pointed out that the malady could always be referred to infection following some minute injury of the skin.

As the site of the sense of touch the skin transmits to the brain the sensation produced in it by exterior contact. It informs us not only of the quality, hardness, and shape of the object touched, and that

with the eyes closed, but is also the site of corporal sensation, as the sensatory nerves terminating in it can excite in the brain according to the character of the irritation of the skin, the impressions of pain, tickling, heat, cold, &c.

The skin performs further a very important part as *an organ regulating heat and cold.* As a bad conductor of heat it keeps the intrinsic heat of the human blood, 98·4° Fahrenheit, in good health, the same both in summer and in winter, in the warmest parts of Africa and the coldest of Russia.

This is to us of the greatest importance. For we know that a feverish rise of temperature of the blood above 108° Fahrenheit (42° Centigrade), or its fall below 90° Fahrenheit (36° Centigrade), amounts to almost certain death. In other words, it would be absolutely impossible for us to exist either in very hot or very cold countries (whose difference of temperature is 140° or more) if the temperature of the outer air had any definite influence upon the internal temperature of the body. Of course it is not the skin alone that protects us from having our blood frozen in a very cold winter, or from its becoming heated during summer; dwelling places, artificial warmth, clothes, food, and many other factors perform their part, but it is the external skin that does most of all to enable us so to adapt ourselves to the temperatures of summer and winter, that an excessive cooling or heating of the blood (with which we shall presently become acquainted under the names of *frost-bite* and *sun-stroke*) may be described as comparatively uncommon dangers to health—in addition to which gross imprudence generally gives rise to them.

Under the influence of cold the skin becomes dry. It contracts (goose-skin) and the arterial blood, in consequence of the constriction of the vessels, is driven further into the organism. In consequence, the skin, under the influence of cold, becomes pale, or even bluish, owing to the venous blood showing through. Under the influence of heat, on the contrary, the blood vessels of the skin are distended, the colour becomes rosy, and the skin, in consequence of increased activity of the sudoriparous glands, and increased evaporation of water, becomes damp, if not quite wet. Upon our knowledge and use of this power of cold to contract the vessels, and of warmth to distend them, are based to a great extent the excellent results of water treatment, as it enables us to influence the distribution of blood in the body, in the manner that shall be most advantageous in the malady which we have to treat.

After all that has been said about these most important functions of the skin, it will be quite plain that any man who is seriously concerned

about the preservation of his health will consider care of the skin an important duty. The time that it requires, and the attention and expense are really so trivial, that any one can very well afford them; but it must, unhappily, be confessed that the average man of the present day considers himself a model of cleanliness if he washes his hands and face once every day, and, when a jubilee arrives, screws up his courage to the great undertaking of washing himself once in a way from head to foot.

Amongst the labouring and agricultural classes an indifference and idleness about such matters exists, which might be supposed to be perfectly impossible.

In the times of classical antiquity the case was altogether otherwise. Care of the body then was a matter of very different importance The gymnasium was a universal institution for the harmonious development of the body; and the first thing offered a stranger on his arrival after a welcome greeting was—a bath. Recently a distinct movement in the right direction has happily been made. Hygenics have assumed a leading place amongst the various procedures of medical science; and in the direction of proper care of the skin, which at this moment interest us, the beneficial institution of swimming baths, public baths, school baths, &c., show that the masses are becoming aware of what is necessary for the preservation of a healthy skin.

Respecting the importance for the body of *cleansing* baths, it must be remembered that the outermost surface of the epidermis is constantly falling off to be renewed from below; that the sebaceous glands and sudoriparous glands are continually engaged in excreting their secretions in the form of oleaginous matter and perspiration upon the surface of the skin; and that finally the evaporations from the skin, the dust from the air, and the linen all contribute soon to cover the body with a thin layer of dirt that must prejudicially influence the exchange of gases through the skin.

It is quite sufficient to take a cleansing bath once a week. A complete washing of the whole body at home may of course replace it. Luke-warm water is to be recommended and good soap which by its alkaline contents possesses the property of loosening the uppermost particles of the outermost skin, swollen by the action of the water, so that they are removed by rubbing the skin with a dry towel.

After the *cleansing* bath the *refreshing* bath may claim our attention. This is in the heat of summer a great benefit to both young and old, as it not only washes off the perspiration and cools the body, but also

stimulates the relaxed nerves. It may be taken either under cover, in a swimming bath, or in a tub, or in the open air as a river bath, or sea bath. If the temperature is not above 64° Fahrenheit (18° Centigrade) it is in addition to being refreshing a hardening bath.

Sea bathing is an extraordinary means of strengthening and hardening the body, not only on account of the salt contained in the water, but also on account of the motion of the waves. *But it does not agree with all;* as, indeed, it may be said that in general both cold and hot water are appliances that work both ways, and can do much good, but also much harm.

I shall subsequently when speaking of water treatment mention severally the principles upon which it should be applied in its various forms; and so in this place need merely say generally that it is necessary to proceed very cautiously and gradually with what is called "hardening the skin" in the case of young children, scrofulous and anæmic patients, and those that are suspected of consumptive tendencies—at least so far as concerns washing and bathing in cold water. On the other hand, persons suffering from affections of the heart, with a proclivity to congestion, faintness and headaches, should be cautious in the use of vapour, or turkish baths, or of warm baths and steam in general.

But the use of water alone does not constitute the whole care of the skin, as a great many over zealous partisans of water appear to suppose. Many other factors have an important part in proper care for the skin, and I must devote a few words to two at least of them—*dress,* and *sufficient exercise in the open air.*

It would take up too much space were I to speak here at length of the hygiene of dress, of the perversity of many present fashions, of the injuries produced by too tight shoes, too small corsets, and many other mistakes of toilet, in consequence of which the skin is the first to suffer. I shall limit myself to some general advice in this direction, and shall be pleased if my advice is followed.

Above everything else a regular change of linen appears to me to be important if the skin is to be cared for. A different shirt should certainly be worn by day and at night; so that the night shirt may have an opportunity during the day, and the day shirt during the night of parting with the evaporations from the skin which they have absorbed.

For children in particular a dress should be chosen as comfortable as possible, and one that both allows as much light and air as possible to come to the body, and exercises no pressure nor constraint.

Respecting the much disputed question whether vests and pants

should be worn under the other clothes, or the body should be so hardened that they can be dispensed with even in the winter, I am distinctly of opinion that their use is to be recommended, both in summer and in winter; and that to do as much as possible without them is no evidence of hardening. In winter I recommend their being of wool, in summer of linen. The woollen substances better absorb the perspiration, and, as bad conductors, allow the evaporation to take place more slowly, so that the loss of heat from the body in the winter will be more gradual. In the hot summer weather the linen substances allow quick evaporation of the more abundant perspiration, which induces a refreshing coolness of the body.

Damp clothes are always a danger to the body, and should be changed for dry ones as soon as possible. Wet feet, in consequence of snow water, are a frequent source of chills, which are almost always to be referred to sudden changes of temperature.

In conclusion, I recommend regular exercise in fresh, pure air as one of the best means for obtaining a healthy colour of the skin, which is an evidence of the healthy condition of the rest of the body. It is necessary only to place side by side a country child and one who spends his life on one storey of a house in town to see placed before the eyes the great advantage of free exercise in the open air. Exercise enlarges the blood vessels in the skin; the skin, in other words, becoming better nourished by the blood streaming through it; whilst a sedentary life draws the blood more and more into the interior organs, and so leads to an overcharging of the portal vein system, which we have already considered.

The Most Important Disorders of the Skin.

As the clothes can in no way be regarded as a sufficient protection of the outer skin—they are, on the contrary, frequently the cause of disorders of the skin—it will cause no surprise that an organ, which has its whole extent so much exposed to external injuries, may become unhealthily affected in many different ways. We have, indeed, already (quite apart from eruptions such as those of scarlet fever and measles) described a number of disordered conditions of the skin in connection with other maladies, of which I may mention, for example, catarrhal jaundice, *pemphigus neonatorum*, and erysipelas.

In fact, the host of different diseases of the skin is so numerous, that their treatment has become quite a specialised study; and I should regard it as pure waste of space and time to place before my

readers the whole series of rare diseases of the skin, difficult to describe, of which it is scarcely possible to form any idea without plain representations. I am much more anxious to give general useful hints respecting skin diseases, and to describe only, with their proper treatments, the most important of those which are of frequent occurrence.

Excessive perspiration. This occurs chiefly in the feet, and generally with people who have to walk a great deal. But it may affect other parts of the body, and in the shape of excessive perspiration of *the groin*, the *arm pits*, and the *hairy scalp*, prove a tiresome complaint. It occurs also as a symptom of general weakness, and accompanying advanced tuberculosis in the form of heavy nightly perspirations. In rheumatism of the joints we also often find an excessive perspiration of the whole body, which must be described as unhealthy.

The perspiration, if not regularly removed by washing, assumes a disagreeable rancid smell, in consequence of the decomposition of fatty acids; and the softening and fouling of the outermost layer of the epidermis, in consequence of the perspiration remaining upon it, can easily lead to sores on the foot, or excoriation of the groin. Regular washing of the skin must be recommended as of first importance, and also frequent change of the stockings, or of the linen.

The widely-spread belief that a foot that perspires excessively is on no account to be washed is to be distinctly discountenanced. It is both permissible and necessary to treat all maladies, and this as much as any other.

What is called military foot sweat powder may be highly recommended. This is composed of talc, starch, meal, and boric acid, and can be purchased cheaply at any chemist's in a box for sprinkling. It suffices to shake a little every other day into the stocking before drawing it on. The folds of the groins, arm-pits, and hands can be similarly sprinkled. For the hands it is a good plan to wear at night an old pair of cotton gloves, which have been sprinkled inside with boric acid powder.

In mild cases, when soreness of the feet is rather to be treated than an excessive perspiration, quick and perfect cure can be effected by sprinkling with zinc powder after a preliminary washing with ichthyol soap. For corpulent persons who easily suffer from excoriation it is a good plan, on long tours, always to take a little boracic ointment with them, and to grease the smarting groin with it in good time, so that the groins may not rub each other raw under the influence of perspiration.

Comedones. This disorder of the skin consists in a congestion of

the *sebum* of the skin in the excretory ducts of the sebacious glands. It is found very frequently on the face, and particularly near the nostrils, on the forehead, and on the chin, and it is generally easy to press the congested mass, in the shape of crooked worm-like plugs, out of the gland ducts.

But it is better *not too often* to remove the comedones by strong pressure of the fingers, as in consequence of that pimples are often formed on the face. It is wiser to wash the face twice daily with fairly warm soap and water (moist alkaline soap is best for this), and then to rub the face gently with a sulphur salve. By this means the ducts of the glands are widened, and the contents softened by the warmth come away of themselves without the vicinity being irritated by pressure.

Chapped skin. There are many persons who suffer from great *liability of the skin to crack*, not only on the hands (where this is most common), but also on the lips and cheeks, and easily get clefts of the skin and chaps in cold weather.

In the case of patients with chapped hands the malady generally takes the form of deep and painful cracks in the folds of the skin. The chief sufferers are maid-servants, washerwomen, and others who have to work a great deal in water, and expose damp, undried hands to the cold external air. The simplest advice is always to dry the hands well when they are taken out of the water, not to go immediately into the cold, and to rub the hands lightly after drying them with white vaseline or lanoline, which can be very conveniently carried in a closed tube.

Corns. The corn is merely a circumscribed round thickening of the skin occasioned by continuous excessive pressure upon the foot. It is found by far most frequently upon the back of the four smaller toes, and just over the joint, the skin being here thinnest, and just over the bone. But it occurs also under the ball of the great toe. Strong callosities are also often found on the sole of the foot, and are to be referred to the same cause.

The cause of this painful but harmless malady is always a shoe that does not fit—one that is too narrow, too much pointed, and, in the case of ladies often one with too thin a sole. Howsoever often, the nuisance may be removed, it will always reappear until the patient determines to wear, if less elegant, at least more comfortable shoes.

The treatment of corns consists in their removal, which is a much easier matter than most people suppose, who attack their corns with old razors, tinctures, and corn-plasters instead of at once taking to shoes that fit them.

The simplest manner of removing the corn is as follows :—A fairly warm foot bath of soap and water is taken on two successive evenings After the foot has been dried the corn is covered with a morsel of salicylic soap plaster, which remains on the whole night. After the second night the whole thickened horny mass can be easily removed with the finger nail ; after which it remains only to take care that a new corn is not formed.

Corn plaster rings are a mere speculation on the idleness of humanity, and can therefore lay no claim to recommendation. Cutting corns is a common proceeding, and unless carefully done, is often followed by severe gatherings and inflammations, if the cut is accidently made so deep as to open the blood vessels and the knife is not perfectly clean.

Warts are proliferations and enlargements of the small *papillæ*, which are found in countless numbers on the surface of the dermis, and are collectively called the papillary layer of the dermis.—They rise quickly, growing to the height of as much as a sixth of an inch, and are at first always covered with a smooth epidermis. Large warts after a longer space of time crack, and the warts then assume not only a cloven form, but, influenced by the dust in the air, take a darker colour. They are at first always of the colour of the skin.

Warts occur chiefly upon the skin of young people and mostly upon the hands and face. They are rarely alone, occurring generally in larger or smaller numbers, and often disappear in one place to reappear afterwards in another. When the formation of warts is not very numerous, and not distinctly troublesome nor disfiguring, I would recommend quietly waiting until the wart disappears, as, on account of the poor nourishment they receive, the life is short. If there are reasons for wishing rather to remove the wart, "sympathetic" cures and charms may be neglected, and the wart may be either bound as tightly as possible around the roots with a silk thread that has been boiled, or it may be touched for a few successive days with a sharp caustic (lunar caustic), after which the warts soon die and fall off.

Freckles, moles, liver-spots. In all these cases there is a more than normal deposit of colouring matter (pigment) in the mucous layer of the epidermis, which, as has been explained, determines the complexion.

Freckles and moles are certainly to be referred to hereditary disposition. The same cannot be proved in the case of liver-spots, which have no connection with the liver, but have received this name on account of their colour.

Freckles are small yellow or yellowish-brown spots about the size of a grain of rice, which do not protrude. They occur principally upon the face and arms, and mostly in the hot summer months, gradually disappearing again of themselves in the colder seasons of the year.

In particular girls with delicate complexions, and persons with red or light hair both show freckles distinctly, and become very much freckled.—As freckles require the direct influence of sunlight to develop them distinctly, the simplest and best way of avoiding these small spots, which often occasion young ladies so much annoyance, is to shelter the face as much as possible from the sun. In addition to sheltering the face with a sunshade, and the use of a broad-brimmed hat and long gloves, it is well to avoid heating the face, and washing it either with too strong soap or with cold water.

To the sterner sex a few freckles more or less can make no difference, and a man may allow the sun to shine freely upon him. But I cannot give the same advice to a lady with fair hair, as it must be admitted that a large accumulation of freckles is distinctly disfiguring to the face.

Mother marks are congenital: they are either level or raised, and are generally hairy colourings of the skin. They are limited to no locality, but may be found either singly or in groups in any part of the body. They occasion no danger to health, and can be regarded only as detrimental to beauty, particularly when they are of some size, and situated on the face. They are most simply removed either by a surgical operation or by electrolysis.

Liver-spots are brown irregularly-shaped colourings of the skin, raised either not at all or very little, which can arise from various causes. They occur principally upon the forehead and cheeks of pregnant women, and may in these cases be a valuable corroborative evidence of pregnancy. They also occur after severe exhausting disorders, after burns, irritations of the skin (sunshine, mustard plaster, Spanish fly, &c.), or at the conclusion of chronic diseases of the skin, and after injuries of the skin. Treatment is fairly hopeless; that of the spots which occur during pregnancy is to be deprecated, as they will disappear of themselves after delivery.

Burns, scalds, and frost-bites. Both in injuries of the skin occasioned by the influence of a too high temperature (*burns* and *scalds*), and in those occasioned by too low temperature (*frost-bites*), three different grades are distinguished according to the depth to which the injury of the skin penetrates. We speak of a *burn* or *frost-bite of the first grade* when the skin is only *painfully inflamed* and *slightly swollen;* by the *second grade* we understand *raising of the skin* with *formation of blisters* and

excretion of fluid; to the *third grade* finally are assigned all injuries that penetrate more deeply, involving destruction of the skin and of the vessels beneath it, which can be cured only by gangrenous shedding of the dead tissues.

If it seems, according to this, that, under all circumstances, the third grade of burn must be far more dangerous for the patient than a burn of the first or second grade, it must be remembered that much importance attaches also to the superficial extent of the burn. At the period when I was a hospital surgeon we had a case of two young girls who, in consequence of setting themselves on fire with petroleum, had widely extended, but not deep, burns of the skin. In spite of every effort made to save them, both succumbed, after a severe struggle, within twenty-four hours, in consequence of the portion of skin remaining uninjured being insufficient to support the skin respiration, and owing to the accompanying shock.

It will hardly be necessary for me to enter here into the commonest causes of burns, scalds, and frost-bites. Sometimes carelessness in the kitchen leads to scalds. Sometimes little children playing with matches, sometimes the unfortunate custom, which can never be sufficiently censured, of lighting the fire with the assistance of petroleum poured into it, are the occasion of severe burns. In addition to these, burns and scalds are of daily occurrence in consequence of accidents in iron foundries, the bursting of steam pipes in factories, explosions, &c.—Inconsiderateness is not so often the cause of frost-bites, as we have to take the cold as it comes, and men are often compelled by their calling to remain in the open air in spite of excessive cold.

There are people, in general more particularly anæmic or poorly developed individuals, who in their earlier years are prone to get their feet, ears, or the tips of their noses frozen, when the thermometer registers but one or two degrees of frost. In particular, shop assistants, washerwomen, and generally persons who have to work in the cold, and during their work to deal with wet things, frequently develop chilblains on their hands, without being conscious of having exposed these members to any great degree of cold.

To describe somewhat more exactly the symptoms of different grades of burning, scalding, and freezing, I may mention that in burning and scalding of the first degree the skin affected by too great heat is strongly reddened and somewhat swollen. The burn or scald is also felt as a sharp pricking pain. This first and mildest grade of burn or scald is generally brought about by a brief action of the heat (steam, a flash of flame, spilt boiling water, &c.) In burning and

scalding of the second grade the formation of blisters is a prominent symptom. These often appear several hours after the accident—for these cases are usually results of an accident. The blisters are often of considerable size, and represent the lifted skin. Their contents are at first a transparent fluid, which either empties outwards in consequence of the bursting of the blister, or, sometimes, curdles, or, in consequence of infection, becomes purulent, as in erysipelas. Both the pain and the time necessary for recovery is, in serious cases of burns and scalds of the second grade, distinctly greater than when the skin has been simply reddened. Nor must it be forgotten that life is directly imperilled if more than one third of the skin has been rendered useless for respiration by the burns.

In burns and scalds there is always an eschar of the skin, and of the tissues lying beneath it, whether they are muscles, tendons, or bones. Here a complete death of the tissues ensues, the dead parts being afterwards cast off by purulation; after which the healing commences from the edges and base, proceeding slowly, and leaving a cicatrice. Burns and scalds of the third grade always heal slowly, often making but the smallest progress during weeks. They also very often leave permanent deformities and disturbances of the functions, particularly when joints have been affected.

Whether there is any hope of saving life or not can generally be observed during the first four and twenty hours after the accident. If great irritation with commencing delirium sets in, and after that unconsciousness with retention of the urine, death, which is a release, soon ensues. But after much slighter burns, whilst it is believed that the patient is already out of danger, death may ensue rapidly in consequence either of severe inflammation of the kidneys, or from blood clots getting into the circulation.

The treatment of burns and scalds must be determined by the depth of the injury done to the skin and by its superficial extent. In mild cases cooling compresses with boric acid or Fuller's earth solutions do excellent service. In burns and scalds of the second grade I have never hesitated to open the blisters as soon as possible, near the base, with a clean needle, to dry up carefully with a clean wad the water trickling out, and then to sprinkle the blister with a little zinc powder. If one is fortunate, after this the whole dries, under a soft cotton wool bandage, into a dry crust, and after a few days falls off without purulation, as soon as the new skin has formed underneath the crust. In burns and scalds of the third grade, moist bandaging with cotton wool that has been dipped in Carron's oil (a mixture of oil of linseed and lime water in equal parts) not only alleviates the

pain, but also checks inflammation.

In severe and extended cases damp packs of the whole body is desirable, and the patient, particularly if an adult male, should be given a strong dose of brandy thrice daily. This is not only to support the heart's action and to keep up the pressure of the blood, but because persons accustomed to the regular use of spirits will without this stimulant, easily drift after burns into a condition resembling delirium.

If during the cure of a severe burn (in which bandages with salves are generally used) the improvement all of a sudden advances no further—a case which I have myself several times observed—courage must not on that account be lost. The remedy, which will generally have been one of the curative salves, must be altered; and it is especially helpful to take care to provide the best nourishments, good digestion, and fresh air. Some years ago I treated in the hospital a tanner for severe burns of the third grade. In consequence of an explosion of benzine the skin of the breast and abdomen had been completely destroyed. After that the cure had for the first ten weeks made excellent progress, it came suddenly completely to a stand still. The patient who had a wife and children, and was looking forward to an early restoration to health, became almost despondent about the sudden cessation of his progress. I perceived how seriously the troubled condition of the patient's mind threatened to interfere with an undisturbed progress of the cure,* and immediately took steps to have placed in the beds on the right and the left of my tanner two good humoured and amusing patients, who would leave him no time to ponder upon his misfortune. At the same time I changed his diet, and let him take large doses of iron every morning and afternoon. On the third day the cicatrization of the enormous wounds recommenced with renewed energy, and after three weeks I had the pleasure of allowing the man to leave the hospital perfectly cured.

In *frost bite* we have generally to deal with injuries of those parts of the body which are distant from the heart and particularly exposed to cold. Frozen ears, hands, and noses occur with all possible variations in every severe winter. Here belong also the smartly itching chilblains, which plague those who suffer from them until May. Especially when the patient is compelled by his calling to be a great

* It is a fact attested by many observers that injuries of every kind are healed much more rapidly when the patient is in a hopeful frame of mind than when he takes a gloomy view of the future. In the campaign of 1870-71, wounded French soldiers who had been defeated recovered in the hospitals by far more slowly than German soldiers who had come off victorious.

deal in the wet, these often break, and lead to purulations that last for a long time. They recur year after year, after appearing to have been perfectly cured.

In severe grades of frost-bite, such as occur in cases of those who have lost their way in snowstorms, of journeymen who have fallen asleep in the snow, &c., in addition to blistering, we find also destruction, similar to that by burning, of larger or smaller portions of the body, which are in consequence lost, and are broken off with purulation, not seldom proving fatal in consequence of blood-poisoning.

The treatment is similar to that of burns, and accordingly to be determined by the severity of the case. In mild cases the circulation in the frozen part is first to be restored by rubbing (best with snow), and a warm compress, or vinegar water compress is then to be laid upon the frozen part. If hands or feet have been affected the compress may be replaced by putting the hands or feet into vinegar water. For further treatment what are called frost salves (camphor salve and iodine salve), and painting with tincture of iodine do good service.—For chronic chilblains warm baths, followed by rubbing with camphor salve, is an approved remedy.

In severe cases of frost-bite care must be taken not at once to bring the patient into a warm room; and he must on no account be placed in a warm bath. On the contrary, the change of temperature must be gradual. The frozen portion of the body should, if possible, be suspended high, so as again to stimulate the circulation. To afford substantial support to the patient's circulation small quantities of brandy should be given, and the unaffected part of the body should be carefully massaged. If it is discovered that a hand or foot is irrevocably dead immediate amputation is strongly to be advised in the interests of the patient.

Acne occurs in various forms depending upon its cause. It consists either in an inflammatory irritation followed by purulation of the ducts of the sebaceous glands and the immediate vicinity—the connected hair follicles in particular becoming involved; or in an original dilatation of the blood-vessels of the sebaceous glands.

The favourite localities of ordinary acne (the spots never occur alone but always in numbers) are the face and breast, but particularly the back. It seems to be an ascertained fact that the development of acne is closely connected with puberty, as it always appears more fully developed from that epoch, and afterwards assumes a chronic character. Puberty also exercises a great influence upon comedones, which in reality are the occasion of acne.

In acne rosacea, which must be completely distinguished from

common acne, we have at first only an enlargement of the blood-vessels. It generally occurs first about middle age, and in persons who are accustomed to eat immoderately, and to drink a great deal of alcohol—particularly in the form of heavy red wines. It shows itself in a marked chronic redness of the nose and cheeks. The nose in particular (in consequence of a distension of the vessels which is constantly becoming more evident) often exhibits great changes of shape and dimensions.

There can be no doubt that the origin of ordinary acne must in most cases be referred to comedones, the pressure of the congested masses of sebum setting up an inflammation of the parts around. But on the other hand an eruption resembling acne can arise from taking certain drugs medicinally, particularly preparations of bromium and combinations of iodine. Also rubbing the skin with stimulating salves (among which tar holds the chief place) can produce acne. But I must mention that this artificial production of acne almost always heals soon after the discontinuation of the irritation, and without cicatrices; whilst ordinary acne unfortunately very often leads to further disfigurement of the face in consequence of the formation of innumerable very small cicatrices, a thing that is not strange, considering that this disagreeable but by no means dangerous malady may continue for years.

The treatment. The principal aim in ordinary acne is to make the openings of the ducts of the sebaceous glands free, and to remove the comedones. To this end must be recommended regular washing of the affected skin with fluid alkaline soaps, or spirit of soap. A soft rag of flannel should always be used, and fairly warm water. Immediately after the washing an attempt should be made to remove, by gentle pressure, all the comedones, which now lie soft and loosened in the ducts. Any hard squeezing of the skin with a watch-key, or with the nail of the thumb, or with instruments, should be avoided as much as possible, as it irritates the skin unnecessarily, and causes the formation of fresh acne.

To hinder the formation of new comedones in the future it is advisable to use a sort of soap that will involve the wearing off of the hardened uppermost stratum of the epidermis, and will, in consequence, keep the openings of the ducts of the sebaceous glands free. Resorcin soap and brimstone soap are particularly fitted for this. They can be bought combined as resorcin brimstone soap.—Naturally no one must expect after three or four days to have a perfectly clear skin by means of this cure. The result is obtained rather only after many weeks; but I consider this gradual result preferable to a rapid one.

If any one prefers a quick result he should, in the evening, wash his face in warm water with mild glycerine soap, and then rub the whole affected portion of the skin thoroughly with a ten per cent. sulphur salve, which is to be washed off with luke-warm water, not before the following morning.—Resorcin-zinc-paste works still better and more quickly. But in using these last two remedies it is necessary to pause for some days after the third or fourth application of the remedy, and, during this time, to soften the skin with some non-irritant salve (white vaseline), that the skin may not become rough and peel.

The treatment of acne rosacea requires, in the first place, that the alcohol, that causes the injury, should be given up, which, unfortunately, is often urged in vain. Massage with ichthyol salve is the best remedy.

Eczema. This disease takes many varied shapes, and appears both in an acute and chronic form. Essentially there is always an irritation of the epidermis, which, the character, strength, and duration of the irritation, may turn to an inflammation.

Between its beginning and its cure the malady always passes through various stages of development. It always begins with an itching, reddening, and swelling of the skin, with a simultaneous development of small pimples, about the size of the head of a pin. These pimples give a sensation of increased heat. After this first stage of formation of pimples the second stage, that of formation of vesicles, follows, with an excretion of liquid, and removal of the uppermost stratum of skin covering the pimples.

In many cases eczema does not proceed beyond this second stage, the watery contents of the vesicles becoming dispersed in about twenty-four hours, after which cure ensues without further consequences.

But, much more often, a further development ensues in the following manner. The clear contents of the vesicles become purulent, and a pustule is formed. Or else the vesicle, in consequence either of internal pressure or external injury, bursts, whereupon a continuous damp state of the skin, which generally lasts for a long time, ensues. The continuously exuding fluid matter dries with a mixture of blood lymph, and pus into the well known ulcerous crust, whereupon, when the excretion of fluid ceases, cure ensues; a protracted desquamation and sloughing off of the uppermost layer of the epidermis in small flakes for a long time recalling the preceding spots. *It must be remarked that no scar marks the spots.*

It must not be supposed that every spot passes exactly through all

the various developments described—pimple-spots, vesicle spots, pustules, crusts, wet spots, &c.—or remains at the same stage. All the forms of the eruption are closely connected with one another, and we generally find all the various stages present on a single patient at the same time.

The course of eczema is either acute or chronic. It has a pronounced inclination to wander, and spreads from one edge outwards to new portions of the body, whilst on the opposite edge it is healing satisfactorily. In general a period of from four to six weeks is considered sufficient for the healing of an acute eczema spot, those which last a longer time are known as chronic eczema—of which what is called salt-rheum is one of the best known forms.

Favourite places for the attack of eczema (particularly in children) are the ears, the face, and the hairy scalp. Adults generally suffer on the interior side of the joints, and the external sexual organs. But extended eczemas occur in all parts of the body, being determined by the locality of the injurious irritation of the skin.

It seems important to say something concerning the origin of eczema; as in many cases the most careful and scientific treatment has no effect, so long as the cause of the malady is unknown, or no possibility exists of removing it.

To begin with the frequent eczema of childhood, which is often chronic. Want of cleanliness and unsuitable diet are very often the causes. In particular lice are much oftener than many mothers suppose the cause of eczema of the hairy scalp. Scrofula, also rickets, chlorosis, disturbances of the menses, and chronic disturbances of digestion favour the appearance of eczematous eruptions.

Professional avocations play a very important part amongst the causes of eczema in adults. In a whole series of chronic eczemas, chemical, and mechanical irritations or irritations dependant upon temperature cause the eruption, the eczema being in these cases a distinctly professional complaint. Thus we find eczema among bakers, smiths, founders, &c., in parts of the body especially exposed to scorching heat; we meet with it amongst labourers in dye works, lacquerers, lithographers, type-compositors and others who are constantly handling irritant chemical substances. Labourers in mills, coal heavers, and bricklayers often suffer from protracted irritations of the skin occasioned by corn dust, coal and lime.

It is important to know that a great number of the most severe eruptions of the skin are developed first at the conclusion of some other malady of the skin. Thus for instance severe eczema in consequence of itch or lice, or prurigo, is simply a result of the constant

scratching—all eczemas, and particularly chronic ones are accompanied by violent itching—and accordingly in these cases it is first of all necessary to get rid of the itch, lice, or prurigo; whereupon the eczema will heal of itself.

In conclusion I must add respecting the causes of eczema that chronic forms of the malady attack many men after damp compresses, packs, and douches, particularly when some particular portion of the skin is exposed for a long time to the action of water. When fanatical devotees of water treatment regard these eruptions as something good and wholesome, and assure their patients that "bad humours" are thus being worked off, it is hardly necessary to say that their statements are pure nonsense.

Beyond the general strengthening remedies which I recommend for children who suffer from long continued eczema as well as from rickets, scrofula, or anæmia, little or nothing can be hoped from internal remedies. Cod liver oil (a tea-spoonful three times a day) or some good form of iron preparation may be recommended as a general strengthening remedy.

In addition one may be sure of seeing acute eczema cured in a very short time, if all other treatment is left alone and the eczema sprinkled with a little zinc powder which favours desiccation. The portions of the skin affected, which are often very wet, should be enveloped in clean cotton wool, which may be most simply allowed to dry up with the crust that is forming. After a few days the whole then falls off. But the new skin should be for some days protected from irritation by being lightly covered with a protecting bandage. Constant examination and change of the bandage is harmful. Wet compresses, and bathing of the affected part are also as detrimental as anointing with all kinds of home remedies. As a rule eczema cannot endure wet treatment.

Chronic eczema requires entirely different treatments in its different stages.

In the discharging stage—this is by far the most frequent—treatment with salves, especially with diachylon salve, is by far the most effective. But the salve must not be applied sparingly, but be laid on at least as thick as the back of a table-knife. On the limbs it is best to place what is called imbricated bandaging. The various strips of bandage are so laid one over the other that they lie over one another with even edges like slates on a roof. The whole should be wrapped in a cloth not too thick. This bandaging is to be renewed every day, but should not be removed in the interim.

Of other salves zinc salve, sulphur salve, salicylic salve, and balsam

of Peru are recommended. With them must be used, if they do not produce a rapid improvement of the discharging eczema, washings with liquid alkali soap.

Dry desquamating eczema of a chronic character can be handled by far most safely with preparations of tar. The tar (which is best diluted with half the quantity of pure alcohol) should be daily rubbed into the affected places. But it is advisable first to treat only one single place in this manner, so as to make sure whether the right time has come for tar treatment. If the skin after two or three days' treatment exhibits no irritation in the spots rubbed with tar, the whole eczema may be confidently treated in the same manner; and a distinct improvement will be found after a few days.

In conclusion I may once more point out emphatically that chronic eczema requires, if possible, the removal of the cause that has occasioned it, and that its treatment requires from the patient great patience and a careful compliance with directions.

Boils and carbuncles. By a boil we understand an inflammation and purulation of the tissue, accompanied by severe pain, and sometimes also with fever, starting from the base of a follicle of the skin or hair follicle, and always referable to infection by a purulent microbe.

In many cases a boil develops itself directly upon an acne; and for this reason persons who suffer from chronic acne suffer also remarkably frequently from constantly recurring boils: these develop mostly on the nape of the neck, under the arm-pits, and on the haunches.

At first the infection, an invasion from without, shows itself only as a clearly-defined hardening of the skin, extremely sensitive to touch, until a purulent collapse of the inflamed tissue ensues (not seldom accompanied by fever and marked general disturbances of health), and forces itself outwards as pus. After this the hollow wound grows together from within outwards day by day, and closes over with a cicatica.

The treatment of boils consists first of all in the application of heat, by which the boil is assisted to *ripen* as soon as possible, an expression we use to describe the formation of the pus.

When the upper surface of the boil becomes yellow it may be, without hesitation, opened by a superficial cross cut, and the contents squeezed out by soft pressure applied at the sides. Nervous people, who will not hear of the knife, had better wait until the boil opens of itself. For the warm poultices it is best to use a rag that has been soaked in boric acid (a tea-spoonful to a cup of warm water). The rag should cover the boil well. Above that should be laid a large

warm poultice (boiled oatmeal, or boiled linseed), which should be often changed.

The carbuncle is simply a large boil focus in the depths of which, under conditions of high fever, and general disturbance of health, a gangrenous shedding of dead tissues takes place. The carbuncle is generally developed on the nape of the neck and back, and is a frequent complication of constitutional maladies (diabetes mellitus), and of severe, cunsumptive diseases. Carbuncles require invariably to be treated by a professional medical man. It is important that they should be early opened, so that the absorption of decomposing matter may not set up blood poisoning in the circulation.

Inflammation of the cellular tissue and *abscess.* Both inflammation of the cellular tissue (phlegmon) and abscess belong rightly to the domain of surgery, and can be only briefly sketched here, in order to give the reader at least a notion of the nature of these maladies, whose treatment is best placed from the outset in the hands of a medical man.

Both imply the presence of infectious purulent microbes. In inflammation of the cellular tissue these have entered through the injured skin. The abscess, occurring at the close of infectious diseases, can arise in consequence of migration of the germs through the vascular system, or through the lymph tracts.

Inflammation of the cellular tissue shows itself always as a very painful inflammation in the subcutaneous cellular tissue (with a violent and feverish course), accompanied by intense purulation pressing to break out through the skin. In the treatment the affected portion of the body must be kept still, and placed in a high position. It must be opened (either by an operation or by means for producing discharge of the purulent matter) by a medical man, as phlegmons in a very few days spread under large tracts of skin, and can, in consequence, produce destruction of the tissues of incredible extent.

In abscesses we have rather cases of accumulations of pus in deep and clearly defined hollows; so that the abscess cannot be rightly described as a disorder of the skin, though, sooner or later, it makes an effort to break its way out through the skin. With this aim, in the form of what is called *gravitation abscess*, it often makes an actual migration in the body, proceeding downwards, choosing, for the final exit, opportune portions of the body. The course of an abscess is not so violent and acute as that of phlegmon, as a *cold abscess* may develop without fever, and almost painlessly; but professional medical treatment is indispensable, for which reason I say no more about it here.

Injuries of the skin, though they may be of the slightest kind, whether cuts, blows, or abrasions, always require careful attention. A whole host of invisible, but by no means despicable foes, seem to be always on the watch to make their entrance, through ever so small an opening, into the circulation—there to produce the most serious injuries to health.

If what I have said above about erysipelas and its origin is not alone sufficient evidence for the truth of this statement for any of my readers, let me ask them to think of the numerous cases, which are mentioned in the newspapers alone, of "blood poisoning" appearing after some apparently unimportant and disregarded injury, to put a close in a few painful hours to a hale strong life.

The treatment of injuries will be discussed later in a chapter dedicated to wounds and the cure of wounds. But I wish to say a few words here about quite small skin wounds, often considered of no importance, that after a few days, nevertheless, lead to severe inflammations.

It is most imprudent immediately to place a morsel of sticking plaster upon these small wounds, after having wetted it with the tongue. Very often in such cases a man by doing this plants an infectious germ warmly and securely. In the middle of the next night he has to rise in great pain to wash off the plaster with warm water from the small wound, and to discover to his astonishment that a quantity of pus emerges from it. It is by far better to lay on the wound a wet rag dipped in clean water, and to place a piece of gutta percha tissue to cover it, then binding the whole with a morsel of muslin. It is certain then that no harm will ensue, and the wound heals in a short time without purulation, particularly if the bandaging is from time to time renewed.

Nettle Rash is a disorder of the skin quickly arising, and disappearing equally quickly, almost always harmless, accompanied by an acute itching. It consists in blotch-like elevations arising in some part of the body, occasioned by an effusion of fluid in the epidermis. The blotches vary in size from the dimension of linseed to that of something over half-crown. Different blotches often melt together into one, and then large, irregularly shaped, island-like elevations of the skin arise, generally distinguished from the parts around by a lighter colour.

Nettle rash must be referred to an irritation of the very small branches of the nerves of the skin, which regulate the quantity of blood in the small vessels. It can occur as a distinct consequence of the stings of insects, of stinging nettles, and of scratching in itching

disorders of the skin (prurigo); and sudden changes of temperature can also produce the blotches.*

But reflex irritations also play a large part in causing nettle rash. It is well known that there are a number of persons who immediately develop a strongly developed rash after partaking of certain (mostly aromatic) fruits—pine-apple, raspberry, strawberry, &c.; or piquant delicacies—crabs, oysters, lobster; or certain drugs—quinine, turpentine. The rash disappears as rapidly as it comes. Catarrh of the intestines, irregularity of the menses, and in particular disorders of the womb can also by reflex action cause nettle rash.

Sudamina has no connection with nettle rash, and is here mentioned in connection with nettle rash only because similarity of the symptoms often leads to a confusion of the two maladies.

Sudamina consists in the appearance of very small pearl-like vesicles, which have a close resemblance to those of what are called teeth-pox. They appear almost always after previous excessive perspiration, often also after infectious disorders, and particularly after rheumatism of the joints; and after a few days again dry up and disappear.

The treatment. Special treatment is unnecessary both for nettle-rash and for sudamina. The patient does best to await the disappearance of the irritation of the skin in a warm room, but without applying either salves or compresses. But in cases of excessive itching cold compresses or rubbing the weals with lemon-juice may be recommended.

Prurigo is a very serious chronic disorder of the skin. It occurs generally in early childhood, and generally in the second year, and is distinguished particularly by incessant torturing itching.

The malady begins with a mere eruption of very small pearl-like pale-red pimples. As these itch excessively they are soon scratched off by the child. New ones are constantly forming, and meet with the same fate. In consequence of this the malady loses its original form of simple prurigo, and in the course of time eczema, produced by scratching, ensues in a widely-extended form, so that it becomes difficult to say which malady originally existed.

In order to distinguish prurigo from similar disorders of the skin (a neglected scratch presents a great similarity to old prurigo) it may be here mentioned distinctly that the malady attacks particularly the

* Some years ago I saw a case of a brewer, who had in the heat of summer gone down into the ice cellar to arrange something, and was immediately on returning from the cellar seized with so extended a nettle rash on his whole body and face that he was scarcely recognisable, and hardly able to endure the itching.

exterior surface of the lower leg, the sacral region, and the haunches. I have also observed various true cases of prurigo on the anterior surface of the arm, on the sides, and on the anterior abdomen. *The face and the interior folds* of the knees and elbows always remain unaffected.

If an energetic and properly-conducted treatment is not applied from the outset prurigo develops into a severe chronic disorder. And I must state clearly that this malady, which will appear harmless to many of my readers, has brought to their graves a number, both of children and adults. The continuous tearing and scratching to which the patients find themselves provoked day and night, in the course of time inevitably produces a condition of severe exhaustion.

Patients attacked with prurigo suffer also socially. No child in the school will sit near them. No fellow labourer will work with them. No one desires to associate with them on account of a fear of infection ; and, after all that, no one will be surprised to hear that the patients are almost always nervous, timid, poorly developed individuals, who shyly stand aloof from their fellow creatures.

Whence prurigo originates is up to the present entirely unexplained. Hereditary predisposition and a connection between tuberculosis of the parents and prurigo of their children has been suggested. But I have never yet found the suggestion supported by facts. My own son suffered from prurigo from the age of two to four, and afterwards recovered—thus disproving the too despondent opinions of well known specialists, who hold prurigo, when once developed, incurable.

The treatment. As prurigo can be a really serious malady, and as, after years of continuance, it may become almost incurable, and make life a torment to the patient, I must strongly advise all parents, if this disorder attacks one of their children, from the first moment to treat it with the greatest care and energy. A successful issue of the very simple treatment depends entirely upon exact compliance with all directions.

Good nourishment, plenty of fresh air, great cleanliness of the clothes, and daily bathing in luke-warm water are the first necessities of a successful treatment of prurigo.

Next, of all the remedies recommended I have found Wilkinson's salve (a mixture of tar, brimstone and soft soap) by far the best and most trustworthy in the case of a number of children including my own son. It effects even after only eight or ten days great improvement, a diminution of the itching, and a consequent healing of the eczema. The latter often covers the inflamed, thickened, and reddish

brown skin of the patient in thick scabs.

But it is important not to discontinue the treatment after some eight days, because the symptoms are abating, but to continue the use of the salve uninterruptedly for several weeks. Otherwise a new eruption of prurigo soon occurs, and I may mention develops much more rapidly in warm summer weather than in the colder months.

The best way of using Wilkinson's salve is the following:—In the evening not only the affected parts, but those near them also should be well rubbed with the fluid salve, which smells strongly of tar, and wrapped in linen bandages. On the following morning the child should be washed with luke-warm soap and water and with soft soap. In the evening the salve should be again applied.

Excessive itching of the skin, independently of prurigo, arising from a number of causes some of which are completely unknown to us, also occurs.

Of this kind is what is called old age itch, no doubt connected with senile degeneration and disturbances of the nourishment of the skin. Not rarely it is a symptom accompanying cancer. It may attack any part, but so far as my experience goes, generally appears in the lower parts of the abdomen and in the folds of the groin.

Of the salves that may be applied menthol salve is the most to be recommended on account of its cooling properties. The application of cold compresses may always be tried first.

Fever spots (shingles, herpes) are a disorder of the skin almost always setting in with fever, along with which a number of small clear vesicles are formed, which, after a few days, completely dry up and disappear of themselves. These vesicles are not scattered at random over the body, but occur rather always ranged in a certain manner, following the course of certain nerves of the skin, so that they must be regarded as a result of some irritation of the nerves unknown to us.

The spots are most often found lying along the course of various branches of the fifth cranial nerve (the trigeminal nerve), which, next to the facial nerve, is the most extended of all the nerves of the face (see above p. 283). Accordingly we find the vesicles on the lips, the cheeks, the head, aud the nape of the neck. The rash also occurs along the course of the intercostal nerves as shingles, and on the abdomen and sexual organs, disappearing again, without further consequences, after a few days (as I have already said), the general health in the meanwhile being not seldom disturbed.

Particular treatment is only thus far needful, that it is advisable to protect the rash from pressure or damage, as it is best for the vesicles to dry up without being opened. Sprinkling with zinc powder serves to

diminsh any itching.

Psoriasis is a not uncommon chronic and incurable disorder of the skin, consisting in an excessive cornification and desquamation of the epidermis. It generally attacks young people, and, even when it appears, as it often does, to have almost disappeared for a long time under proper treatment, continues to the end of their lives.

Its course is unaccompanied by either fever, or disturbance of the general health, so that when it is hidden under the clothes it is rather a tiresome than dangerous disease. It is not infectious, but is certainly hereditary, passing to children and grand-children, which has been positively proved by statistics.

At the beginning of the disease, first of all a number of very small red pimples appear. Their uppermost surface, after a time, changes into a horny scale. But the single focus gradually develops into a portion about the size of a threepenny piece, and the dry white skin scale is then seen to rest more or less fixed upon a reddened base. So long as the scale is not absolutely dead its removal occasions a slight bleeding of the part beneath. From old foci the scales can be easily removed without bleeding.

Psoriasis is most often found on the front surfaces of the upper and lower limbs; on the hairy scalp, the ears, the back, and the breast, it is often widely developed in such a manner that new continuations of the disorder are always arising, so that we can almost always see old light, and new more or less dark coloured foci of the disease on the same patient. Not seldom various neighbouring foci run into one another, and unite into one great patch, so that chains, like wreaths, and large places like coins are formed.

It must be further observed that in psoriasis the palms of the hands and soles of the feet always remain unaffected. If similar eruptions appear on the palms or soles a medical man should at once be consulted.

The treatment of psoriasis can indeed only in the very rarest cases effect cure; but that it can effect a considerable amelioration of the patient's condition I have myself seen in many of those which I have treated.

The treatment of an old psoriasis spot consists, briefly stated, in two processes; first of all the removal of the old scales, and then the healing of the focus of the malady lying beneath it. The use of a lukewarm water compress, and covering the scale with common soft soap is particularly well calculated to effect the former purpose; for the subsequent treatment a use of the preparation of tar, exactly as above described in the case of eczema, will be found excellent.

The itch. This eruption, of ill repute for the troublesome itching it causes, is due, as everyone knows to a small parasite, the itch-mite, which eats its way into the skin. The smaller males make shallow passages in the skin of small extent, which serve to a certain extent for dwellings, but the females, half as large again, dig passages under the skin often of the length of an inch or more, parallel to the surface, in which they lay their eggs. The larvæ emerge from these eggs in about a week, and after another fortnight develop into male and female mites.

At first only a small insignificant vesicle is produced by the boring of the mites in the skin; but the subsequent movements of the small parasites occasion so intolerable an itching that the patients attacked by them are prompted to a perpetual scratching, whence eczema results. The eczema almost always becomes purulent, being infected by the dirt of the finger nail, so that purulent pustules and eczema scabs become prominent features of this disagreeable complaint.

The itch-mites appear to like warmth, and accordingly make their presence felt particularly at night, prompting their host to such perpetual rubbing and scratching that a night's rest is a thing not to be thought of.

The itch-mites are particularly fond of settling upon the sides of the fingers, on the under side of the wrist, in the anterior shoulder, on the navel, in the hollows under the knee, and not rarely on the palms of the hands. They may, it is true, in neglected cases, take possession of the whole body; but it is important to notice the favourite localities above mentioned in order to distinguish this malady from others (prurigo).

It need hardly be said that itch can be communicated to other persons by transferance of the itch-mites. The malady is almost always found simultaneously in several patients. I have known whole districts where the malady appeared to be endemic.

The treatment. As soon as the presence of itch has been recognised, the first thing is to kill the mites. After that the eczema, pustules, and furuncles can be treated.

As it would be too much trouble to extract the mites one by one with a needle (by making a small incision in their track) and to kill them, it is simplest to use one of the well known remedies—sulphur, or tar, which no mite can resist. I have myself in the hospital (whither man-servants and maid-servants, and in general persons who have no house of their own, are by far best removed) proceeded as follows:—In the evening the whole of the patient's body is well rubbed with a sulphur mixture. After this the patient goes to bed,

and the following morning takes a cleansing bath using soft soap. After this has been continued for three days, the rubbing is on the fourth day discontinued. It is very seldom necessary to resort to it again on the fifth day.

The patient must of course change his clothes and linen at the beginning of the treatment. The simplest plan is to hang them for a few days in the fresh air, in which the mites in the clothes die.

After the death of the mites the eczema is treated in the usual way.

Lice. It is necessary to speak of this disagreeable subject, because these vermin are, much more frequently than is generally supposed, the cause of chronic eruptions and eczemas, which cannot be cured unless the lice are destroyed.

Three varieties of these creatures exist, and infest respectively the head, clothes, and pubes. All three occasion itching by their bites; and the consequent scratching provokes in time troublesome and long lasting eczema, with scabs, which, in neglected cases, may assume serious dimensions.

The head louse (*pediculus capitis*) infests the hair of the head alone and multiplies so rapidly that a few weeks suffice to increase their number a hundredfold. They are commonest among children, and by no means exclusively among those of the poorer classes, as is often imagined. They are easily transferred from one child to another at school, or during play. As soon as they have settled themselves on the head they occasion more or less smart itching, according to the sensitiveness of the individual. Their eggs, the "nits," are laid directly on the hair, and a single hair may be found covered from end to end with the small grey objects. The young emerge from them after a few days.

The vermin may occur also upon adults, but generally only on those who neglect themselves, and upon beggars and vagabonds, whose horror of soap and combs favours their presence.

It must by no means be supposed that the eczema above mentioned is the only consequence of their presence. In neglected cases inflammations of the eyes, and swelling of the lymph glands ensue, and ultimately a complete matting of the hair, known as elf-lock, or *plica poloncia*, one of the worst forms of human uncleanliness.

The louse in the clothes (*pediculus vestimenti*) is somewhat narrower and longer. It infests the clothes, getting especially into the seams and folds of the body linen. It provokes the same itching, eruption, and chronic eczema, with formation of scabs, pustules, and abscesses of the skin. It occurs in great numbers only on degraded negligent persons; as it cannot long escape the notice of those who pay any

attention to their persons, and is by them soon got rid of.

The louse of the pubes (*pediculus pubis*, or crab) is nearly square. It infests the pubes, to which it attaches itself by its hooked legs; but afterwards may wander to other hairy parts of the body, but *never attacks the hair of the scalp.* Like the others, it provokes a continuous itching.

The treatment aims at the quickest possible destruction and removal of the vermin. Cleanliness and regular care of the skin must be cultivated to prevent their reappearance; which, however, cannot be always avoided, even with the greatest attention. The vermin on the head, and their "nits," are most simply destroyed by petroleum. But care must be taken to guard against the petroleum catching fire. It is best to shave the whole head closely; after that, in the evening, to rub in the petroleum well; and during the night to wear a night-cap, or some similar covering.—Common mercury ointment may also be used with good effect. It should be rubbed on for several evenings in succession.—The head is afterwards to be washed each time with soap and water. The eczema soon heals after the vermin have been destroyed.

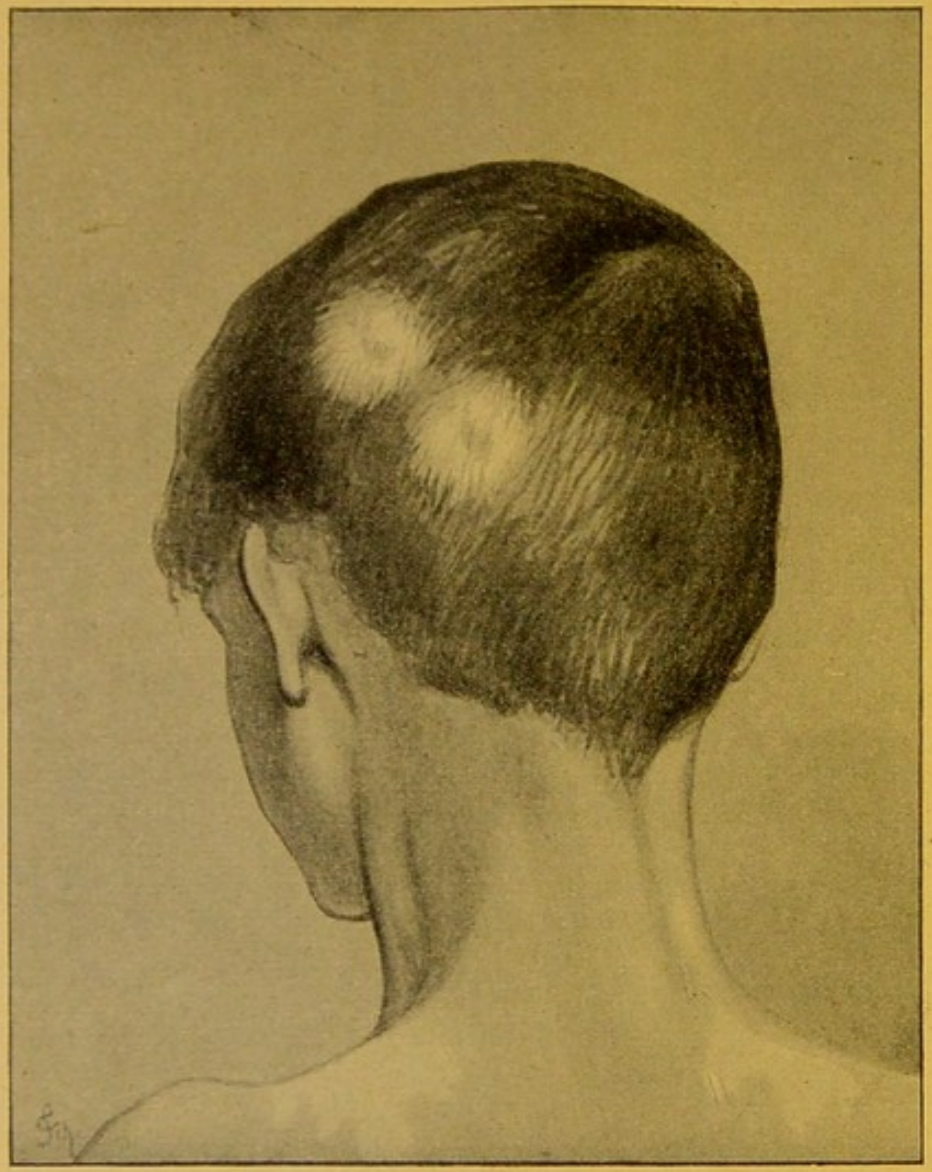
Lice in the clothes are most simply destroyed by boiling and washing the clothes with soda, or by heating them in dry heat.

Lice in the pubes may be easily and certainly destroyed by a single good rubbing in of mercury ointment.

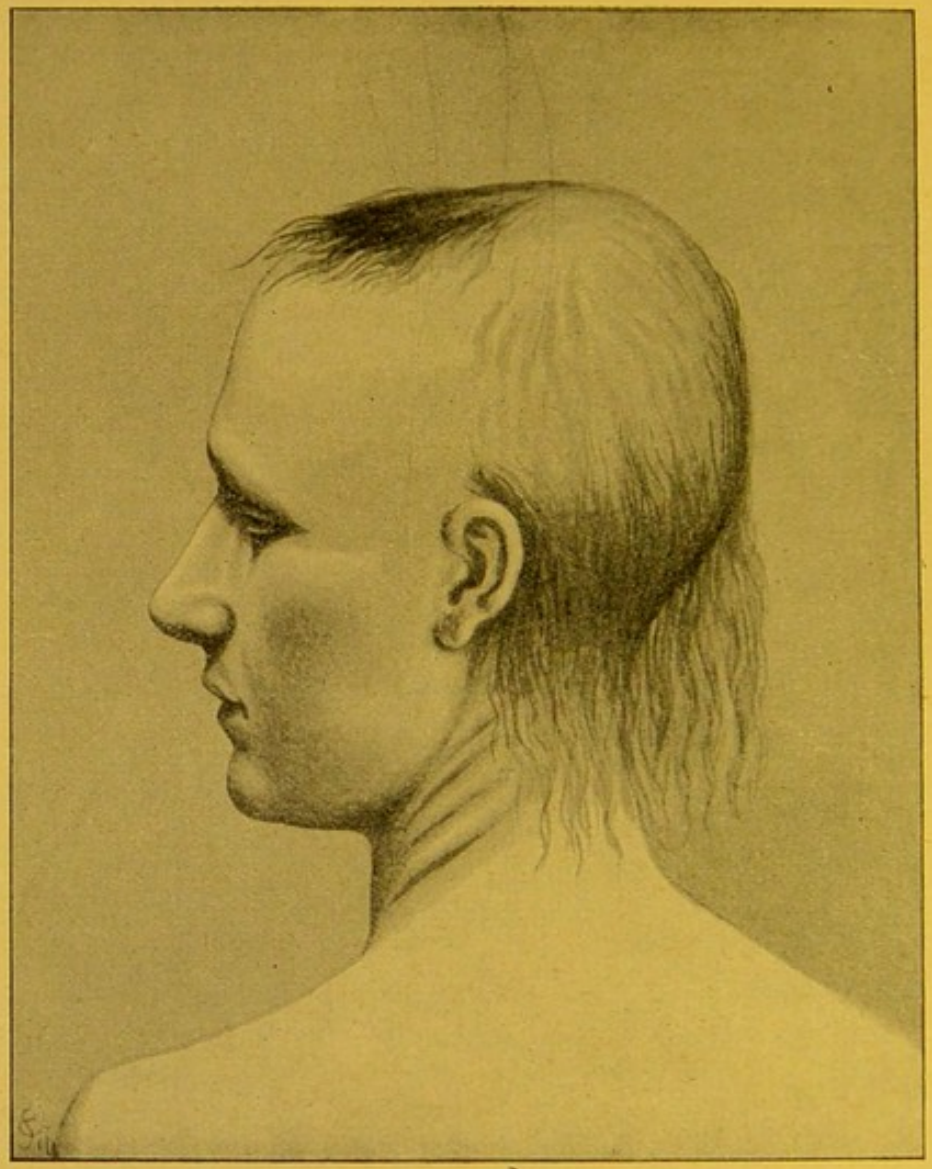
Honey-comb (favus) is an infectious disorder of the hairy scalp occasioned by vegetable parasites. It occurs not only in man, but also amongst guinea-pigs, cats, and dogs, from which it is not seldom communicated to human beings. In very rare cases the finger nails also are attacked by the disease and become changed into yellow, brittle, thickened masses of horn.

Favus occurs almost always in youth, and often extends chronically over a whole number of years. The nature of the malady is as follows:—The spores of the favus fungus get into the hair follicle and destroy it. A yellow crust forms around the hair of the follicle attacked. This extends itself slowly upwards, and thrusts off the stratum of the epidermis above it like a scab. The coalescence of different foci often produce extended yellow scabs, in the course of time producing complete baldness if proper treatment is not early applied. The hairs lost in consequence of favus never grow again; the hair follicles being destroyed.

The treatment is generally tiresome and ill repays the pains bestowed upon it, as the fungus lies at the bottom of the follicle. First of all the eczematous scabs must be softened by damp compresses of soap



I. Congenital absence of colouring matter (pigment) on the hairy scalp and on the nape of the neck.



II. Marked loss of the hair after Typhoid.

and water or carbolic oil. After this the diseased hairs should be taken as low down as possible with hair tweezers and removed by a slight pull. For destroying the parasite, washing with one per cent. sublimate spirit, and rubbing in balsam of Peru may be strongly recommended.

Ringworm is another infectious malady of the skin produced by a vegetable parasite. This however does not penetrate so deeply, but effects rather the uppermost strata of the epidermis. The malady occurs not in men alone but also in domestic animals, cats, dogs, horses, and cattle, from which it is certainly often communicated to men.

Ringworm may attack the hairy scalp, the beard, the nails, and also the rest of the skin. It shows itself first in round, white, slightly scabby spots about the size of a shilling, the hair breaking off just above the surface of the skin. If the nails are attacked, they become soon changed into dull yellow horny masses which show a great tendency to become brittle and to peel.

The treatment. Ringworm appears not rarely in an epidemic form where a number of individuals are living together—in schools, colleges, pensions, &c.—on account of its extremely infectious character. The treatment consists first of all in the use of remedies which effect the shedding of the outermost stratum of the epidermis. Here again soft soap does good service. It is best rubbed, on several successive evenings, into the affected portions of the skin, and washed off on the following morning with luke-warm water. After this has been done for three or four successive evenings, and the crusts and scabs have been thoroughly removed it is a good plan to treat the affected parts with some remedy that will destroy the fungi. The best are a strong solution of iodine or a strong carbolic salve.

Sycosis. I purposely insert this pustular eruption here next to ringworm, because in many cases the malady is simply a transference of ringworm effected by the razor.

There is another form of sycosis, not infectious and not due to parasites. This is nothing more than the inflammation of the sebaceous glands, or acne of the beard.

The treatment differs accordingly as we have to deal with the first or second form, and corresponds completely with the instructions already given. It is always best, in order to effect a rapid cure, to cut the beard as short as possible, as otherwise the remedies have too slight an effect upon the locality of the malady.

Head-scurf must be referred to the increased activity of the sebaceous glands and to an unwholesome increase of the desquamation

of the uppermost surface of the skin.

That the period of puberty, especially in the male sex, is connected with an increase in the activity of the hair germs and sebaceous glands is proved not only by the growth of the beard and the frequent formation of pimples, but also by the appearance of head scurf. These appear almost without exception at the time of puberty (especially in the male sex), and in a short time occasion a considerable loss of hair.

The treatment is unfortunately in most cases either too much neglected, or carried out with too great energy—when in order to remove the troublesome scurf the hairy scalp is attacked with brushes and dandruff combs of too rough a kind. Both plans are of course equally injudicious. The head should be rather washed twice a week with soft soap, and the loosened scurf then combed out with a dandruff comb. Hard brushing irritates the skin of the head too much and loosens the hair so that it falls out and leads to baldness.

Falling off of the hair, whose preservation must conclude this chapter, results from various causes. It follows after many exhausting maladies (scarlet fever, typhoid, and many others, also especially after nervous troubles), also in consequence of parasitic disorders (ringworm), but most frequently of all after head-scurf, in consequence of the use of too hard brushes and combs. In all these cases a stop can be put to the malady by timely application of a proper treatment; and then, after a few weeks the hair will be seen to grow again.

There are, however, also almost hopeless forms of loss of the hair, in which all the hair, including the eyelashes, eyebrows, &c., is lost. In these cases, no remedies avail except time and patience. In these very severe forms of the loss of the hair, disturbances of a nervous nature exist, and none of the many remedies advertised can, under these circumstances, produce a growth of the hair or beard. Only general strengthening measures, good nourishment, and care of the skin in such cases afford any prospect of a new growth of hair.

CHAPTER XV.

The Muscles.

The muscles and bones, which make up by far the greater part of our body, constitute in their united mechanism the motor system of man. The muscles represent the active, moving portion, the bones the passive, moved portion, of the mechanism.

The muscles. Every muscle is composed of a great number of bundles of muscular fibres joined together. If we examine the finer anatomical construction of these bundles of muscles we find that some consist of *striped*, and others of *unstriped muscular filaments.*

All muscles composed of striped muscular filaments are under the control of the will.* For this reason they are called voluntary muscles. To these belong the muscles of the trunk, those of the arms and legs, and all the muscles of the bony skeleton.

The muscles composed of unstriped muscular filaments are not under the control of the will. They effect no local change of position, as they are nowhere connected with the skeleton, and lie in the interior of the great cavity of the body; for example, in the stomach, the intestines, and bladder. They are called the unstriped muscles, or the involuntary muscles.

In their composition the muscles consist, like the muscular flesh of slaughtered mammals, of albuminous substances, connective tissue, tendons, water, and blood.

How is motion effected? By means of *the contraction and relaxation of the muscles.* Every living muscular bundle possesses the property of contracting when stimulated. By this contraction the muscle becomes thicker and shorter. The cessation of the stimulation relaxes it, whereupon it again becomes thinner and longer. The character of the stimulation may differ. In voluntary movements *our*

*The heart is an exception; it works indepentently of our volition, although it consists of striped muscular filaments; also the muscles of respiration, which work steadily during sleep.

will is the stimulant. Proceeding from the brain by the way of the nerves of motion it commands the muscles to contract.

The voluntary muscles are so arranged upon the skeleton that they arise from one bone and are inserted or terminated in another. In consequence of the contraction of the muscle a movement must ensue in that bone upon which the pull of the muscle acts.

The forms of the muscles are very various, and depend upon the movements which they are to effect. Sometimes the muscular filaments make long parallel bundles of muscle, constituting in their totality a long muscle, contained in a thin muscle-sheath, which encloses the whole. The muscle is strongest in its centre, and either thins at the end into a tendon (this form occurs mostly in the limbs and on the neck), or the various muscle-bundles join into wide flat muscles (such as we find on the abdomen and chest), or they form a ring, and lie around some opening of the body.

The operation of the muscles almost always corresponds to their form. The long muscles running along the limbs effect the movements of folding or stretching out; the wide ones effect raising and lowering; the muscles in the shape of rings serve for opening and closing various orifices.

Most of the voluntary muscles exist in pairs, and are arranged alike on the right side and on the left. Only the muscles situated in the middle join their filaments to a certain extent with one another, and sometimes join in united action. We may see this form most clearly in the circular muscle of the mouth (*orbicularis oris*).

A movement is only in the rarest cases produced by the action of a single muscle. Almost always a number of muscles co-operate to support one another.

Now as every movement is produced by the contraction and subsequent relaxation of the muscles; and the movement is more powerful and more prompt in proportion as the muscle is more energetically and more quickly urged to tension and relaxation; these questions suggest themselves—is it of advantage to the body and to the health to possess such muscles as contract as powerfully and as swiftly as possible? And, if the reply be affirmative, by what means can a man attain to that development of his muscles?

To reply to the first question, it is of distinct advantage; or, in other words, the strength and indefatigability of the muscles is identical with the physical strength of the man, and the stronger he is, and the more capable of labour the more healthy he is.

And by what means can we attain to this development of the muscular system? By practice. The cardinal law of the use of the

The outermost stratum of the Muscles (posterior view).

muscles is, *every muscle which is not used, that is to say which is not exercised, becomes numb, grows languid, and ultimately perishes by fatty degeneration, and every muscle that is exercised and put to regular use, grows strong and increases in size, in consequence of which it is capable of a higher degree of tension.*

The correctness of this dictum will be most simply demonstrated by comparing the condition of the muscles of the arm of a paralytic and of a professional athlete. Whilst in cases of severe and permanent paralysis the muscles gradually disappear, because they are no more used; the arm of the athlete assumes in consequence of daily exercise, such dimensions and such solidity that it may be thrice the normal size.

Though the muscular system can thus be strengthened and trained to greater rapidity and efficiency of movement, it must not on the other hand be forgotten that the body can retain its health and be prosperously developed during this exercise of the muscular system only when the increased development of the forces is supported by a corresponding increase of nourishment.

Increased movement involves increased metabolic changes—the prescription of exercise for corpulent patients is based upon this; and we know that a labourer who exerts his muscles all day requires a diet entirely different from that of a young lady who never quits the house.

On the other hand a caution must be given against over exertion of the muscles. A sensation of fatigue is the best indication of when the body requires rest; and exercise undertaken for the sake of health has in many cases been carried too far, and led to severe injury of health.

A fitting choice of exercise and of activity of the muscles: *gradual* increase; and so far as possible a *simultaneous exercise of the whole muscular system*—these are the three chief rules which everyone who desires to strengthen his muscles methodically must take to heart if he does not wish to arrive at some undesirable result.

The habituation of the body to regular daily exercise is, however, by no means beneficial for the strengthening of the muscles alone, it produces many other advantages precious for health. We must not forget that we have already seen, when discussing the organs of respiration, what great influence walking exercise, athletics and gymnastics have in the development of a sound chest. We must reflect that by exercise the circulation of the blood is also stimulated: that is to say the soaking of all the tissues with nourishing vital juices is furthered, and the internal organs, often overcharged with blood, relieved.

The activity of the brain is also favourably influenced in cases of

fatigue by exercise in the fresh air; sleep and digestion follow regularly, and, in brief, exercise in a proper form is of the greatest advantage to the body.

In youth, athletics cannot be too strongly recommended, both for boys and girls; not only because they introduce a necessary alternation of physical and mental activity, but also because they favour a harmonious development of the body, and strengthen courage and energy—in a word character.

Adults have also many reasons for exercise. Anyone who has not time or opportunity to take a daily walk, or cannot get requisite exercise in the form of athletics, swimming, rowing, skating, cycling, or riding, should certainly not neglect to keep his body lissom and strong by means of regular gymnastic exercises at home. Five minutes in the morning, and another five minutes in the evening, are absolutely sufficient for a series of the most important hygienic exercises; and I can say emphatically, from my own experience, that a man soon becomes so accustomed to these exercises that he seems to himself all day long to have missed something if he has, for any reason, neglected his usual gymnastics.

In conclusion it should be particularly observed that it is not good to engage in these exercises directly after a meal, that is to say upon a full stomach; also that it is dangerous, when the body has become heated by exercise, to expose it to sudden changes of temperature (draughts, or cold drinks), and that no particular kind of exercise should be carried too far. Rather every different sort of exercise should be used in a manner proportionate to the physical strength, if disagreeable consequences are to be avoided.

The diseases of the muscles. The muscles are well protected from most injuries by the covering of skin that envelops them; and the number of maladies to which they are exposed may, in consequence, be called comparatively few. But we must not overlook the fact that disturbances of digestion, chills, and penetrating injuries, and their consequences, can affect the muscles, and impair their health. We have already, on several occasions, had to speak of maladies of the muscles; and I need name only trichinosis, and the fatty degeneration of the muscles in consequence of permanent paralysis. Here also belong one-sided contraction of the muscles, and consequent restrictions of normal powers of movement, such, for instance, as we encountered in "wry neck," &c.

Rheumatism of the muscles. A whole number of what are called rheumatic inflammations of the muscles, accompanied by severe pain in the muscles, have been already described amongst nervous diseases

The outermost stratum of the Muscles (anterior view).

(to which the reader is referred), because neurasthenic, or hysterical symptoms, or painful irritations of the small branches of the nerves were involved. On the other hand it must be admitted that, under the influence of severe chills, independent inflammations of the muscles may arise. These are characterised by symptoms of severe pain, fever, and impediments of motion, and are both well known, and justly feared, under the name of rheumatism of the muscles.

Probably in this disease an increased accumulation of fluids exists, producing a painful pressure upon the very fine ends of the sensitive nerves. Quite similar pains are observed, apart from any chill, in what is called athlete's fever, and in persons who attempt excessive and unaccustomed muscular exertions (for example after first attempts to ride). After very small ruptures of the muscles, not seldom met with in persons engaged in severe labour, the consequent effusion of blood in the substance of the muscle is also the decided cause of the pain.

Acute rheumatism of the muscles, or, as I should prefer to say, the inflammation of the muscles in consequence of chill, attacks in particular four parts of the body. The muscles of the neck are often affected (what is called *stiff neck*), and the lumbar region (lumbago). Also the intercostal muscles (in these cases affected with sharp pains in drawing the breath, sneezing, coughing, and laughing), and the muscles of the scalp are not rarely the seat of the malady. But it is doubtful whether "rheumatism in the head" is not of purely nervous origin.

If the rheumatism of the muscles passes into a chronic form (which is rare, for medical examination in such cases can almost always discover some other reason for the chronic pain in the muscles) pain is generally not so severe, and is limited either to one muscle or to a few muscles near to one another. In these cases we find generally wandering pains, and feeling of general stiffness. This becomes most marked in damp cloudy cold wet weather, and not seldom foretells a change in the weather—so that these patients are their own barometers.

The treatment. Apart from those pains of the muscles which result from laceration of the filaments of the muscles in consequence of excessive strain (for which the best treatment is rest and repose) the best treatment for rheumatism of the muscles, whether acute or chronic, is passive *exercise*, or massage.

The man with a stiff neck or a lumbago who packs himself up warmly in bed has much more to suffer than the one who has himself properly massaged. I myself have seen more than one patient, who entered the consulting room with a stiff neck carefully wrapped up,

and with a helpless hapless expression, after a single massage set off homewards completely cured. When the patient's alarm about being handled has been once overcome, the pressure and stroking, commencing gently and becoming gradually stronger, is found to be distinctly agreeable. Among other remedies may be mentioned rubbing with volatile liniment, opodeldoc, or spirits of camphor; also a steam bath, perspiration cure and electricity. But massage is the best of all.

In chronic forms regular general exercise (a daily walk) is most important. In addition, besides massage, the use of mud baths, pine-needle baths, and electricity are beneficial.

Abdominal hernia. By abdominal hernia we understand the protrusion of a portion of intestine covered with the peritoneum through an opening in the anterior wall of the abdomen.

By far most frequently the extruded part (it is almost always a loop of the intestine—hernia of the intestine; and rarely a portion of the mesentery—hernia of the mesentery) finds it way through some already existing opening in the wall of the abdomen, namely either through the opening of the navel (*umbilical hernia*), or the inguinal canal (*inguinal hernia*), or the crural ring (*femoral hernia*).

We have spoken fully of hernia of the naval under the diseases of childhood, and can here turn our whole attention to hernia of the inguinal canal, and of the crural ring.

Respecting the origin of these herniæ, inguinal hernia in particular, is often congenital in the male sex, or at least proclivity to this hernia is congenital, in consequence of an imperfect closure of the inguinal canal, which, as I have said at the beginning of the book (p. 9), must allow the testicles to pass into the scrotum.

Where this congenital proclivity exists the child's frequent crying, or straining, in consequence of costiveness, suffices to produce the inguinal hernia.

In later years the usual cause of inguinal hernia is lifting or carrying heavy weights. The malady is a fairly common one among the labouring classes.—Among females inguinal hernia is distinctly rarer. Definite causes cannot be always assigned for it, but frequent pregnancy, and the consequent relaxation of the anterior wall of the abdomen, certainly favours the occurrence of the hernia.

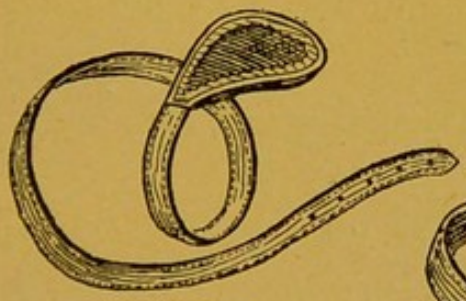
Though, both in the male and female sex, inguinal hernia produces a roundish protruberance, about the size of a walnut, on the inner and upper surface of the thigh, the form of the rupture is different in the two sexes. In the male sex the hernia presses down into the scrotum. In the female it presses into the *labia majora*, and presses their folds

apart. At the time of its commencement the imperfect and only half developed hernia is felt in both sexes in the inguinal hollow as a globular swelling, which, in case of coughing, can be distinctly felt by a finger placed upon it to move and stretch.

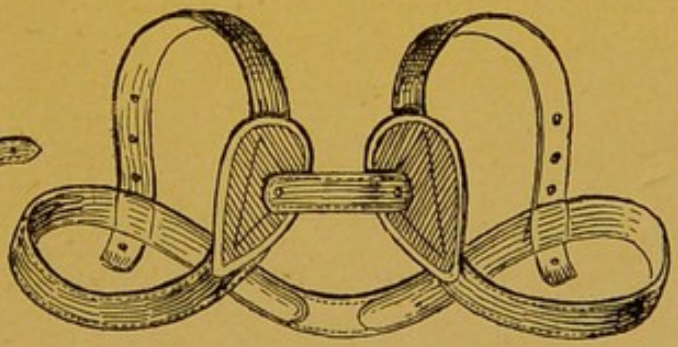
So long as a hernia can, without much trouble, be replaced through the orifice of the hernial opening the malady is rather a tiresome than a dangerous one. But there is always a danger of what is called constriction, and, for this reason, every hernia is to be regarded with misgiving.

Constriction of a hernia consists in the portion of the intestine, which has protruded through the orifice of the hernial sack, becoming so compressed that it dies with the symptoms of gangrene.

The treatment. To begin with the danger of constriction last mentioned. As soon as it is found that the hernia cannot be replaced in the ordinary manner, that is to say cannot be put back into its place through the orifice, it is absolutely necessary to procure surgical aid. One must on no account wait until severe pain in the hernia, nausea, vomiting, and a weak pulse ensue, as these are at once bad symptoms, but the medical man must be summoned with *a mention of the kind of assistance that is wanted;* so that he may know what is the matter, and that his early presence is necessary.—It may be here mentioned that if



Left-handed truss for inguinal hernia.



Double truss for inguinal hernia.

the medical man is unable to restore the hernia to its place by easing the constriction, the operation for hernia should not be too long postponed.—For the rest a well fitting elastic truss, with a spring cushion, will always so close the orifice that the hernia cannot issue.—The expense of a good and comfortably fitting truss should not be grudged; it should be fitted on its place by a professional hand.

In the case of little children it is particularly important that they should soon have a truss; as very often, under the influence of a properly fitting cushion, the orifice of the hernial sack diminishes so much that the hernia cannot again occur. But a truss should not be

used until the child is at least nine months old. Before this the spring of the truss becomes rusted by the urine, and can become dangerous to the child.

Wry neck, might have been justly mentioned among the maladies of the recently born, as it is almost always occasionod by a rupture of the muscles of the neck during a severe parturition, and generally in the case of children born with a buttock presentation. The malady consists in a shortening of the injured muscle resulting from a cicatrized healing of the wounded muscle. This one sided shortening (it affects the sternocleidomastoeideus, the most powerful of all the muscles of the neck) produces in the course of time a gradual oblique position of the head, which the parents often do not notice for a long time. In later years a spinal curvature almost always becomes associated with it.

Wry Neck.

The treatment. By far the best way of treating wry neck is by a surgical operation, both the insertions of the shortened muscle being

cut immediately above the sternum (breast bone) and the clavicle (collar bone). For some period after the operation it is advisable to wear a padded paste-board collar, which is made somewhat higher on the affected side than on the other.

Wounds and the cure of wounds. By a wound we understand any intentional or unintentional serious piercing of the exterior skin involving opening of the blood vessels. Of these we may set aside the operative incisions made by the hand of the surgeon for the cure of certain maladies; and turn our attention to those injuries which may at any moment occur, generally in consequence of an accident.

It would be superfluous for me to say that I have no intention whilst treating of wounds, to introduce my reader to all the refined distinctions of surgical language which would be of no service to him. My intention is rather to point out simply how bleeding can be staunched, and how a wound is cleansed and bound up; so that any person, when a medical man is not at hand, may know what to do at the first moment to prevent risk to life and health.

First then to say something about different kinds of wounds. They are generally distinguished according to their causes, as *cuts*, *slashes*, *tears*, *stabs*, and *shot wounds*.

Cuts and *slashes*, or *tear wounds*, on account of their clean edges, present the best prospects of rapid healing.

Tears almost always heal slowly, and present danger of purulation, particularly if they have been occasioned by rusty iron (*old nails, &c.*)

Stabs and *shot wounds* have always a small exterior opening, but are often the most dangerous, as they penetrate deeply, and may affect important organs.

Burst varicose vein bound up.

Very slight injuries of the skin have been already discussed. In all other wounds one of the principal symptoms is a more or less abundant *bleeding*. To arrest this must be the first object. The bleeding is the natural consequence of opening of the blood vessels. According to the depth of the wound the *the capillaries*, *the veins*, or the *arteries* may be opened, and their contents effused.

In the case of superficial injuries the blood trickles from the wound slowly, and without any great force. This shows that only the vessels of the skin and the capillaries have been reached. If a

cold wet compress is applied the blood soon ceases to flow, coagulating of itself. But if important veins are cut the blood flows more freely, and if arteries are cut the effusion of blood is excessively brisk, and with a jerky pumping action.

Bleedings of the veins and arteries differ principally in the colour of the blood effused, and in the pressure. The blood of the veins is dark, that of the arteries bright red. The blood of the veins, no doubt, flows sometimes very freely, as in a burst varicose vein, but never with the sharp jets of the arterial blood, which, in consequence of its direct subjection to the action of the heart, is emitted from the wound in successive gushes.

Injury of artery of lower arm.

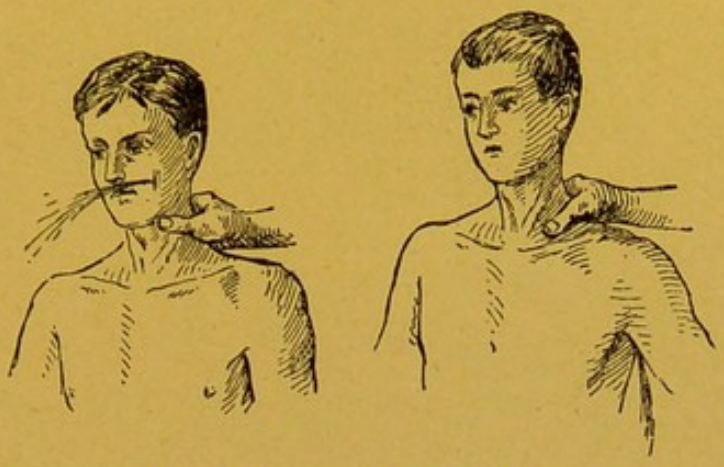
As the body requires a certain quantity of blood to keep up the circulation and respiration uninterruptedly, bleeding to any considerable extent can be directly dangerous to life. In order, therefore, to check it as quickly as possible it is advisable to compress the vessel that has been opened *above the visible wound.* If an arm or leg is wounded it should be immediately laid bare by removing the clothes. The wounded limb should be held high, and bound with a girdle, garter, or any other available bandage, between the wound and the heart. If, in the hurry, nothing can be found that will furnish a binding, no hesitation should be shown about compressing the vessel with the hand at the most favourable spot, as the wounded man may often in this way be rescued from severe danger.

If the blood shoots in jets from the sides of the neck, or from a deep wound on the face, so that an injury of the carotid artery, or one of its branches, must be assumed, an attempt should be made with a strong pressure of the fingers, in the manner represented in the cut, to press the carotid artery against the vertebral column.

In a similar manner the subclavian artery can be pressed by the fingers against the ribs, and be held closed for some time. It is also advisable in this case (and also in cases of wounds in the arm-pits) to draw the arm of the injured side strongly backwards, as by this the clavicle is drawn down, and the constriction of the blood vessel assisted.

As illustrations assist the general public (who are ignorant of the exact localities of the various vessels) better than words to understand

the most important points for binding in case of wounds, the following cuts may serve to give practical hints when immediate assistance is needed, which is almost always the case.



First-aid for the wounded.
Compression of divided vessels of the neck.

In all severe bleedings, after the flow of the blood has been first arrested by constriction, the patient must be carried as soon as possible either to his house or to a hospital, and medical aid immediately procured, that the constriction may be loosened and replaced by a proper binding up of the wound. The *tight constriction* of the injured portion of the body must be regarded only as *first help* given in an accident. If it is not within a few hours replaced by surgical bandaging of the injured vessel there is danger of mortification of the constricted limb, which would require amputation.

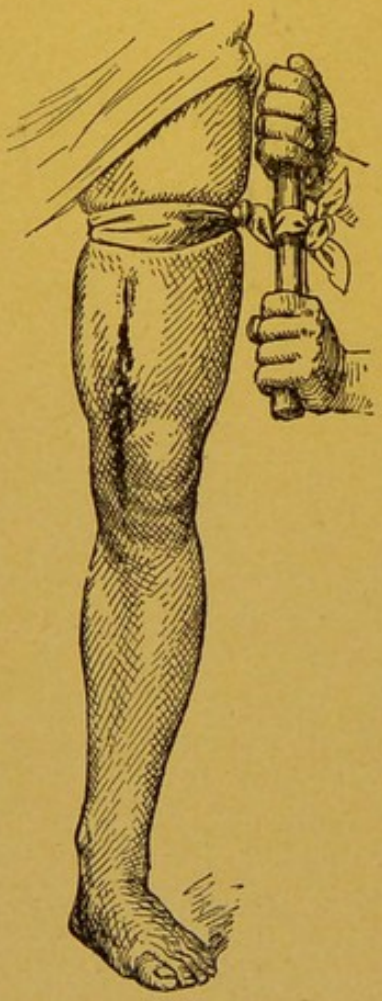
Let us turn now to the further measures which orderly treatment of a wound demands. After staunching the flow of blood our attention must be next turned to cleansing the wound.

If the wound is of so serious a nature that getting medical assistance is immediately decided on, it is better to attempt nothing in the way of cleansing, but simply to put a wet clean wad of cotton-wool or muslin *upon*, or better still *into* the wound. The whole should be covered with an outer band that covers it well, and the medical man should then be sent for—unless the patient though wounded is in a condition to go to him.

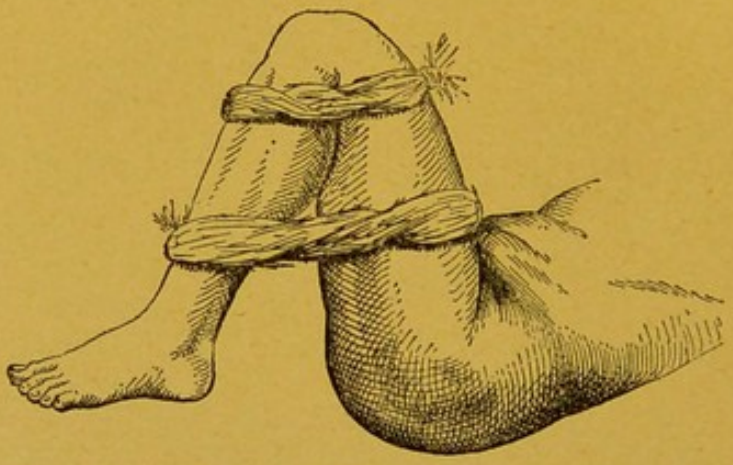
In cases of wounds of the arms the limb is to be held up as soon as possible for which a sling arranged as in the cut is most convenient. In cases of wounds of the legs it is best to lie down, with the leg placed high, and to await the arrival of the surgeon.

In the case of smaller wounds with which a man feels himself

competent to deal, or in cases when medical assistance cannot be procured before the following day, it is always best not to bind up a wound before it has been cleansed, as in this way the danger of blood poisoning, or at least a delay in healing occasioned by purulation is avoided. If the wound is very much fouled with machine oil, dirt from the street, or other impurities, it is only in the rarest cases possible so to cleanse it that it heals without purulation. For that



Injury of the femoral artery and its practical constriction.



Straw wisps used as substitutes for bandages in case of injury to the popliteal artery by a cut from a scythe.

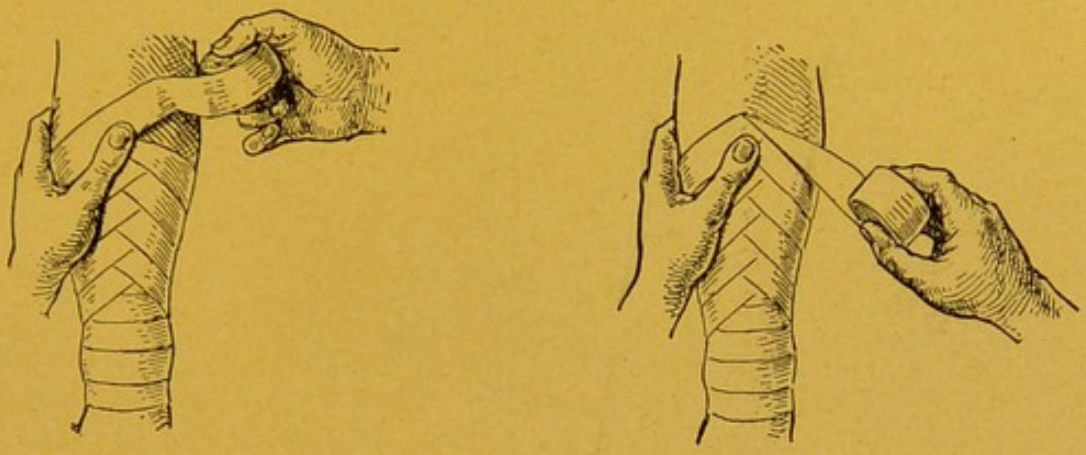
Sling.

reason it is best to be contented with washing the wound and the parts about it with luke-warm soap and water, and then binding it up in bandages damped with one of the disinfectant fluids mentioned below.

But even in the case of wounds which appear ever so clean, and do

not seem to have been at all dirtied by the injury, washing before binding up is necessary, so that the invisible purulent germs, which so often prevent unhindered cure, may be killed.

There are two different kinds of healing of a wound, which may be briefly described as healing *with* or *without* purulation.



Application of Imbricated Bandages for Varicose Veins.

The healing without purulation and without traumatic fever, which will naturally be aimed at, requires :—

That the wound remains free from purulent bacteria.

That the edges of the wound are smooth and lie well against each other.

That the edges unite fairly soon.

That the wound is properly nursed, and not disturbed by being shaken.

If these conditions are complied with, new growths of vessels and connective tissue form within a few days ; the surfaces and edges of the wound unite ; and only a small, soon almost invisible thread-like cicatrice remains after healing.

In the other case of healing the course is quite different. Here the injury is exposed to invading purulent germs and to their influence. These germs are very small microbes, which, either as staphylococci lie scattered without any definite arrangement, or as chain-cocci are ranged in long threads like strings of pearls. They occasion, with marked increase of temperature (traumatic fever), a serious transformation of the fluid of the wound into a yellowish cream like mass (pus). This pus thrusts the sides of the wound apart and delays the healing. First of all small red granulations seem to rise gradually from the surface of the wound. These become constantly higher and higher, and not only gradually fill up the whole of the cavity of the wound

but often in the form of "proud flesh" proliferate over the edges of the wound, and can be most simply removed by lunar caustic (which is quite painless), after which the wound closes with a large scar.

In the case of wounds that promise to heal without purulation the bandage is best not removed so long as there is no pain. It is quite sufficient to close the wound with a clean compress of cotton wool or muslin, and to envelop this in a muslin band. It is very bad economy involving danger to use the same bandage twice, first with one side outmost and then with the other—a mistake unfortunately often made.

In the case of wounds which heal with purulation it is of primary importance to guard against blood poisoning, by which we understand the passage of impure products of decomposition into the blood. Blood poisoning is a severe disorder that very often soon destroys human life, and is frequently to be referred to the neglect of small wounds, or to a completely mistaken treatment of them. It is impossible to warn people too strongly against an ancient superstition (still very prevalent in country localities) that spider's webs, cow's dung, and similar things should be laid upon open wounds on account of their healing properties.

The excretion of pus, and the purulent decomposition of the already formed pus can be most certainly and effectively hindered by a number of antisceptic remedies which may be applied partly in the form of dry powders, partly as solutions in wet bandages in immediate contact with the wound.

Which of the several remedies should be recommended as the best is difficult to say. Powerful remedies that have a disagreeable smell such as iodoform, creolin, lysol, &c., are not to be recommended to the public for home use. Nor is it possible to recommend such remedies as require very great dilution, and in their concentrated state are powerful poisons (carbolic acid, mercurial solutions), as mistakes may occur at some later period when the contents of the particular bottle have been forgotten.

It is unadvisable for the general public to expose themselves and their families to these dangers, seeing that there are perfectly harmless remedies whose antiseptic properties are equally effective. Of such powders I will mention here only *boric acid*, which has an *antiseptic desiccating*, and *healing* effect upon purulent wound surfaces, and particularly upon ulcers. Of remedies to be applied on damp bandages, I place in the front rank the *permanganate of potash* which I have already often mentioned. A single grain only need be dissolved in boiled water, to obtain a bright red coloured effective antiseptic

fluid.

Respecting the bandage itself, absolute cleanliness is of primary importance not only when the bandage is first applied, but whenever it is changed. It is best to bind up the wound in the following manner: after cleansing it, to sprinkle it with boric acid with a dry hair brush; or to lay upon it a damp pad of muslin, which has been dipped in the solution of permanganate of potash. If the wound is bound up dry a layer of cotton wool should be placed over it, and then the whole should be covered with a muslin bandage, or with strips of sticking plaster and wrapped up. On the contrary if wet bandaging is used a layer of gutta percha tissue must be placed between the wet layer and the cotton wool layer, in order to prevent evaporation.

It is impossible here to go any further into surgical treatment of wounds (sewing up wounds, &c.), which in many cases is absolutely indispensable, and often leads to excellent results in cases of very serious wounds. Respecting poisonous wounds (bites of dogs, or of snakes) I must refer the reader to the sections treating of first help in cases of poisoning.

The skeleton. The most solid part of the body is composed of a great number of separate bones of very different forms. These bones are connected together partly by sutures (in the skull), partly by ligaments and joints. They not only give the body firmness and support, but must also be described as a passive motory apparatus put into motion by the muscles.

The most prominent quality of the bones is their hardness and elasticity. They owe both these qualities to their composition of inorganic (mineral) and organic (animal) elements. The proportions of these are not the same at all ages. In the adult skeleton, which has an average weight of about five and twenty pounds, two thirds are reckoned to consist of bone earths, the remaining third being made up of organic matter which is named *bone gelatine*. The earthy constituents (phosphates and carbonates of lime) give the bone its hardness, brittleness, and firmness, the *bone gelatine* imbedded amongst them give it its flexibility and elasticity.

The number of bones in every man exceeds two hundred and fifty. According to their form and mould we divide them into *long*, *flat*, and *short* bones, without this division making any pretension to exactitude; as many bones, especially those of the skull, are so irregularly shaped that they cannot be described by their form, but only by their fixed names.

I shall here remark only generally that the long bones, called also *tubular* bones, are to be found principally in the limbs. They are long tubes of bone, hollow within, and filled with marrow. Their upper and lower extremities are provided with knobbed articular surfaces, by means of which they are connected with neighbouring bones. The *wide* and *flat* bones are to be principally found where important cavities of the body exist, where they protect important organs. The best examples of this are the bones of the skull and of the pelvis.

The *short* bones, such for example as we find in the wrist and ankle, are of many forms, some round, and others angular. They occur principally where a considerable degree of strength is required, as well as a good deal of mobility; for which reason they are stoutly connected together.

Every bone is covered with a skin of its own, known as the periosteum. The periosteum nourishes the bone, and contains the blood vessels which enter, through very minute orifices, into the bones to supply them with blood.

The interior of the bone (as we may perceive most clearly in the tubular bones) is either completely hollow and filled with marrow, or else contains a spongy soft bony substance, wanting only in very small, quite solid bones.

The marrow, or medulla of the bones is a soft yellowish red gelatinous mass, consisting entirely of fatty tissue. Its use is not yet fully known. The medulla of the bones is regarded primarily as a place of prepartion of the blood corpuscles, as in all severe constitutional maladies degeneration of the medulla of the bones is observed—as we have already said whilst treating of severe forms of anæmia.

The connection of the bones with one another is by far most often by means of moveable joints, which are so constructed that the hemispherical shaped end of one bone (covered with a smooth cartilaginous integument) is fixed in the corresponding hollow (also covered with cartilage) of the other bone (the head of the joint and the socket of the joint), and is here kept in its place partly by atmospheric pressure and muscular action, partly also by elastic and very firmly fastened bands. The interior of every joint, that is the space between the two bones which, at the joint, move on each other, is, to avoid friction, lubricated with a fluid known as synovia. The interior of the joint, named the articular cavity, is protected by an air-tight close-fitting covering, which is called the synovial capsule.

But all bones do not move so easily upon one another with joints as these particularly free ones of the arms and legs. On the other hand, neighbouring bones are often fairly firmly bound together, as we may

observe for example in the pelvis, and still more in the skull, whose several bones (with the exception of the moveable jaw bone) are knitted to one another by what are named the sutures, and when the growth is completed are fairly firmly grown together.

Proceeding now to mention all that is most important in the construction of the skeleton, I do not consider it necessary to describe each bone exactly; any more than I have thought it necessary to mention the several muscles, whose number far exceeds that of the bones. The pair of very distinct uncoloured plates, representing the course of the principal muscles (see plates VIII and IX), and the pair representing the arrangement of the bones (see plates X and XI) will give the reader a good notion of both.

I shall here mention only that the skeleton is perfectly symmetric, being composed of two exactly similar halves, and is generally divided into the bones of *the head*, *the trunk*, and *the limbs*.

The Bones of the Head.

The bones of the head, twenty-two in number, are, with the exception of the movable under jaw firmly bound together, and form a great number of cavities to contain the brain and the organs of sense. Eight of these bones, the two temporal bones, and parietal bones, and the occipital, sphenoid, frontal, and ethmoid bones form the cavity in which the brain is placed, the nerves which bring the brain into connection with the rest of the body issuing through numerous foramina. The other fourteen bones of the skull (with the exception of the lower jaw, or inferior maxillary bones), form cavities for the organs of sense and are the superior maxillary bones, molar bones, palate bones, nasal bones, lachrymal bones, inferior turbinated bones, all of which are in pairs, and the vomer. Finally the movable inferior maxillary bones, a pair, form the lower jaw.

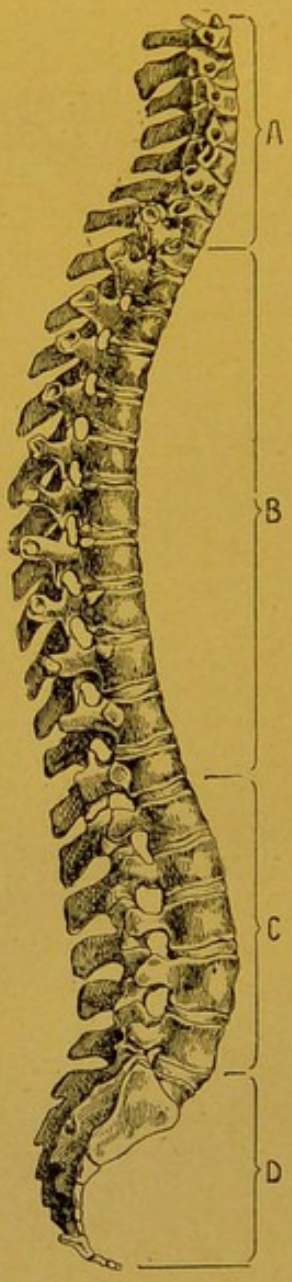
The Bones of the Trunk.

These are divided into the vertebral column, or back bone, the ribs, and the sternum or breast bone.

The vertebral column may be called the base and support of the whole body. It is composed of a number of hollow bones connected together which are called vertebræ, and compose as a whole a long canal which contains the spinal cord.

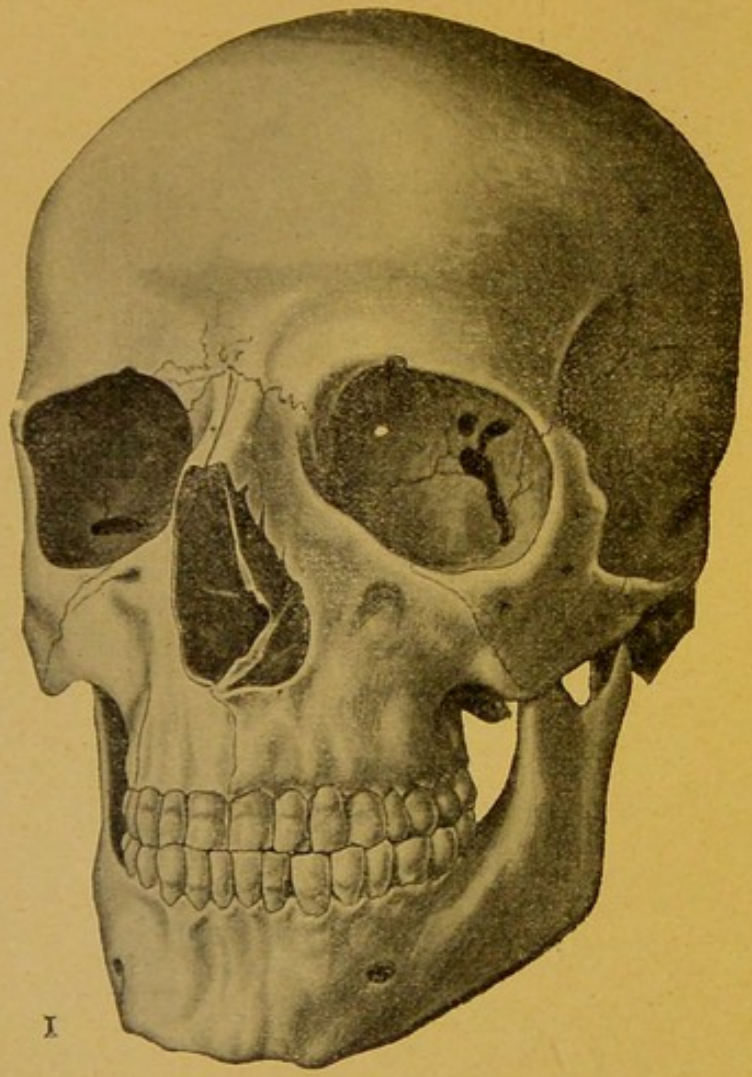
We divide the vertebral column, proceeding from the summit downwards, into the *cervical section*, consisting of seven cervical vertebræ, the *dorsal section*, consisting of twelve dorsal vertebræ, the *lumbar section*, consisting of five lumbar vertebræ. These four and twenty vertebræ are called the *true vertebræ*. The remaining portion of the vertebral column, the *sacrum*, and its continuation of the *coccyx*, are called the *false vertebræ*, as they are grown together, and have lost some of the characteristics of vertebræ.

The vertebral column is not perpendicular, but exhibits in the course of its length four curves, which to some extent balance one another. The cervical and lumbar sections are bent forwards, the dorsal and sacral sections backwards. Thus, if we imagine a plumb-line hung before the vertebral column, we should find that the column advances towards and recedes from the plumb-line with a double curved bend, but does not vary from the perpendicular to either right or left. The object of these curves of the vertebral column is to preserve the brain from the shocks to which the spinal cord is subjected at every step. Were the column perpendicular the shocks would be immediately transmitted to the brain; in the curves of the spine they are spent and counterbalanced.



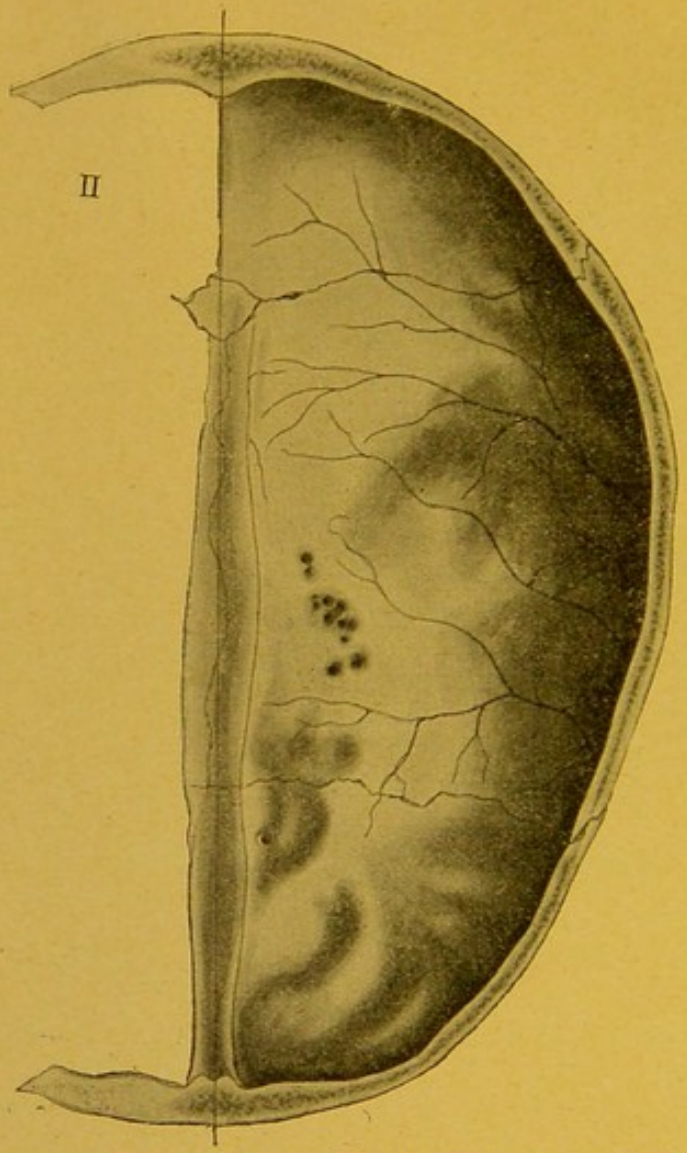
The spinal column. a, cervical section; b, dorsal section; c, lumbar section; d, sacral section.

Each single vertebra may be regarded as a closed ring with an anterior and posterior portion. The anterior portion is by far the stronger, and in each vertebra is thickened into a vertebral body, a portion consisting of spongy bony matter, whose superior and inferior portions are united with the corresponding parts of the contiguous vertebræ, from which they are separated by a cartilaginous pad inserted between them. The posterior portion is much more slender and more elaborate. The vertebræ send out seven processes, four of which serve as processes for joining the bone to the neighbouring vertebræ, and three (the two pedicles and the single spinous process,



I

I. The Bony Skull.



II

II. Interior view of the upper portion of the Skull.

projecting backwards) are for the attachment of muscles. Between every two vertebræ small orifices exist on both sides known as the intervertebral foramina which serve for the issue of the spinal nerves.

The sacrum closes the back of the pelvis, being inserted between the two *ilia*. It is a hollow bone, broad above, but rapidly diminishing, and formed somewhat like a pointed shovel. It consists originally of five vertebræ, which, about the time of puberty, coalesce into a single bone, and are, for this reason, called false vertebræ.

The coccyx is pointed, consisting of four small portions, that become less and less, and are grown together. They still show distinct traces of the form of vertebræ. Inside it is hollow, like the rest of the vertebral column.

The sternum, or breast bone, is a single bone directly opposite the superior portion of the dorsal vertebræ. It forms the anterior boundary of the bony chest. It has been compared to the short sword of the ancient Romans, and its parts have been accordingly distinguished as the *manubrium* (handle), the upper part; the *gladiolus* (sword blade), the middle; and the *ensiform appendix*, or point. The side edges of the sternum are connected with the inner ends of the seven superior rib cartilages. The upper edge of the *manubrium* has, on the right and left, two small projecting surfaces, covered with cartilage, for the insertion of the inner ends of the shoulder bone.

The ribs are in half rings of bone, in pairs. They are very elastic, and form a connection between the vertebral column and the sternum, thus forming the chest.

We reckon twelve ribs on each side. Of these the seven superior ones are described as true ribs, the inferior five as false ribs; because the seven superior ones are directly connected with the sternum by what is called the rib cartilage, whilst the lower five are either attached in front by cartilaginous processes to the cartilage of the inferior true ribs (as the plate plainly shows), or have their ends free among the muscles, which we find to be almost always the case with the eleventh and twelfth ribs.

The Bones of the Limbs.

These are divided into bones of the upper and lower extremities. Amongst the former are reckoned the shoulder-blade, the clavicle or collar bone, the bones of the upper arm, both bones of the lower arm, the eight bones of the wrist, the five bones of the middle hand, and

the bones of the fingers. The bones of the lower extremities are the pelvis, the thigh bone, both bones of the lower leg, the ankle bones, the bones of the middle foot, and, finally, the small bones of the toes.

The bones of the upper extremities. The *scapula*, or shoulder-blade, is a wide, triangular, flat bone, which is placed against the posterior portion of the chest, and covers it pretty well from the second to the eighth rib. We distinguish on it an anterior and posterior surface, and corresponding to its triangular form, three sides and three angles. The anterior slightly concave surface lies against the posterior ribs. The posterior free surface serves for the attachment of different muscles. The posterior surface of the shoulder-blade is divided into two parts by a stout process, called the spine of the scapula. The two parts are distinguished as the *supra spinus* and *infra spinus fossæ*. The continuation of the spine of the scapula, outwards and upwards, is called the acromion process. It has on its extreme end a small articular surface for its juncture with the collar bone.—The superior corner of the scapula, on account of its massive development, is named the body of the scapula, and is arched above by a strong process of bone, which is called the *coracoid process*. This part of the scapula bears the somewhat flat articular depression for the ball of the humerus.

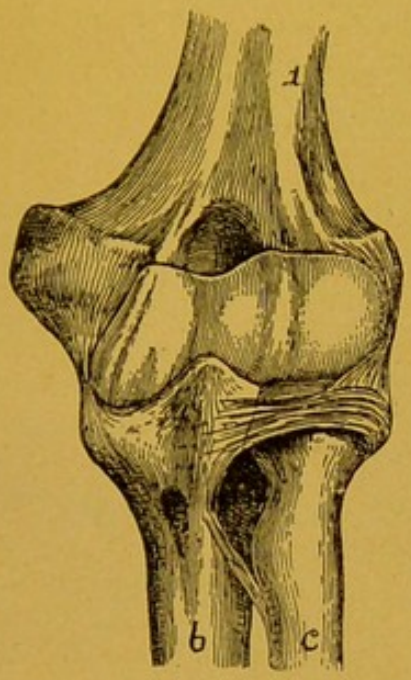
The clavicle or collar bone is a bone about the thickness of a finger, with a very slight double curve which connects the breast-bone with the shoulder-blade.

The humerus, or bone of the upper arm, is a long strong tubular bone. Its round central portion is hollow inside. The superior and inferior extremities consist of solid masses of bone. The superior extremity has a spherical protruberance called the head of the humerus. Its free surface, covered with cartilage, articulates with the articular surface (glenoid cavity) of the blade-bone. The lower extremity of the humerus is wide and flat, compressed from front to back, terminating in a deeply forked roller-like oblique edge. This articulates with the crescent-shaped notch of the ulna, whilst a spherical knob lying near it forms an articulation with the radius.

The bones of the lower arm are two in number, the *ulna* and *radius*. Both bones are long, somewhat narrow tubular bones. They articulate with the humerus at the elbow, and are connected below with the bones of the wrist. The bones are so situated that the radius is on the thumb or pulse side of the arm, and the ulna on that of the little finger. They are somewhat brittle, and of all the bones are the ones most often broken.

The wrist consists of eight small solid bones which are arranged

beside one another in two rows, and so tightly bound together by stout short ligaments, that they almost constitute a single whole. The upper row of wrist-bones, proceeding from the side of the thumb to that of the little finger, are the scaphoid, the semi-lunar, the cuneiform, and the pisiform bones; the second row are the trapezium, the trapezoid, the os magnum, and the unciform bones.



The left elbow-joint.
A, humerus; b, ulna; c, radius.

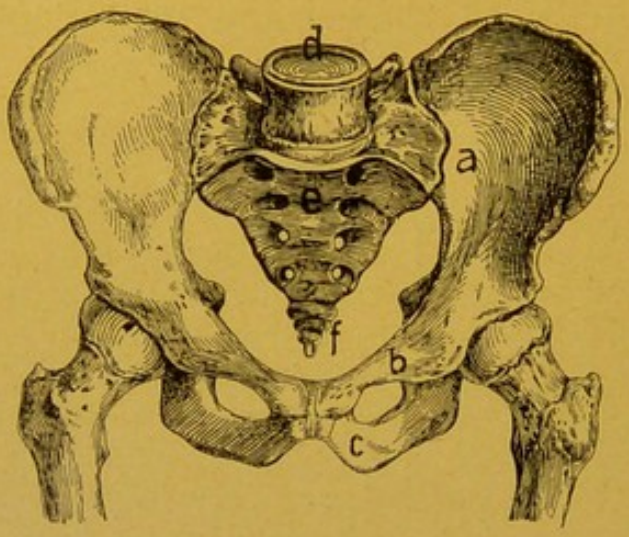
The middle hand contains five bones lying beside one another, which gradually diminish in size from the thumb to the little finger. They give the middle hand its wide flat form. Above they articulate with the lower bones of the wrist, below with the bones of the fingers.

The finger bones, the last of which supports the nails, are two in number in the thumb, and three in each of the four fingers. They are articulated with one another, and by the great number of their joints give the hand, and more particularly the fingers, a very great mobility.

The Bones of the Lower Extremities.

The pelvis is the uppermost portion of the bones of the lower extremities. Compared with all the other bones it is at once recognisable as the most solid portion of the skeleton. The configuration of its bones is such as to enclose a space open above and below, which contains most important organs. It is composed of eight bones—the *sacrum* and *coccyx*, which have been already described in connection with the vertebral column, right and left *ilium*, right and left *ischium*, and right and left *os pubis*. These three bones, ilium, ischium, and os pubis, about the time of puberty, grow so completely into one that they may be regarded as a single bone on each side, the *os innominatum*, which forms the lateral and anterior walls of the pelvis. —The *ilium* constitutes by far the largest part of the pelvis. It extends laterally and upwards in a concave form. Its exterior edge is the crest of the ilium, which extends in a rounded form both forwards and backwards, and serves for the attachment of different muscles.—

The *ischium* is divided into two portions, the ascending and descending branch, the latter of which ends with the tuberosity of the ischium. The os pubis divides into a descending and horizontal branch. These join with the corresponding branches of the other half of the pubes by means of a cartilginous attachment known as the symphysis of the pubes. Where all three originally independent bones of the os



Male pelvis.
A, ilium; b, ischium; c, os pubis; d, last lumbar vertebra; e, sacrum; f, coccyx.

innominatum meet is the hollow articular cavity, lined with cartilage into which the head of the femur is inserted, to make the hip-joint. Inwards, and somewhat below the articular cavity, is a large oval foramen—called the obturator foramen—bounded by the branches of the ischium and os pubis. This foramen is so covered with a stout skin that only a small orifice in the superior exterior corner remains for the passage of the vessels and nerves.

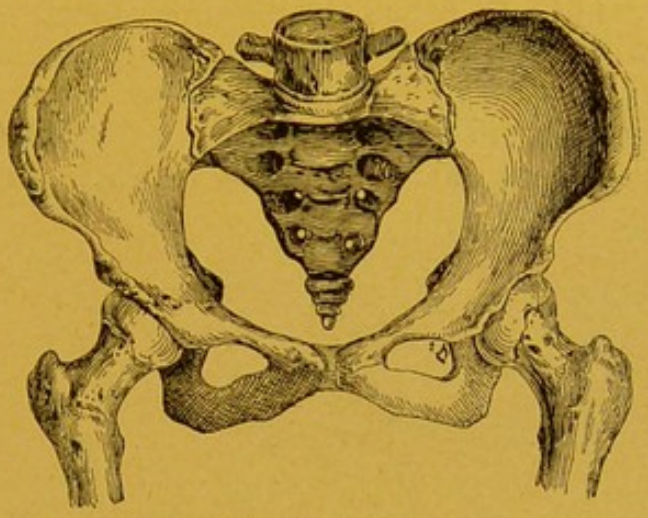
The upper portion of the pelvis is called *the false pelvis*, the lower *the true pelvis*, the latter being the smaller. The pelvis is of great importance in parturition; and it is important to observe that the female pelvis has, in all directions, a larger diameter than the male.

The male pelvis is characterised by depth and narrowness, the female by shallowness and width; in consequence of which the female hips differ strikingly from the male by their width.

The size of the pelvis may be seriously affected by rickets, and the result may be at the time of childbirth a question of life and death for both mother and child. This has been already mentioned in the discussion of rickets, and will be alluded to again when we come to

speak of childbirth.

The femur is the largest and strongest bone in the human body. In form it may be compared to the *humerus*. It is, like the *humerus*, a long tubular bone with a hollow centre containing marrow, and two ends covered with cartilage. The upper end carries upon a long



Female Pelvis.

neck, projecting at an angle, a globular head, which enters into the articular cavity of the *os innominatum*, to form the hip joint. The lower end resembles a roller covered with cartilage which, together with the *patella* or knee-cap, and the bones of the lower leg, forms the knee joint. The *patella* is a hard roundish and somewhat heart-shaped piece of bone, rounded above and pointed below which is placed moveably before the knee joint. It serves for the attachment of extensor muscles, and in forward and backward movements of the lower leg glides over the anterior surface of the knee joint.

The bones of the lower leg are two in number, corresponding to those of the lower arm, and are called the *tibia* and the *fibula*.

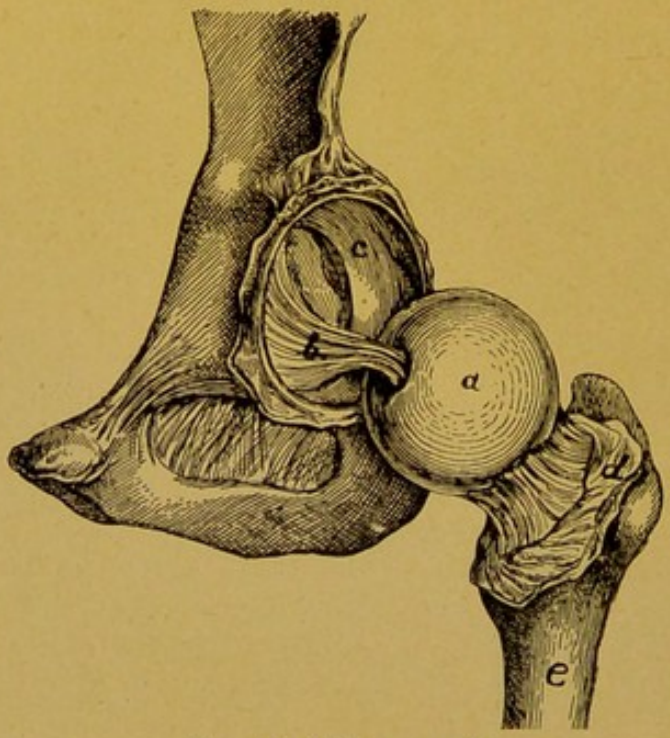
The *tibia* (shin bone) is by far the stronger and larger of the two, and constitutes the essential support of the lower leg. It weighs nearly four times as much as the fibula which stands by its side. The central portion of the tibia is hollow and filled with marrow. The two extremities (as we have observed in all tubular bones) form solid enlargements shaped to articulate with other bones, namely at the knee with the femur, and at the ankle with the bones of the ankle. The central shaft of the tibia has an anterior sharpish crest, which can be felt outside the leg. A blow upon it is extremely painful. The lower extremity forms the inner malleolus.—The fibula is

distinctly more delicate than its strong neighbour. Its upper extremity, called the head, lies outside the tibia, but without reaching the femur. Its lower extremity forms the exterior malleolus.

The ankle, like the wrist, consists of a number of short, solid bones of different forms, some lying above, and some beside the others. They are tightly bound together, so as not to be forced out of their places by the weight of the body resting upon them.

The number of the bones of the ankle (which cannot be more fully described here) is seven. They are called the *calcaneum*, *the astragalus*, *the cuboid*, *the scaphoid*, and *the internal*, *middle*, and *external cuneiform bones.*

The middle foot corresponds in structure with the middle hand, and



The hip joint opened.
a, head of femur; b, the ligament; c, articular cavity, acetabulum; d, synovial capsule; e, femur.

contains five tubular bones, situated near one another. The central portion is not round, but triangular, and extends backwards and forwards to terminations covered with cartilage, which articulate with the bones of the ankle and those of the toes.

The bones of the toes completely correspond in their number, arrangement, and form with those of the fingers, from which they differ only in being of smaller size. As in the hand, so in the foot, the last bone carries the nail, whose growth, structure, and diseases we have already discussed among diseases of the skin.

The Diseases of the Bones and Joints.

With the exception of fractures and dislocations, which almost always occur suddenly, most diseases of the bony parts of the body may be described as taking chronic courses. They are almost always secondary disorders, that is disorders which have been transferred from the tissues to the bones, as has been already explained in the case of tuberculosis and infectious disorders. All diseases of the bones must be treated from their very commencement with the greatest attention and care. Delay and mistaken treatment are generally severely punished.

Inflammation of the periosteum. We must first of all distinguish between two different kinds of inflammation of the periosteum; the mild form which may originate from direct injury of the periosteum; and the more serious forms which proceed from within, extending to the periosteum after destruction of the previously diseased tissue of the bone.

These latter forms of inflammation of the periosteum always follow long, antecedent, general disease of the bones, and commence with gangrenous casting off of a larger or smaller portion of dead bone (called a sequestrum), with purulation and formation of fistula. They always require medical treatment from the beginning. For that reason I shall limit myself here to the former kinds, called traumatic inflammations of the periosteum—that is inflammations resulting from wounds—which occur fairly often among the labouring classes.

This inflammation of the periosteum by far most often attacks those parts of the body where the bones are protected from external injury by only a thin layer of muscles (the front of the shin bones, the bones of the lower arm). The malady consists in a mechanical injury, by pressure, of the periosteum, accompanied by extravasation of blood from the very small crushed blood vessels. The most certain symptoms are *pain* and *slight swelling* of the skin of the part affected, and later *discolouration*, which, according to the quantity of blood extravasated, may amount to a dark blue.

The treatment. The first aim of the treatment must be to secure complete rest for the injured part. If this be an arm it should be carried in a sling to avoid blood pressure. If the part injured be a leg (as often happens in consequence of a kick from a horse), or a rib, rest in bed is to be recommended.

Also cold compresses (which must be frequently renewed) may be strongly recommended, not only because they alleviate the pain and the inflammation, but because they check purulation, which is always

possible, and is especially likely to occur when, in addition to the bruise, there is some injury of the external skin.

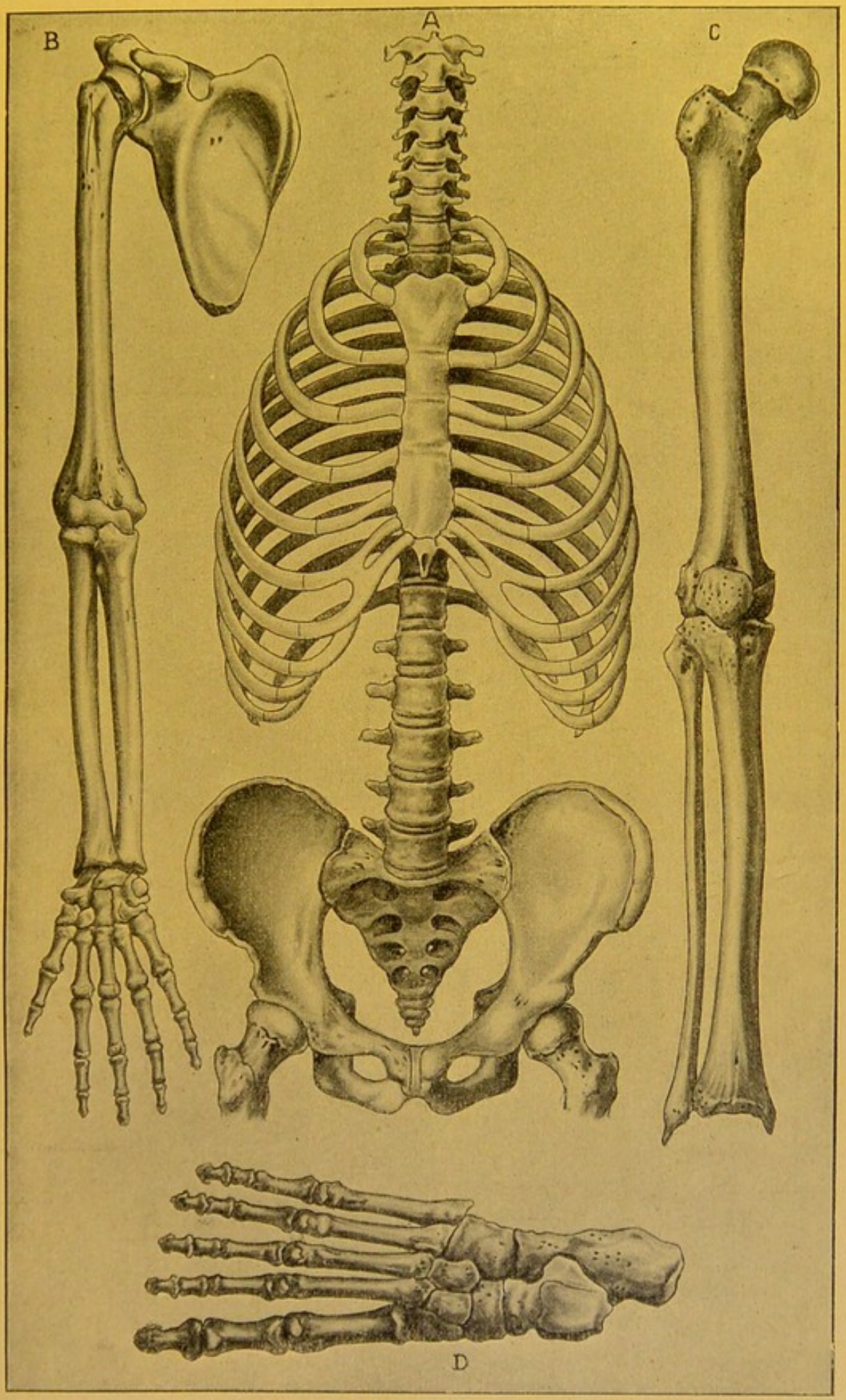
Acute purulent inflammation of the medulla of the bones. Here also we distinguish different forms of the malady, according to the species of infectious germs which occasion it. As it has been already pointed out in a previous chapter that infectious disorders, in their later stages often pass into the bones and their medulla, and bring about a purulent decay, which must as soon as possible be arrested by the hand of a surgeon, I shall not here say any more concerning that form of inflammation of the medulla of the bones, but shall enter rather fully into those purulent forms which occur so frequently in youth. These are almost always accompanied by high fever, and are to be referred to the entrance of purulent microbes into the interior of the bones.

Imperfectly nourished chlorotic girls, before the time of the first menses, appear to be particularly liable to be attacked by the germs of this disease. The germs probably enter first into the lungs with the inhaled air, and thence reach the bones by the way of the circulation. I have, however, met with severe feverish cases of inflammation of the medulla in strong young men, who had previously suffered from influenza.

Feverish purulent inflammation of the medulla, called by French medical men bone-typhoid, always commences with violent general disturbances, the foremost being high fever and shivering fits. In the case of young children who are unable to give any explanation of the locality of their pains, it may at first be confused with other serious disorders, and particularly with typhoid. The fever may reach such a height that the child's life is lost, without hope of rescue, in the first days.

If the pus succeeds in breaking through the wall of the bone the fever generally recedes considerably, and a phlegmonous inflammation of cellular tissue ensues, breaking through the external skin. But at the same time important changes of the bone precede in its interior; since, in consequence of the secondary inflammation of the periosteum, disturbances of nutrition take place in the bone, which now, in proportion to the extent of the purulation, dies and is thrown off through a fistulous opening in small pieces or remains as a sequestrum.

The treatment. After mitigating the general severe symptoms the treatment must aim at effecting the earliest possible opening of the focus of purulation by means of hot compresses, luke-warm baths, and supporting diet of eggs, meat broth, milk, cocoa, etc. This is not



A. The Bones of the Trunk (Spinal Column, Ribs, Breast-bone (Pelvis). B. Shoulder-blade; Bones of Upper and Lower Arm. C. Bones of Upper and Lower Leg. D. Bones of the Foot.

only to ward off the immediate danger to life, but also to facilitate the passage outwards of the portions of dead bone.

Experience proves that medullary cavities surgically cleansed afterwards heal well, and without any subsequent functional disturbance in the affected bone.

Caries of the bones, or tuberculosis of the bones, is a malady of the tissue and medulla of the bones, which has in its consequences a great similarity to the purulent inflammation of the medulla just described; as in this case also we find a destruction of the bone with formation of a sequestrum, and an external effusion of pus. But we have here first of all to deal exclusively with an infection of the bone with tuberculosis bacilli; in consequence of which the malady assumes a quite peculiar significance, and is always characterised by a long chronic course.

Tuberculous caries of the bones has been also called *granulating inflammation of the medulla of the bones*, because, under the influence of the tuberculosis bacilli *a proliferation of spongy* granulations is generally produced, in consequence of which the tissue of the bone is gradually

Tuberculosis of the cervical vertebræ.

destroyed and purulently decomposed.

Tuberculosis of the bones generally attacks young persons, and exhibits a peculiar predilection for the short tubular bones of the hands and feet, also for the bones of the vertebral column, and for the elbow and knee-joints. It almost always follows preceding scrofula of the glands, and particularly attacks persons who are either evidently

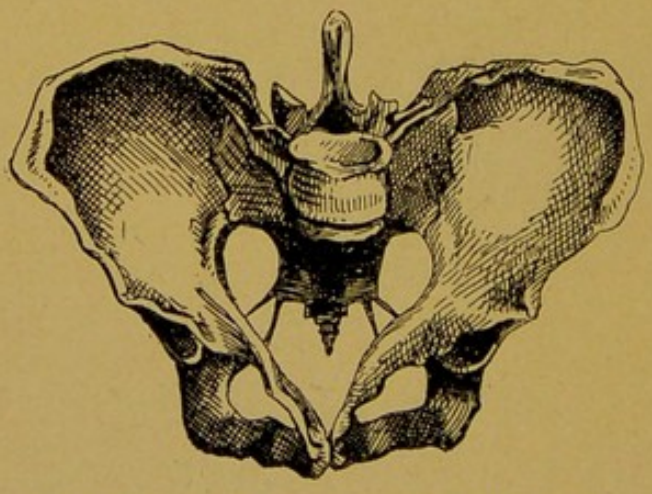
suffering from a general tuberculosis, or are descended from consumptive and tuberculous parents.

The actual commencement of tuberculosis of the bones can hardly ever be exactly fixed, as the malady in many cases takes its course almost entirely without pain, the patient beginning to complain bitterly only when the pus after the destruction of the bone begins to seek an outlet and makes itself felt under the skin as an abscess.

The fistulous ducts of tuberculous inflammations of the bone are almost always small, slightly inflamed at the edges and somewhat sunken. Generally a thin fluid, foul-smelling pus issues from them, but there are also forms in which no pus is seen to issue from the fistula (*dry caries*).

The functional power of the nearest joint (which in a great many cases is the point of departure of the malady, for instance in pulpy degeneration of the knee joint) is generally considerably diminished.

The treatment. In addition to the general treatment of tuberculosis of the bones (which will be found in the sections on consumption) it is most important to obtain surgical aid as soon as possible. No one should allow himself to be deceived into hopes of cure either by unprofessional persons, or by promises of natural healing, or by the application of compresses, ointments, painting, or any other similar remedies. The malady in the meanwhile will be merely making continual progress, requiring stronger surgical measures, whilst at the beginning often an effective excision of the disordered focus effects



Pelvis contracted by softening of the bones.

permanent cure, particularly if supporting diet and exercise in the fresh air accompanies the treatment.

Softening of the bones to a certain extent represents rickets in the

adult. It consists in a disordered softening of the bones previously completely hard and sound. It generally arises under circumstances of an insufficient and inappropriate diet, and amounts to an atrophy of the bones.

This malady, whose nature is very imperfectly understood, has the peculiarity that single regions show a particular tendency to this softening, namely Alsace, Belgium, and Westphalia. It almost always attacks women, and particularly during pregnancy, and announces itself by tearing dragging pains in all the limbs.

The malady is doubly dangerous to pregnant women on account of the frequent considerable degree of alteration in the pelvis, which can be most clearly understood from the accompanying illustration. It frequently makes the caesarean operation necessary, the woman being incapable of bearing her child in the ordinary way.

The treatment hitherto has proved to give poor hopes of a satisfactory result. It is self-evident that the first step must be to provide a strong and varied diet and to bestow all possible care upon the physical condition of the patient. But no remedy has yet been discovered by which we can restore to the bones the lost salts of lime.

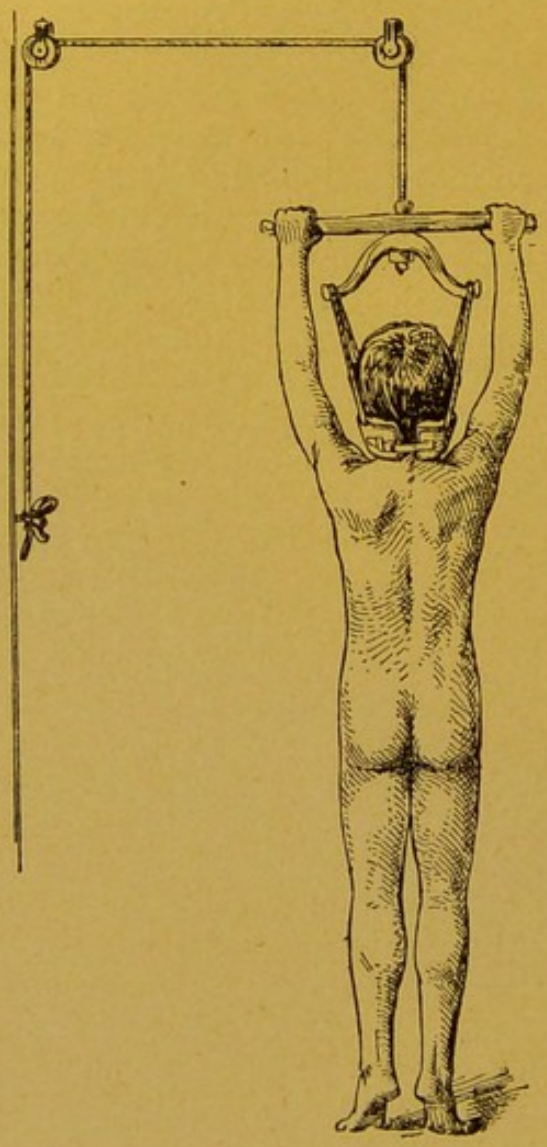
Thecal abscess or Whitlow is practically connected with disease of the bones only when it is neglected or wrongly treated. The malady consists at first in a feverish inflammation of the cellular tissue, which has resulted from the invasion of the finger by purulent microbes, through some very small and often invisible wounds.

In most cases the mischief commences in the immediate vicinity of the nails, or near the ends of the fingers. But the inflammation, always accompanied by severe pain, always shows a great tendency to creep along the tendons and bones of the fingers, and I have for this reason purposely placed whitlow amongst diseases of the bones, because purulent inflammation of the periosteum with death of the bones frequently accompanies and aggravates the malady.

The treatment should consist in early opening of the focus of inflammation, because the pus, so long as it cannot find an exit, produces disorder in the interior of the finger. The patient should not postpone the incision until the pus becomes visible beneath the skin, as the integuments of the tendons and the periosteum are frequently already involved in the malady long before that happens. *Cure depends upon having the finger opened early.* The hand must be supported in a sling, and the finger thoroughly washed with lukewarm soap and water. To have the finger opened at once by the medical man is by far the best plan; only patients who are nervous and timid may use warm compresses to hasten the formation of the

pus. After the operation luke-warm bathing of the finger and damp bandaging are very beneficial.

Curvature of the spine. I have already mentioned that the vertebral column is not perpendicular, but has a slightly undulating form with two curves backwards, in the cervical and lumbar regions, and two corresponding curves forwards in the dorsal and coccygeal regions.



Self-treatment for Curvature of the Spine.

These curves are not congenital, as anyone may perceive on examining the back of a sucking child, whose spinal column forms a slightly convex line. The undulating form of the spine is developed gradually, as a consequence of the upright posture in walking and of

the weight of the body, and represents a natural evolution in the direction of self-preservation, providing for the equilibrium of the body in standing and walking, and the preservation of the brain from shock.

A number of causes may occasion a pathological departure of the vertebral column from the normal form described; and it is evident that there may be either a *departure from the vertical line towards the right or left*, or *abnormal positions forwards and backwards.*

Curvatures of the spine towards the side or lateral curvatures are called *scoliosis;* faulty curvatures forward are called *lordosis;* and faulty curvature backwards *kyphosis.* In many cases different curvatures occur together, so that an original scoliosis becomes in the course of time accompanied by a kyphosis. Such forms of the malady as are called kypho-scoliosis, kypho-lordosis, etc., can also occur.

If we enquire into the most frequent causes of the malady we may observe this—that faulty developments of the vertebral column almost always originate in early childhood. This suggests that the vertebral column has not been sufficiently stoutly developed to support the weight of the body, and for this reason crumples. For this reason we must sharply distinguish lateral curvatures (scoliosis) from lordosis and kyphosis. The former are principally due to general weakness, poor development of the bones, wrong bringing up, or too early attempts to walk and stand, whilst the latter are almost invariably consequences of disease of the bones, amongst which rickets and tuberculosis occupy the most prominent position.

Lateral curvature (scoliosis) is a very common malady. It is frequent among the children of large towns, and commoner in girls than in boys. The curvature is almost always of a double nature, a curvature of the upper portion of the column to the right being balanced by a curvature of the lower portion to the left, and *vice versa*, with the result that either the form) or S is produced.

Lateral curvatures developed at a tender age result sometimes from the mother always nursing the child on the same arm, and so taking insufficient care of a proper development of the child. Sometimes they are favoured by too early attempts to walk on the part of rachitic children with weakly developed bones. But scoliosis may on the whole be called a school malady, as by far the most numerous cases result from unhealthy positions assumed by children in school during the first years of their education. Even in kindergartens a great deal of mischief is done in this direction, the very small children being compelled to sit as still as possible for hours. In consequence of the fatigue of the back that results, they gradually sink on one side or

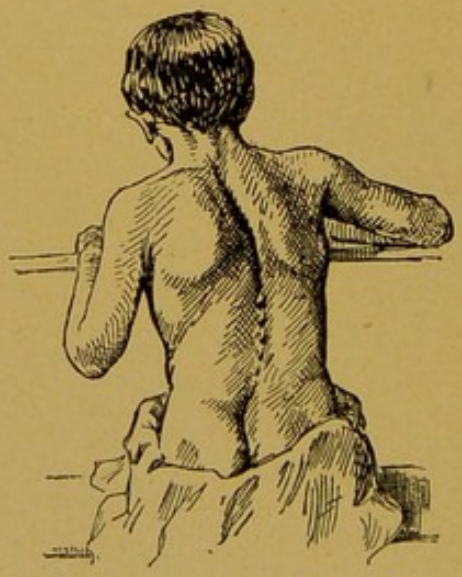
forwards, the delicate muscles of the back being incapable of supporting the long effort.

In the subsequent years of school life the opportunities of acquiring a curvature of the spine are by far more frequent. Desks, either too high or too low, cause an unhealthy position of the body during writing or cyphering, and so directly produce curvature. Very often the form and its back leave much to be desired.

In this connection it may be mentioned that the habit of reading, writing, and working with the hands, with the head hung down and the back bent, constitutes an equal danger for both back and eyes; and I am convinced that fancy work and needlework, with which many mothers plague their daughters at much too early an age, is by far more often the cause of weak eyes, poorly developed chests, and curvatures of the spine, than is generally supposed.

Certainly I am the last person who would encourage a mother in keeping a child at home doing nothing. On the contrary, the child should be useful and assist her mother as much as she can, so that she may early acquire a taste for and pleasure in household duties. But needlework, in my opinion, is certainly not the right way to arrive at this end, unless attention is paid to the position in which the child holds herself.

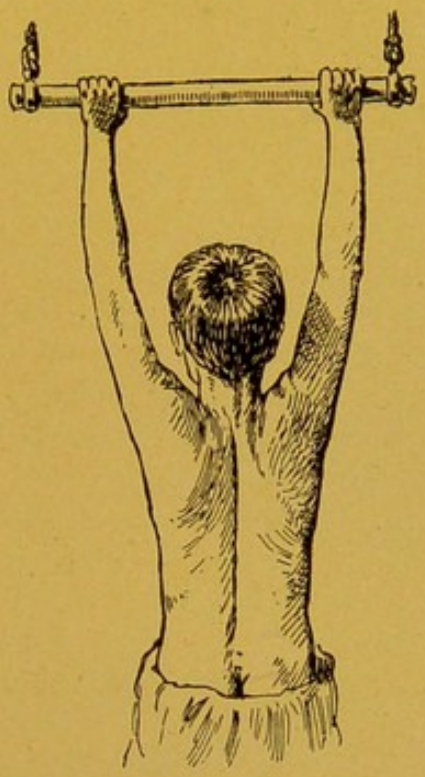
Now, perhaps, it will be said that it is no very great evil if the



Curvature of the spine, occasioned by unhealthy position.

spine is a little twisted to the right or the left. The small malformation will be hidden by the clothes. That may be true of a very slight

scoliosis. But when a commencing scoliosis is not treated at once, the chest does not assume its right form. The muscles are more tense on one side than on the other, more or less marked alterations



The same curvature completely cured by hanging from the arms.

in the chest ensue, and show themselves on the back as *crooked shoulders* and *deformed hips*. As the abnormal expansion of the chest on one side must lead to its constriction on the other, it is self evident that the lungs on the contracted side will be hindered from working freely; and, as a fact, we often find tuberculosis of the lungs associated with curvature of the spine, if the invasion of the destructive bacilli is not guarded against by all the means at our disposal.

The treatment. Before entering upon the treatment of a scoliosis that has already established itself, I would advise all mothers, from time to time, to assure themselves, when undressing and bathing their children, that the vertebral column runs straight in the middle of the back. I would further advise that delicate children, and such as exhibit symptoms of rickets, should not be too soon placed upon their feet. The bandy legs of many small children (which, happily, afterwards generally become straight under a proper treatment with phosphorated cod-liver oil) show that the legs have been too weak to

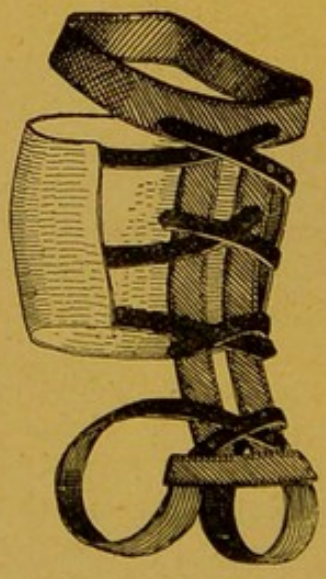
support the weight of the body above them, and that at the same the vertebral column is not strong enough to remain straight in walking and standing.

I beg all ladies in kindergartens and infant schools to take care that the little children entrusted to them do not receive permanent damage, either from sitting in unhealthy positions, or from sitting too long; and to provide that there shall be a constant alteration of mental and physical occupation, so that neither mind nor body may be overstrained at this important period of development.

It is also important that all teachers should pay attention to the healthy position of their pupils during the hours of education. A child negligently allowed to sit cramped up, or askew, at school will certainly do the same at home and elsewhere, and exposes himself to the danger of curvature of the spine.

Coming now to the treatment of lateral curvature of the spine I may say that when it is observed as soon as it begins, and is immediately taken in hand it can almost always be removed by strengthening the muscles (massage), strengthening the whole body (good diet), and especially by certain hygenic gymnastic exercises with very simple apparatus. For example how easily the simple exercise of stretching the spine cures a scoliosis may be seen from the accompanying illustration of a boy of ten with a double scoliosis.

Recommended form of jacket serving also for corset.

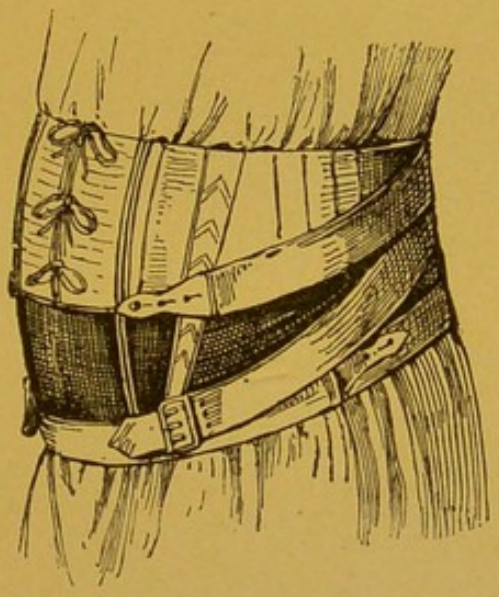


Jacket with shoulder bands and supports for pelvis and abdomen.

The gymnastic exercise of bending the body forwards and then drawing it up (the exercise must be performed slowly, the hips being

held still, and the feet not moved from their position) is much to be recommended; also the plan of walking up and down for three minutes (the time afterwards to be gradually extended) with a staff behind the shoulders is particularly calculated to do good, as it improves the general balance of the body.

In cases when the patient is very young, and has poorly developed bones the use of a jacket is to be recommended. Many different kinds of these exist, some of them very serviceable, but others so heavily constructed that they become a burden. Naturally every care must be considered separately to know exactly what description of jacket should be used. For older girls the jacket is best made in

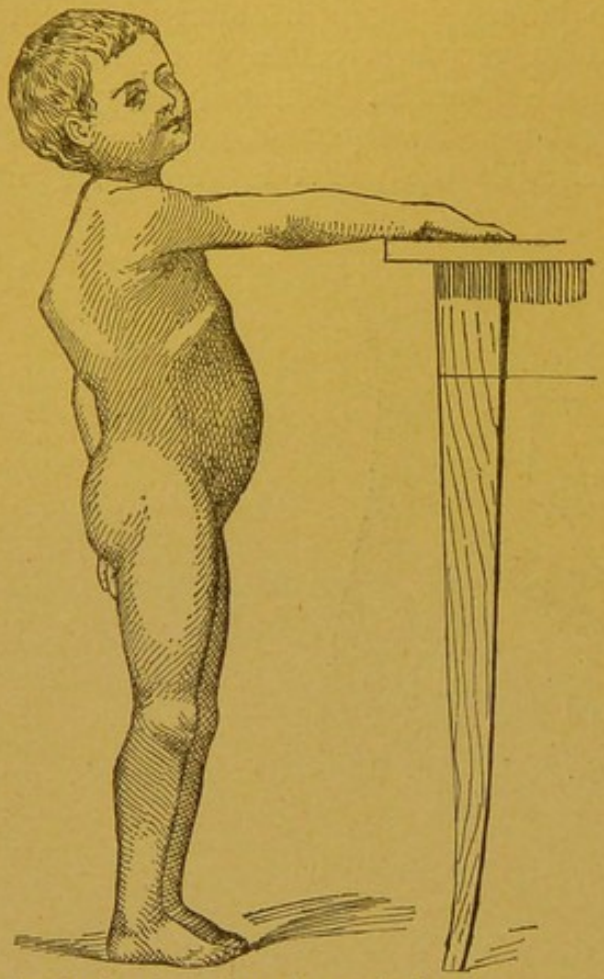


Jacket for Dislocation of the Liver and Kidneys.

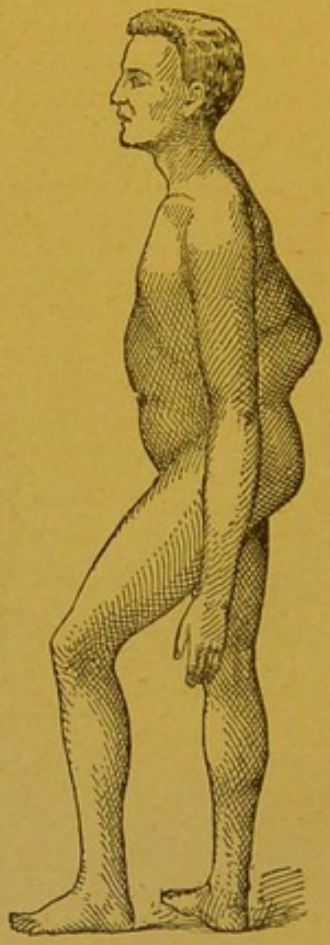
the form of a corset, particularly when it is desirable to balance permanent enlargement on one side by padding the corset on the other. In cases of advanced scoliosis with crooked shoulders and high hips, athletics with special apparatus are to be recommended in addition to massage and the exercises already mentioned. Patients living in large towns have excellent and cheap opportunities of finding what they want in public gymnasia. Those who live in small towns or in the country should consult with their medical man respecting the measures to be taken.

Kyphosis (humpback) is, with the exception of cases resulting from injuries of the spine (for example in a fall) almost always referable to diseases of the spine, amongst which tuberculosis, or caries stand most prominent. Under the influence of tuber-

culous purulation and suppurat ion, an almost complete destruction of the vertebra ensues; and it is evident that an angular bend must ensue at the affected point. Its result, according to the locality of the malady, may be what is commonly called a hump, situated either in the cervical or lumbar region.



Kyphosis of the dorsal vertebral column.



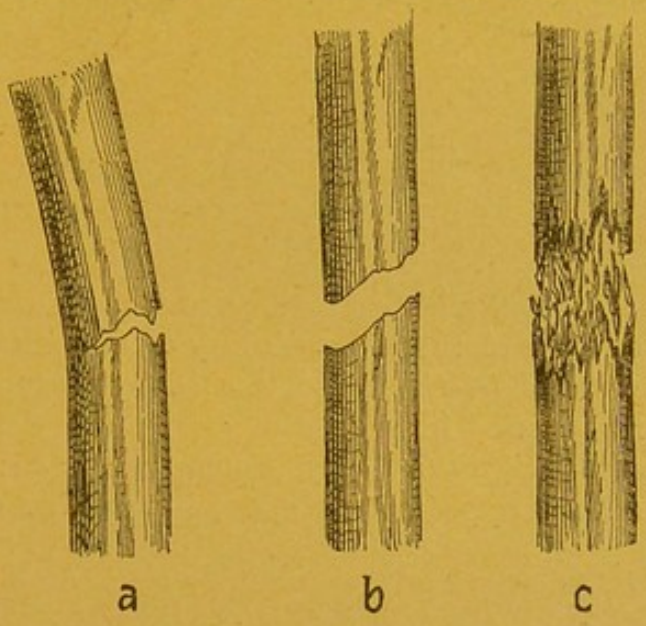
Kyphosis of the lumbar vertebral column.

Tuberculous inflammation of the vertebral column occurs almost always in early childhood (from the third to the eighth year), and is shown particularly by the child's great indisposition to walk, but also by slight fatigue, a little fever in the evening, and the anxious trouble taken by the child to protect the vertebral column from pressure or bending.

The treatment. As soon as a suspicion of slow tuberculosis of the bones in the vertebral column arises, absolute rest on the part of the patient, and a long period spent in bed, are to be prescribed as of

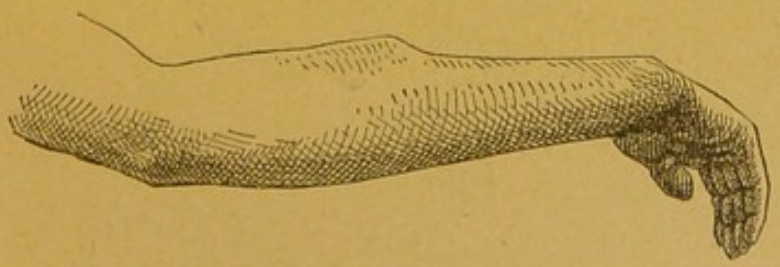
primary importance. Of course the best nourishment is necessary—that is to say the diet calculated to strengthen the constitution in the presence of tuberculosis. Later some appropriate supporting apparatus, or a corset, must be provided, respecting which medica advice, is, of course, necessary.

Fractures and dislocations. Although the bones on the one hand, in consequence of their elasticity and stout construction possess a high degree of strength and power of resisting mechanical pressure, and



Different forms of fracture (diagrammatic).
a, partial fracture; b, clean fracture; c, comminuted fracture.

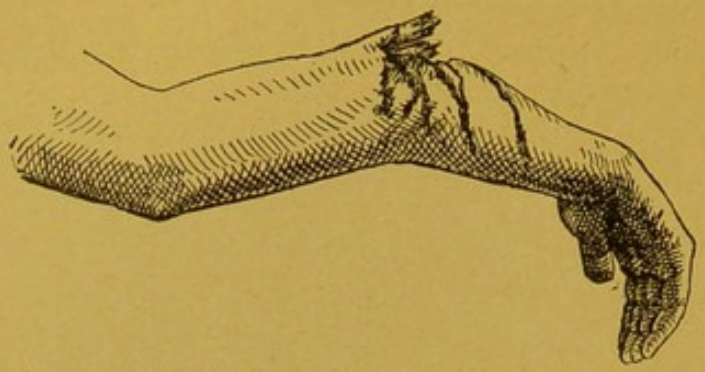
the connections uniting the bones at the joints, on the other hand, are so ingeniously contrived and protected by coverings that they might seem capable of bearing all the strains of daily life, we find daily



Simple fracture of both bones of the lower arm; one of the bones threatening to pierce the skin.

that the strongest bones can break when the pressure brought upon them is too great, and dislocations of the joints easily arise when in

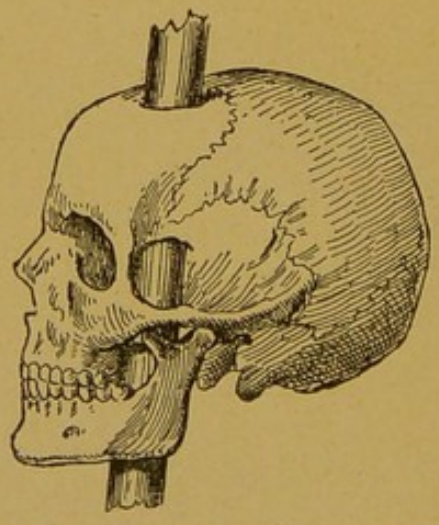
consequence of too great a strain the ligaments and fibrous capsules become torn, so that the ends of the previously articulated bones no longer move against each other.



Compound fracture of both bones of the lower arm in consequence of an explosion.

In fractures we distinguish according to the nature of the injury done the bone, and the simultaneous injury of the soft parts covering it—*simple and compound fractures*, also *comminuted fractures*, and partial or so called "green stick" fracture.

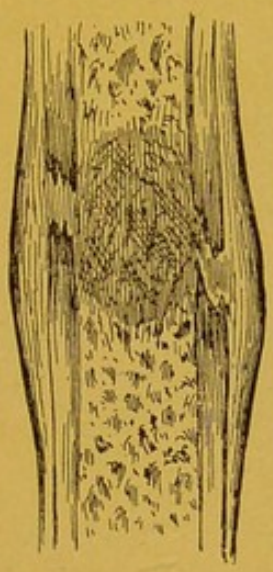
Partial or "greenstick" fracture may be compared to an angular crack. One side of the bone appears torn open, but on the other side the



Severe injury of the skull. The patient survived for thirteen years.

connection of the broken bone is complete. In a *complete fracture* the bone is completely separated at least into two pieces that are now independent of each other. A *simple fracture* (the one that offers the best hopes of healing *without shortening* of the bone) is characterised by

the absence of any shattering of pieces of bone. In *comminuted fracture* we have a shattering of the portions of the bone near the point of fracture. In *simple fracture* the soft parts about the bone are not externally injured. In a *compound fracture* there are external wounds directly connected with the fracture, in consequence of which there is danger of infection.



Fracture in a state of healing.

In the diagnosis of a fracture it is of the greatest importance to know the locality of the fracture, that is not only to know what bone is broken, but where it is broken.

Fracture of the skull, and fractures of the spinal column, are the most serious of all, on account of their involving the central nervous system. Yet recovery does ensue after the most incredible injuries, as in the celebrated case (of which an illustration is given) of an American labourer in an iron foundry, whose skull, in consequence of an explosion, was pierced clean through, from above downwards, by an iron bar, but who survived the accident thirteen years.

Smooth simple fractures of the long bones are the easiest to diagnose. Such fractures of the ribs, of the collar bone, and of the bones of the arms and legs, are common in consequence of falls. If the course of healing is undisturbed, after four or five weeks a tolerably firm, elastic, fibrous connection is established between the two broken ends. We call this the callus. Subsequently it becomes by the deposition of bone cells so strong that it is much stouter than the bone itself.

As it is important to be able to distinguish a fracture from any

other internal injury, and to know what the bystanders may be able to do to allay pain and ward off danger until the medical man arrives, I shall first of all explain the symptoms of a fracture, and will at once give the advice, that in cases when it is doubtful whether there

Treatment of Broken Leg in Childhood.

is really a fracture, or only a severe bruise, it is best to proceed as if there was a fracture, that is the more serious injury of the two. The surest symptoms of fracture are—I am speaking here of the practically most important and commonest simple fractures—

1. The swelling of the part of the body that has been injured; this swelling being caused by the extravasation of blood in the muscles.

2. The pain occasioned by the fracture. This is increased by any light touch, or slight movement of the injured part, and makes the injured limb useless.

3. The unnatural freedom of motion of the two broken fragments now independent of each other.

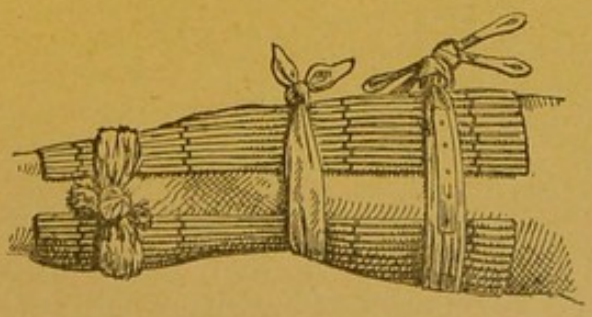
4. The plainly audible grinding of the broken surfaces against each other.

Naturally all these symptoms are not always clearly present, particularly when the case is one of a small fracture near a joint, or when large masses of muscle cover the fracture so that the bone can scarcely be felt through them. In all these cases, care should be taken to have the patient examined as soon as possible by a medical man, whose method of investigation and practical experience will immediately determine the locality of the injury.

First help in cases of fracture may even decide the results of subsequent medical aid and its consequences; and as many hours may often elapse before the medical man can undertake a proper treatment of the injured man, it is of the greatest importance to have a clear idea of the first assistance that can be given.

In general we have to attend to three particulars—the setting of the fracture—the necessary bandages—the transport of the patient, who, if the fracture is in the legs, will not be able to walk.

Respecting the setting of the fracture: but little importance is to be attached to this, and much time should not be spent upon it. It is very painful, and requires professional knowledge. For that reason it is best to be contented with setting the limb straight (by means of a slight pull above and below the point of fracture), in which it is best for two persons to assist, as they then have both hands at their command, whilst a third adjusts the temporary bandages. The object of the bandages is to support the injured limb at the point of fracture, so that the free, often sharply splintered, ends of the bone may not injure the muscles or tear the blood-vessels and nerves.



Temporary bandage (straw-sheaths fastened with handkerchiefs and braces) for a simple fracture of femur.

It is best to bind up the broken limb with *splints*. All sorts of things may serve for splints, anything serviceable that is at hand being taken—thick damped mill-board, sticks of umbrellas, walking-canes,

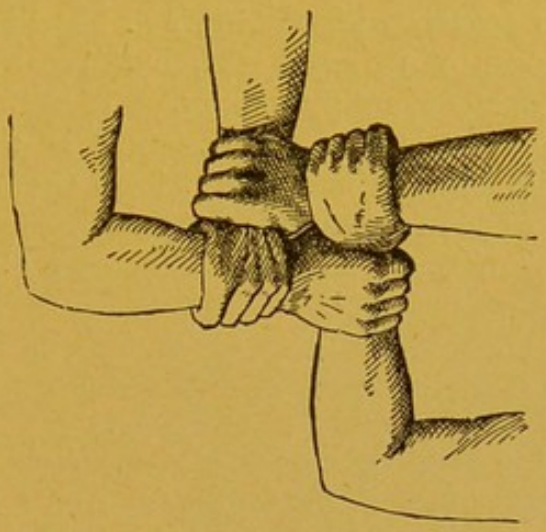
bundles of straw, or rulers may do. If possible they should be padded with old rags, handkerchiefs, hay, moss, stockings, etc., and then bound round with ribbons, strings, braces, handkerchiefs knotted together, etc., so as to make them fast. The main point is that the whole should be firm, and that the patient should be transported before the swelling consequent upon the extravasation of the blood becomes very great, and placed in the hands of a medical man.

The transport is often an important matter. In severe fractures of the spine, and in cases of compound fractures with exhausting loss of blood, it is often best not to attempt to carry the patient, but to obtain the nearest vehicle. Unfortunately circumstances may occur that make this impossible, when it becomes absolutely necessary to carry the patient at least some part of the way.

Simple transport of a wounded man.

Under these circumstances it is often necessary to make use of all kinds of devices. The simplest and most natural litter is made by laying the hands together in the manner showed in the illustration, the injured man sitting on them and placing his arms around the necks of the men who carry him. A strong bough of a tree can also be used in the manner shown in the illustration, until some better means of transport can be procured, for which handbarrows, ladders, and hand-trucks may be used in case of necessity.

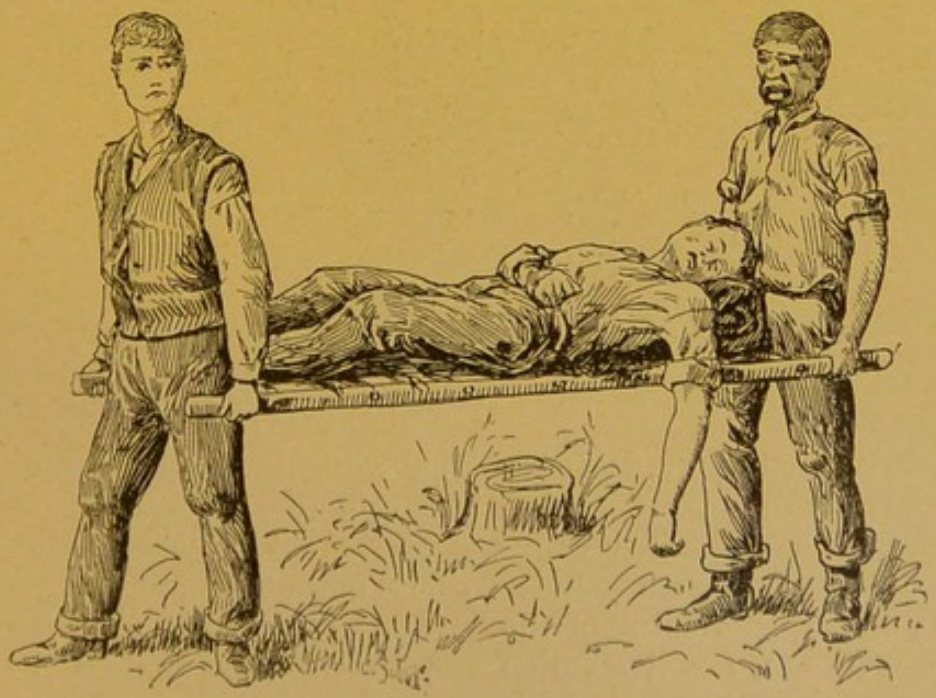
The patient must be carefully lifted, and the injured limb meanwhile supported. The bearers should walk slowly, and with small steps, so as to give the patient as little pain as possible. The injured limb



Simple seat for transport of a wounded man.

must be supported, and may be put into a damp cold pack until the medical man arrives.

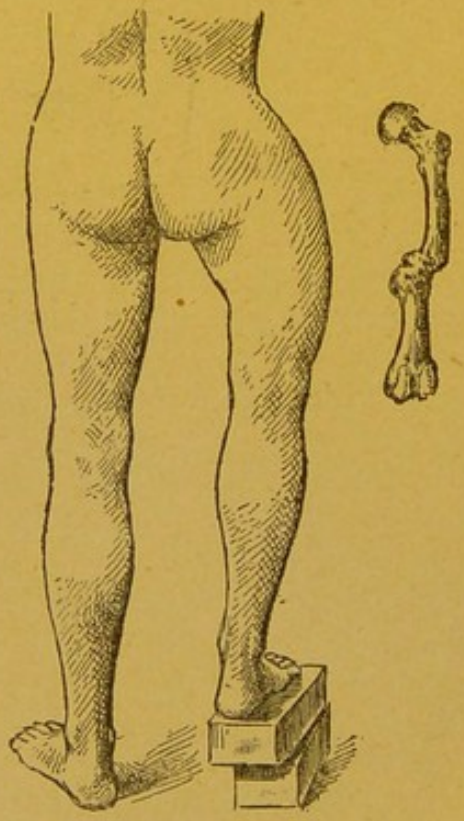
In compound fractures with open wounds, after the removal of the



Simple transport of a wounded man (ladder).

clothes, a damp clean wad should be as soon as possible placed upon the wound, and the whole be well wrapped up in clean linen. The bandage should *not be changed, nor the wound cleansed except by a medical man*, if there is any prospect of obtaining professional assistance.

The healing of the fracture will take more or less time according to its nature. It may occupy a few weeks, but a case of comminuted fracture will take considerably longer. The thing of principal importance for the setting of the fracture is a proper dressing, performed by a medical man, which will keep the broken ends of the bone as close as possible to each other. In these cases there is often a slight shortening of the limb (from a quarter to half an inch) but



Badly healed fracture of the femur (marked shortening).

this is without importance for the subsequent use of the limb. On the contrary the accompanying illustration of a femur in which the broken bone has reunited with one portion by the side of the other must be regarded as a completely false and unsuccessful result, producing a great shortening of the limb and consequent lameness.

In conclusion, I will mention one more point. Formerly, I often found, when treating cases of fracture, that the patient or his friends were very anxious that some solid dressing (plaster of Paris, "water-

glass," &c.) should be placed upon the fracture, and were inclined to regard as negligent the medical man who did not regard a solid dressing as a thing of primary importance and proceed accordingly.

Now there are many cases of fracture which are accompanied with such copious swelling and interior bleeding that it would be altogether a mistake, to immediately place a solid dressing upon them, as the subsidence of the swelling must be awaited. It can be hastened by complete rest, and damp, cold packs.

But it is not at all necessary to treat all fractures with solid dressing. Thus, for instance, fractures of the ribs heal without any dressing. In these cases the muscles themselves, and adjoining parts, take the place of any setting. The very common cases of fracture of the collar bone require nothing more than support and the drawing back of the upper arm, which is accomplished by the use of a bandage.

The subsequent treatment of a fracture is sometimes longer than the treatment of the actual fracture itself, and requires massage, passive exercise by means of machinery, and orthopœdic measures. These are particularly necessary when joints have been affected, and stiffness of the joint threatens to ensue.

After fractures we may dedicate a few words to dislocations. I have explained their nature, and pointed out that the dislocation is always connected with a tearing of the synovial capsule in consequence of which a dislodgement of the previously articulated joints becomes possible.

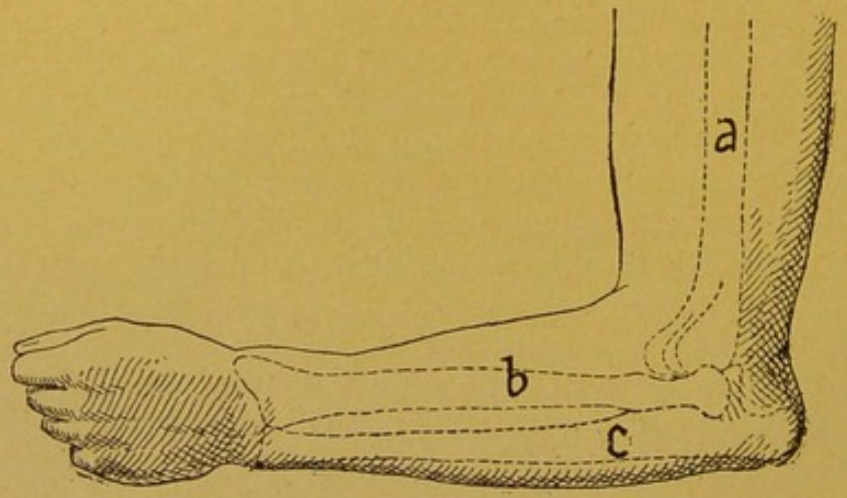
As in fractures so also in dislocations, some sudden violence, and generally an excessive strain placed upon the joint, is generally the cause of the mischief. For this reason dislocations most often occur in those joints which can be affected by a sudden blow upon the hips or the shoulders, and not seldom upon the hands.

If the bones that form the joint, notwithstanding the tearing of the synovial capsule, still remain partly in contact, we call this a partial dislocation. The mildest form of dislocation is described as spraining. By this we understand those cases of injury of the joints in which the synovial capsule and the ligaments have become torn in consequence of excessive strain, but the articulation of the bones has not been affected.

An extravasation of the blood in consequence of the tearing of the vessels is necessarily connected with all these dislocations. In cases of sprain the patient can still use the injured joint, but not without pain. In the case of complete dislocations the joint can be no longer used. Painful swelling rapidly ensues, making effectual treatment necessary, the more as branches of nerves are not seldom pressed upon

by the dislocated head of the bone, in consequence of which severe paralysis may ensue.

I purposely abstain from here entering into the very different kinds of dislocations, and from describing the various methods of treatment by which the *reduction* of the part is affected, and its *retention in position* assured by bandages. And I must add a distinct warning against attempting to remedy a real dislocation. To do so requires exact anatomical knowledge, and many a patient has had to regret entrusting a dislocation to some quack instead of going at once where proper



Dislocation of the elbow-joint.
A, humerus; b, radius; c, ulna.

assistance can be immediately found, that is to say, to a medical man.

If a dislocation has existed for some time, adhesions often make reduction very difficult, and only possible with difficulty under chloroform. For this reason I must strongly advise that medical assistance should be procured as soon as possible.

But it is another thing to know what can be done before the medical man arrives, and what are, directly after the accident, the best means of mitigating the pain and of guarding against further dangers.

The advice to be given may be expressed in three words—*cold*, *rest*, *support*. Particularly in the cases of sprain of the wrist or ankle, which are very common, it is advisable to apply cold compresses as soon as possible, and to rest the injured limb either in a sling or in bed, The blood is then soon absorbed, and the power of using the limb will increase daily with the diminution of the pain.

If bandaging, which assists the undisturbed healing of the injured synovial capsule, is necessary after a sprain, after the removal of the

bandage massage is often necessary, or slow passive movement of the joint either under the hand of the medical man or with special apparatus. In the case of sprains of the foot accompanied by great extravasation of blood, fixed bandaging is often necessary.

Inflammations of the joints, frequently claim our attention either in acute or chronic forms. To understand them rightly it is necessary to understand that the joint is not formed of a single tissue, but that several are combined to make a joint, and that they can all be the localities of inflammatory processes. It may be the bone itself, or the cartilage covering the jointed end, or the synovial membrane that is involved.

In order rightly to diagnose any disease of the joints it is most important to investigate the cause of the inflammation. To mention an example, an inflammation of a joint caused by a wound not only requires a treatment quite different from a white swelling occasioned by tuberculous corrosion of the bone, but quite different conclusions must also be drawn respecting the course and the final results of the malady.

To say a few words about the principal causes of the many kinds of inflammations of the joints, I may begin with a malady of the joint caused by a wound penetrating the synovial capsule. The inflammations almost always present symptoms of infection with purulent microbes, which, in a short time change the *synovia articulorum* into a purulent mass, and produce fever, pain, and a temporary complete uselessness of the joint.

The most important things to be remarked about these inflammations of the opened joint are, first of all that from the first moment complete rest for the joint is best secured by a proper splint and bandages. Next great care must be bestowed upon regularly washing out the cavity of the joint with disinfectants. After the purulation is over, the next thing is that the synovial capsule should heal as soon as possible. Bandages holding the joint in position are for a long time necessary, notwithstanding the danger which they involve of producing a temporary stiffness, which must be afterwards overcome by methodical exercise.

Every inflamed opened joint demands of course professional medical advice and assistance. The sooner these are obtained the greater are the prospects of a rapid cure.

Two other forms of inflammation of the joints, gout, and acute rheumatism of the joints (with particular reference to the occurrence of this malady in childhood) have been already discussed in other parts of this work.

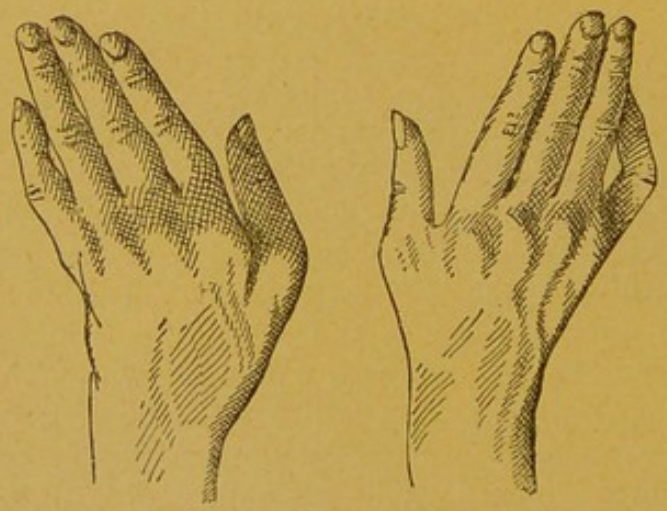
We are pretty well acquainted with the nature of gout—which I have already described. Respecting that of rheumatism of the joints opinion is still divided.

Rheumatism of the joints in adults begins with symptoms nearly the same as those described on page 115. But all the indications of the malady are by far more violent in the case of adults than in childhood; and adults show a particular proclivity of the organism to recurrence of the disorder. This makes it seem probable that in addition to the invasion of some unknown infectious germs there must be a favourable base for them—perhaps an imperfection in the quality of the blood.

The treatment of rheumatism of the joints in childhood has been described on page 117.

In the case of adults, if the inflammation is acute, salicylic acid (best given in the form of sodium salicylate) has decisive effect. It is important not to give small doses at first—15 grains every three or four hours, excepting from midnight until morning. If dizziness sets in after the use of the remedy, with singing in the ears and nausea, antipyrin must be tried—three times daily.—Absolute rest in bed, with encouragement of perspiration by warm drinks, not only checks the inflammation, but also mitigates the pain.

Water treatment is generally a failure in cases of acute rheumatism of the joints. There can be no objection to luke-warm compresses, as



Alterations of the joints in consequence of chronic poor man's gout.

they give many patients a feeling of relief; but they exercise scarcely any influence over the duration of the malady.

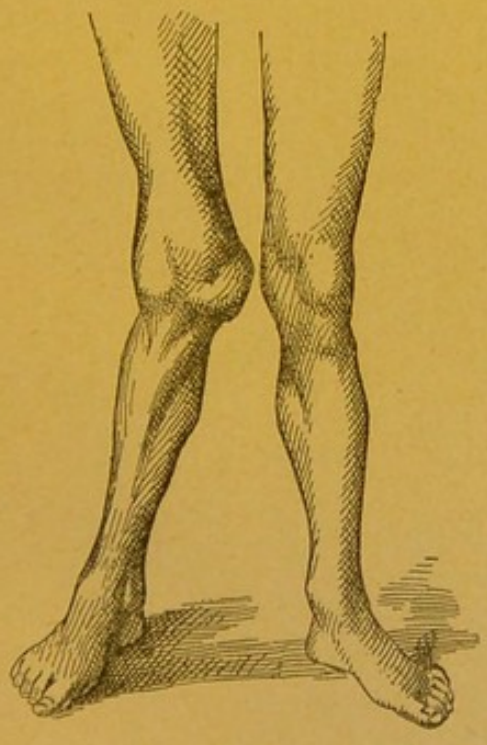
Chronic rheumatism require great application of warmth, either in a

dry form (warm sand-baths, light baths), or warm baths, of which mud-baths have acquired a great reputation.

External rubbing with various liniments is useful, particularly if accompanied by massage. Exercise of the parts affected is invariably accompanied by good results.

That climatic influences have much to do with causing various forms of rheumatism is a fact proved by experience. Particularly chronic forms of rheumatism developed by old people and in the lower classes, for which reason they are called "poor man's gout," are so dependent upon the weather that the patients (like those who suffer from rheumatism of the muscles) might be called walking barometers —as they can tell constantly from the diminution or increase of their pain, and from their ability to move, whether good or bad weather is coming.

Chronic rheumatism of the joints and of the muscles cannot be always clearly distinguished. They often pass into each other, which can be easly explained by the close connection of the muscles with all the movements of the joints.



Knee joints altered by rheumatism of the joints.

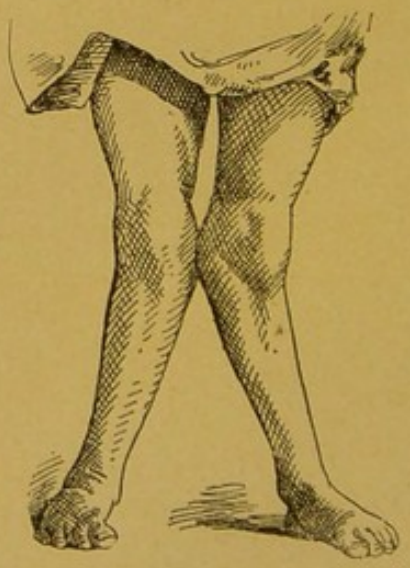
In many cases long lasting attacks of rheumatism of the joints terminate in peculiar alterations of their forms, and crippling malformations. The joints of the hands and of the legs are particularly exposed to these. These disfiguring forms of chronic rheumatism of the joints are undoubtedly connected primarily with gradual inflammations of the synovial membrane of the joint, with subsequent new growths of masses of cartilage and bone which proliferate into the joint, and, in the course of time, so deform the joint that it becomes completely stiff and useless. Warmth and movement are here the only means of opposing so far as that is possible the progress of the malady. But in seeking cure in exercise medical advice must be taken, so that there may be no danger of over-fatigue or of straining the joint, which would make matters worse.

I will not leave unmentioned two particular forms of chronic affection of the joints, that produce alterations of neighbouring portions of the legs, and may become practicallya question of great importance to the patient if he does not make an effort to check teh malady at its beginning. These are what are called knock-knees and flat-foot.

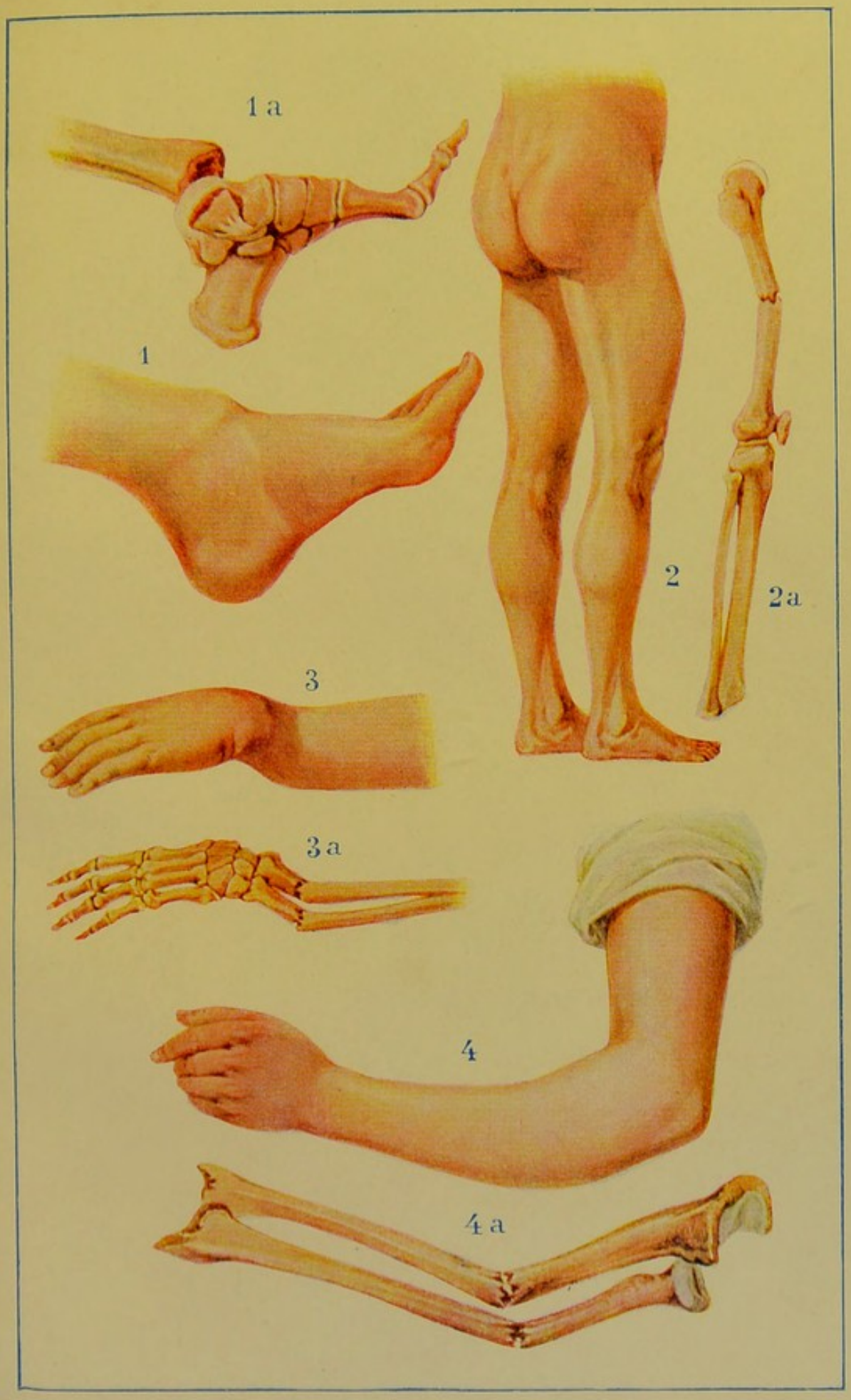
Both forms of the disease mustbe regarded as results of excessive fatigue and stretching of the ligaments, and both knock-knees and flat-foot (apart from congenital cases, which do not here concern us) occur most frequently in childhood, and with patients who standfor long periods.

The shape of knock-knees is well known. In Germany these are called "baker's knees," because bakers are very liable to them, as they frequently stand for hours kneading at the kneading trough, and to relieve the feeling of fatigue rest their knees against each other. The consequence of this is (as anyone may easily discover for himself if he will allow the weight of his body to rest upon the inner sides of his feet) a relief of the inner edges of the knee-joints. This, in consequence of the stronger growth of the relieved joints gradually leads to a permanent angular fold. Others besides bakers may of course suffer from the same malady, who are compelled to stand still for a long time, and in consequence, partly from habit, and partly in consequence of fatigue, rest the body on the inner sides of the feet. I have several times met with cases of knock-knee in waiters so severe that they were compelled to change their calling.

The treatment. It may sometimes be easy for the medical man to order rest, and difficult for the patient to obey, if he has an employer who is resolved that those under him shall not have a moment's rest. Under these circumstances a rigid upright position of the body firmly rested upon *the whole* of the soles of both feet is best for the patient. Knee pieces made of hempen netting interwoven with india-rubber are excellent for supporting and strengthening the knees. They should be made to measure to fit the patient, and can be obtained from any truss-maker. In severe cases solid bandaging by a medical man is necessary for the corrected position of the knees.

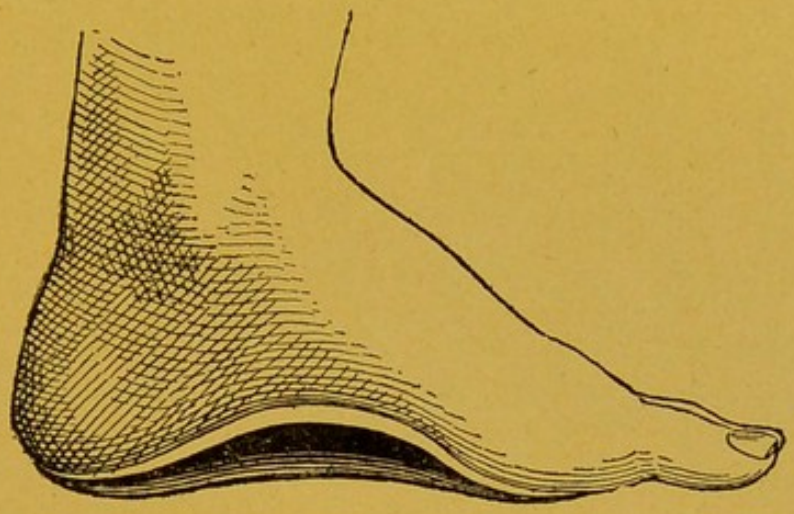


Knock-knees.



1. 1*a* Fracture of the ankle immediately above the right foot.
2. 2*a* Fracture of the right thigh.
3. 3*a* Fracture of both bones of the fore arm in the lower third.
4. 4*a* Fracture of both bones of the fore arm in the middle of the fore arm.

Flat foot, the second of these maladies produced by fatigue with a sympathetic affection of the joints, is almost more troublesome, and also much commoner than knock-knees. It also is generally developed in persons who have to stand a great deal and allow the whole weight of the body to rest upon the hollow of the foot. Clerks who write standing at desks, saleswomen, and also in particular waiters, suffer



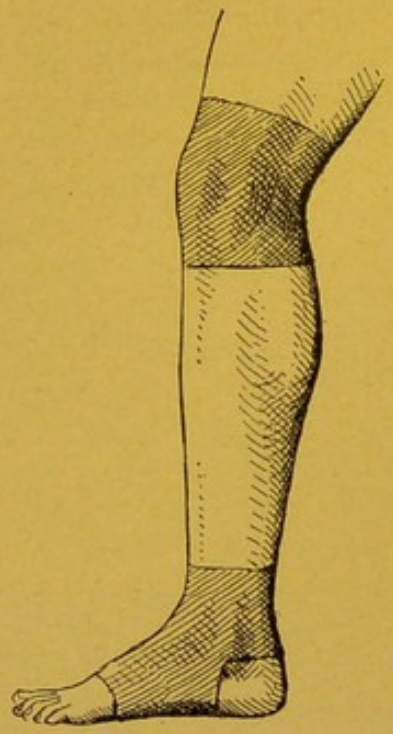
Flat foot with spring padding underneath.

much from this very common malady. Sweaty foot often associates itself with the malady, which then naturally becomes more troublesome and disagreeable to the patient.

The treatment. As the symptoms of the malady are fatigue, pain, and excessive perspiration, a flattening of the hollow of the foot and lower surface of the foot, the first thing must be to afford the hollow of the foot a support which may prevent its collapse.

Such a support is excellently furnished by *flat foot-pads* of solid india-rubber or celluloid, which have more recently been provided with a spring, and by an ingenious contrivance can be fixed in the shoe in such a manner that they do not slip. They can be obtained at a reasonable price from any trussmaker. Also foot-pieces made of hempen netting interwoven with india-rubber, such as are used in the water treatment of sprains of the ankle, are very serviceable, and are to be recommended in the early stages of flat-foot, as they retard the fatigue.

Tuberculous inflammation of the joints, with which I will conclude my remarks upon the diseases of the bones and joints, begins almost without exception in childhood, and is characterised like tuberculous diseases of the bones by a slow protracted course, and almost always



Knee-piece and heel-sock, with interwoven india-rubber.

shows its first scarcely perceptible symptoms only after it has existed for many months.

The nature of the disorder may be briefly described as follows: The tuberculosis bacilli which have invaded the joint first of all occasion the well-known nodulous new growths and proliferations, which afterwards break down and change the whole joint into a yellowish fatty mass, gradually disorganising the joint and the neighbouring parts of the bone. In the course of time the pus in the joint breaks its way outwards through a fistula. After this both the course of the disorder and its surgical treatment resemble exactly those of tuberculous inflammation of the bones.

It is difficult to determine why, of all the joints, the tuberculosis bacillus should most often attack the knee (pulpy degeneration of the knee joint) or the hip. Such is however the case, and the commencement of the malady (generally occurring in poorly developed, scrofulous children) always shows itself first in the form of *fatigue after slight exertion, unwillingness to walk, pain in case of standing for any time, dragging the affected limb, and limping.*

If the child is at once placed under medical treatment, and should the medical man rightly guess the still latent mischief, rest and repose of the affected joint, permanent fixed bandages, and strict rest in bed, favour cure without any shortening of the limb or functional disturbance. Unfortunately, many parents pay small attention to "a little limping," until the patient is compelled to take to his bed, because the affected limb has become useless.

Though the medical man has now to deal with a much more difficult problem, still tolerably favourable results may be reckoned upon if the parents have sufficient sense to allow the affected joint to be immediately opened, if abscess has formed, and an exit provided for the pus. Naturally, the malady has a long course, and requires, not only on the part of the medical man and the patient, but also on that of the parents, great patience to make the long period of confinement in bed endurable to the child.

CHAPTER XVI.

First Help in Accidents.

In a great number of accidents, such as unhappily happen every day, it is often a matter of life and death that someone shall be capable of affording the victim first help whilst the medical man, who may be at a distance, is fetched.

For this reason I have already, on various occasions, mentioned in previous chapters, what may be done to assist the victim of an accident; and have already given directions for first help in cases of of frost bites, burns, wounds, and fractures—all accidents very liable at any moment to occur to working men from various causes. But the number of possible accidents is so great that it seems absolutely necessary to mention them together in a chapter on "first help," and

First Help in Accidents. Broken Ice.

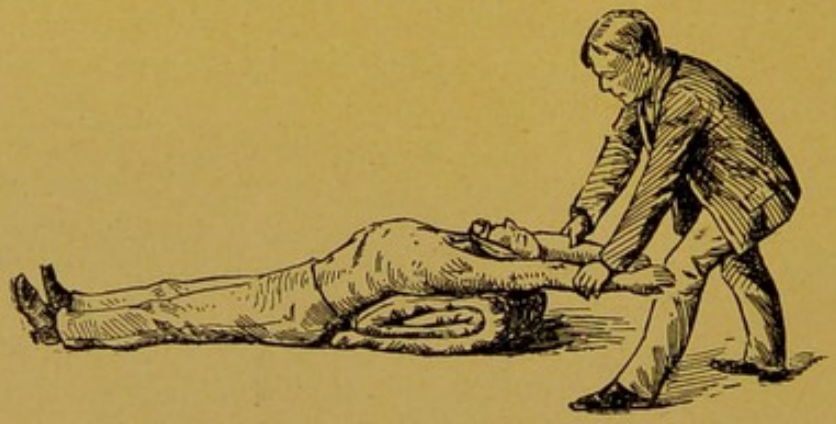
to give some general advice respecting the assistance that may be afforded.

Unconsciousness may be mentioned first. This unsciousness may be of different degrees. Sometimes, after a sudden shock, a transient weakness of the heart ensues with a fainting fit, that passes without any assistance; and in severer cases, on the contrary, a long faint may ensue, or even apparent death—every external symptom of life disappearing, and neither respiration nor beating of the heart being perceptible.

Here our first point is to distinguish apparent death from actual death; and whenever it is possible to reanimate the sinking organism.

The best method of restoring the action of the heart and the respiration is what is called artificial respiration. The different methods of proceeding all aim at the same thing, by an artificial

Artificial respiration after Dr. Silvester.



I. Raising the arms.

II. Laying down the arms.

distention and compression of the lungs to draw the external air into them and then expel it.

The method of Dr. Silvester represented in the accompanying illustrations is the best for unprofessional hands. The patient, after his clothes have been removed from the upper part of the body, or at

least loosened, should be laid down in the manner represented. The mouth should be first examined, as it sometimes, in cases of accidents in the water, contains mud, and if necessary cleaned. The tongue should be drawn forwards. It is best held by a third person if it cannot be fastened in the manner represented.

If only *one* person is able to help he should place himself behind the head of the patient, and take both the arms just above the elbows·

The artificial restoration of respiration after rescue from water, when two persons are able to assist. Drawing back the arms to produce inhalation.

Ditto. Pressing the arms to the sides to produce exhalation.

He should first draw them both simultaneously upwards and backwards till they are above the head of the patient, and then should bring them back downwards, for a moment holding them close to the patient's sides and pressing them against them, so as to favour the

issue of the air from the lungs. The process is best performed by two persons, one on each side, holding the corresponding arms of the patient and raising and lowering them simultaneously. The more regularly and accurately these movements are continued the sooner is the desired result obtained. But I must mention that it is often only after hours of continued laborious exertion that an independent respiration on the part of the patient is observed. The victory is then generally won, and a moment's rest may be taken, as the patient after beginning to breathe almost always succeeds in effecting for himself an increased action of the chest, until he at last opens his eyes with a soft sigh, and returns to his long lost consciousness.

Here, before proceeding further, I will add another remark. The more judiciously and quietly the help is given the more likely it is to prove successful. All running hither and thither, crying and lamenting, does the patient no good at all, and only produces confusion.

In cases when no idea can be formed of what ought to be done to assist the patient, some one should hurry off instantly to the nearest medical man, whilst others occupy themselves with loosening the patient's clothes, putting him into a warm bed, stopping the bleeding, or attending to anything else of immediate consequence—but quietly and with presence of mind, as otherwise more harm will be done than good.

Drowning. After the man has been brought out of the water he should be brought, if possible, into the nearest locality sheltered from cold, wind, and weather. The *clothing of the upper part of the body should be either loosened or removed; the mouth opened and cleaned*, and Dr. Silvester's *method of promoting artificial breathing*, as above described, *immediately commenced.* In the meanwhile some other person should *immediately go to procure medical assistance.*

If the patient's face is bluish-red and swollen, like that of a suffocated man, so that it may be assumed that a considerable quantity of water has got into the trachæa and lungs (in such cases froth and foam is generally observed in the mouth) *before* beginning artificial respiration, the patient may be laid for a few moments on his stomach in such a manner that his mouth laid upon the ground may be lower than his stomach and his lungs; upon which considerable quantities of water are frequently emptied out of these two organs. The plan formerly often used of first standing the patient on his head, and forcibly compressing the stomach and lungs is to be avoided.

Whilst artificial respiration is indefatigably carried out (best with one one calling the time aloud), another person may rub the chest

and soles of the feet of the patient with a brush. It is also a good plan to strike the breast smartly with a wet cloth.

The frequently recommended remedies of tickling the nose with a feather, or stimulating it by strong smelling essences, or by snuff blown in, may be neglected without hesitation—but the artificial respiration must not be intermitted for a moment. If the labour is crowned with success, and respiration slowly reappears, the next most important thing is to stimulate the heart's action. For this purpose the patient should be well rolled up in warm coverings, under which his limbs must be rubbed and stroked.

If the patient is able to swallow, small quantities of warm tea, coffee, grog, milk, &c., are very helpful. But only quite small amounts should be given, and the mistake avoided of offering too much to the stomach only just reawakening to life.

Sunstroke in hot summers is not rare in the case of persons who are compelled to labour in the open air during the scorching heat of midday, or to march under similar circumstances (military manœuvres) without being able to protect themselves against the drying of the tissues, either by drinking water or by cooling the skin. The patient after experiencing fatigue and dizziness has a small pulse, accompanied by reddening of the face, and then suddenly drops down insensible.

The patient should be immediately carried into the shade; all tight clothes should be loosened, and the face, neck, and breast cautiously sprinkled with cold water. A damp cloth should then be laid upon the neck, and another on the head.

If the patient can drink he should be allowed to drink a considerable quantity of water by a little at a time. If the unconsciousness on the other hand continues artificial respiration must be begun.

Alcoholic drinks must be given with caution, and only by drops.

Suffocation may result either from inhalation of injurious gases (smoke from stove-valves closed too soon; coal gas from leaky tubes; carbonic acid; drain gas, &c.), or from foreign bodies entering the trachæa and mechanically impeding the entrance of the air into the lungs (too large mouthfuls, pieces of bone, playthings drawn into the trachæa of children, &c.).

In all these cases the cessation of the respiration causes an accumulation of carbonic acid in the lungs, and an overloading of the blood with that gas. Death must ensue in a short time if immediate assistance is not given.

The treatment must be different, according to the nature of the cause of suffocation. When the patient is suffering from the effects of

injurious gases the first thing is to get him into the open air. After that artificial respiration must be resorted to, during which the uncovered breast and face may be sprinkled with cold water.

In case of suffocation being due to the presence of foreign bodies in the trachæa, the treatment is altogether different. The important thing in these cases is to get hold of the foreign body—often high up in the trachæa, and no hesitation should be felt about putting the finger into the patient's mouth to try to help him. The patient should be held tightly by the nose (closing the nostrils) with the left hand whilst he opens his mouth, and a effort is made to seize the foreign object quickly. Not seldom the mere introduction of the fingers produces so great an irritation that the foreign object is ejected with a few violent chokings and coughs.

In very serious cases trachæotomy must be performed by a surgeon.

Hanging. In cases of attempted suicide by hanging broken neck is much rarer than suffocation in consequence of the accumulation of carbonic acid from constriction. The first thing to be done, therefore, to rescue the victim is either to loosen or cut the cord by which the neck is constricted. The patient should then be laid on the ground with his breast uncovered and somewhat raised, and artificial respiration be continued unremittingly until a medical man (who should be instantly sent for) either reports life extinct or continues the attempt to restore consciousness by the artificial respiration.

Poisoning. It is well known to everyone that there are a number of substances which can be introduced into the human organism only in very small quantities without proving injurious to it, or even fatal.

We call these substances poisons, and the condition which they produce in the organism poisoning. And here I must call attention to the fact that a number of our ordinary articles of diet are poisonous if we take too large a quantity of them. A great many also of our commonest medicines act beneficially and usefully only so long as they are taken in approved quantities; but produce serious symptoms of poisoning so soon as this quantity is exceeded.

The effects of different poisons are as manifold as their number and their nature. Sometimes their effect is caustic (to this class belong the acids and alkalies, also corrosive sublimate, arsenic, oxalic acid), sometimes they numb the central nervous system and produce cramps or convulsions, weakness of the heart and unconsciousness (opium, hemlock, digitalis), sometimes they strike men down in an instant (potassium cyanide, prussic acid), sometimes they produce chronic injuries to health, as we have already seen in the case of lead poisoning of painters, type compositors, and printers; to say nothing of those

devastating and yet willingly and deliberately taken poisons—tobacco and alcohol.

Accidental poisoning may result from drinking acids and alkalies by mistake, from eating poisonous plants (the most important of which I place before the reader in illustrations), from bites of mad dogs, &c. In all these cases first help has to pay attention to two things—first of all to remove the poison from the organism as quickly and as completely as possible, so that it may develop no further poisonous effects—and if the poison cannot be removed to render it as soon as possible harmless.

In the greatest number of cases of poisoning the poison gets first into the stomach. In consequence it follows as a matter of course that in all these cases an attempt will be made to produce vomiting as quickly as possible by giving an emetic. The emetic must be suited to the age of the patient, and can be procured from a chemist ready for use, and with directions how it should be used. But there are many poisons that allow of no loss of precious time for a visit to the chemist; and in cases of poisoning with these something effective must be given at once if the patient is not to be exposed to the gravest danger of death.

It is very important to know that the acids and alkalies neutralise each other, so that they have the effects of antidotes: in consequence, in cases of poisoning with them, the elementary rule is—

If strong acids have been swallowed the patient should be given alkalies dissolved in water to drink (soda water, soap and water, lime water, potassium water, &c.)

If alkalies have been swallowed give acid drinks (vinegar water, sour pickle fluid, &c.)

In almost all cases of poisoning it is also advisable to envelop the poison in the stomach as much as possible, or to dilute it. The former purpose is effected by oil, white of egg, thin paste, water-gruel, &c.); for diluting the poison drinking milk may be recommended.

As it is important that help should be given as soon as possible, and each poison requires to be treated in some special way, I here subjoin (as it seems impossible to discuss every single poison) the commonest forms of poisoning, their chief symptoms, and the first help that should be given, in alphabetical order. But I must add, most emphatically, the warning that a medical man must be invariably immediately sent for, *with an intimation of what has happened*, so that he may bring with him the necessary instruments (stomach pump) and antidotes.

Poisoning with	Symptoms.	First Help.
Alcohol.	Complete unconsciousness. Vomiting. Cold perspiration. The patient smells of alcohol.	Cold douches. Stomach pump.
Arsenic (also in the form of rat poison).	Violent vomiting. Pains in the stomach. Dark diarrhœa. Blood in the urine. Feeling of distress. Loss of sight.	Stomach pump. Emetics. Milk. Sugar and water. White of egg. Antidote, magnesium sulphate.
Atropin.	See deadly nightshade.	
Belladonna.	See deadly nightshade.	
Carbolic acid, taken internally.	Severe pain in the mouth and stomach. Cauterisation of the mucous membrane. Unconsciousness. Dark urine. Small pupils.	Emetics. Stomach pump. White of egg. Lime water. Sulphate of soda. Oil.
Carbon monoxide gas.	Unconsciousness.	Artificial respiration. Fresh air. Ammonia to nostrils.
Deadly Nightshade. Belladonna. Atropin. and Thorn Apple: Datura Stramonium.	Dilation of the pupil. Disturbance of the power of sight. Hurried respiration. Delirium. Gait unsteady. Dryness in the mouth. Violent thirst. Paralyses.	The treatment of poisoning with deadly nighshade, stramonium, and henbane is nearly the same. First, thorough emptying of the stomach should be effected. Then black coffee or tea should be given, or stronger stimulants.
Digitalis (Foxglove).	Diarrhœa and vomiting. Tenesmus. Slow pulse. Convulsions. Deafness.	Stomach pump. Emetics—then stimulants.

Poisoning with	Symptoms.	First Help.
Ether.	Severe unconsciousness. Smell of ether in patient's mouth.	Fresh air. Mustard plaster on region of heart. Artificial respiration.
Fungi.	Vomiting. Serious indisposition. Diarrhœa, with colic of the intestines. Stupor. Weakness of the heart. Delirium.	Purges and emetics. Stimulation of the skin (mustard plaster) and internal stimulants (black coffee, wine). Antidotes.
Hemlock.	Weakness of legs. Staggering—loss of power in all voluntary muscles. Loss of sight. Inability to swallow. Paralysis of respiration. Asphyxia. Death.	Emetics. Black coffee and brandy. Artificial respiration.
Henbane.	Delirium. Dilation of pupil. Spasms. Convulsions. Convulsive respiration. Unconsciousness.	Emetics. Stimulants. Artificial respiration.
Lead (sugar of lead, white lead).	Colic of the intestines. Pains in the limbs. Cramp in calves of legs. (Most lead poisonings are chronic).	Emetics. Purges. Sulphate of magnesia. Warm packs.
Mad dog bite.	Ten to sixteen days after the bite: low spirits, spasms in swallowing, great sense of oppression. Salivation. Hoarseness. Paralysis.	Ligation of locality bitten. Squeezing out contents of wound. Cauterization with strong acids or burning. Innoculation according to Pasteur's prescription.
Meadow saffron.	Diarrhœa and vomiting. Convulsions. Delirium.	Stimulants. Coffee. Wine. Emetics, unless the patient vomits freely without them.

Poisoning with	Symptoms.	First Help.
Mercury (sublimate).	*Acute.* Violent vomiting. Colic. Dark, bloody diarrhœa, with tenesmus. Stupor. Salivation.	Emetics, beaten up with white of egg. Antidote. Hydrated sulphide of iron.
	Chronic. Salivation. Ulcers in mouth. Paralysis. Quivering. Pains in the bones.	Iodide of potassium. Care of the skin.
Mineral acids (sulphuric acid oxymuriatic acid, nitric acid)	Burning pains. Cauterisation and burning of the mucous membrane of the mouth. Vomiting dark masses. (Unconsciousness in severe cases.)	*Alkali.* Magnesia. Milk. Weak soap and water. Pounded chalk in water. *Drink much* (note that poisoning with these acids can weeks afterwards produce constriction of the upper digestive canal in consequence of cicatrices).
Morphium (opium).	Deep unsciousness (stupefaction). Paralysis. Contracted pupils. Pallor.	Stomach pump. Ice compresses on head. Mustard plaster on heart. Black coffee. Warm foot bath. Emetics. Keep patient moving and awake.
Muriate of copper.	Colic. Tenesmus. Vomiting. Convulsions.	White of egg. Water. Magnesia. Milk. *Avoid oils and fats.*
Nitric acid.	See mineral acids.	
Oxymuriatic acid	See mineral acids.	
Phosphorus (matches, rat poison).	Violent vomiting, with a smell of garlic.	Emetics, or stomach pump. Magnesia. Mucilaginous drinks. *Milk, white of egg, and fat to be avoided.*

Poisoning with	Symptoms.	First Hesp.
Snake bites.	Severe pain. Rapid swelling of the dirty discoloured locality of the bites. Dizziness. Trembling of the muscles. Difficulty in breathing. Stupor. Delirium.	Sucking the wound. Ligation above the wound (i.e., nearer the heart). Free use of alcoholic drinks. Injection. Ammonia.
Sorrel salt.	Cold perspiration, vomiting. Convulsions.	Lime water. Pounded chalk in water.
Stings of insects.	Severe pain. Swelling of the part bitten and inflammation.	Removal of the sting. Cold compresses with lead lotion, or acetic acid. Fuller's earth solution.
Coal gas.	Unconsciousness.	Artificial respiration. Fresh air.
Sulphuric acid.	See mineral acids.	
Zinc or tin preparations.	Continuous vomiting, nausea, diarrhœa.	Milk. White of egg. Soda water. Stomach pump.

CHAPTER XVII.

New growths and tumours

It is an interesting but regrettable fact that all the elements of the human body, ultimately in every case composed of cells—whether muscular tissue, or bone substance, or glandular forms—are, under the influence of irritations imperfectly understood, subject to pathological growths. These growths are described according to their results, very different in form and significance, as new growths and simple tumours.

It is often observed that in many cases external mechanical irritations lie at the base of these new growths. The process of the healing of wounds with the formation of granulating papillæ, and the formation of a callus after fracture of a bone, which we have already described, show us plainly that the tissues immediately reply to a mechanical irritation by a new growth of cells. But how a completely sheltered gland—the thyroid gland immediately suggests itself—can develop an excessive growth and become a goitre; or in what manner climatic influences, pregnancy, and heredity can exercise a definite influence over pathological proliferations and new growths is still a riddle to us. Its solution, when we reach it, will indicate an enormous advance in medical science.

It will be self evident to anyone that the form and situation of tumours must be very manifold when it is remembered that sometimes the external skin, sometimes a gland, sometimes a bone, sometimes a nerve may be exposed to unnatural growth. And in fact we meet with flat and globular thickenings externally visible (and by no means ornamental), and tumours in various parts of the internal portions of the organism, particularly in the female abdomen and its organs, which are so frequently the locality of various new growths, that quite one third of all female disorders are to be referred to this cause.

If the tumour is of an external kind, does not change its place, does not exceed certain dimensions, and does not expose its possessor to

any serious danger—or if, though it is internal, it is of importance to health only in so far as it may by pressure affect neighbouring organs, we call these *benignant new growths.* There are however, unfortunately, also *malignant new growths*, which in consequence of their rapid and constant development weaken the strength of the body, and in consequence of their disturbance of neighbouring organs can be very dangerous. Especially in consequence of purulent decay, and of transferance by the circulation, they can appear in new localities, and prepare fatal consequences, if it is not possible quite at the beginning to extirpate the destructive tumour completely (sarcoma and carcinoma).

Any attempt to describe one by one the numerous different kinds of tumours, and to explain in detail their import and treatment, would far exceed the limits of this work. It is better to say briefly that the surest and best way of cure is the earliest possible surgical removal of the new growth whether benignant or malignant.

A benignant tumour which on account of its external situation and unimportant size causes the possessor no particular inconvenience, need not, it is true, be operated on. But internal tumours or malignant new growths *must be immediately surgically removed. There is practically no other prospect of cure.*

I consider it important that the general public should be acquainted with the principal forms of malignant new growths. This will prompt the patient to go at once to a medical man, and not to lose valuable time with such almost incredible indifference, as I have often encountered in cases of women suffering from advanced cancerous new growths on the breast or abdomen. I shall therefore mention here the most important particulars respecting sarcoma, and carcinoma, adding at the same time a serious warning on *no account ever to entrust malignant growths to anyone except a professional medical man!*

Sarcoma is a new growth of connective tissue, abounding in cells, of soft flesh-like nature. Next to carcinomatous tumours it is the commonest form of tumour and can be developed anywhere where connective tissue exists.

According to the form of the cells of which the new growth consists we distinguish *round-cell sarcoma* (mostly in the muscles, on the jaw, and the periosteum), *spindle-cell sarcoma* (mostly on the short bones), and *giant-cell sarcoma* (mostly on the tubular bones and jaws). But a sarcoma in which one form of cell alone exists is rare; and all the above named forms of cells are often found in a single tumour.

Sarcoma is also further distinguished according to its locality and nature. So we speak of *pigment cell sarcoma*, mostly on the exterior

skin; *hollow sarcoma*, or *cystic sarcoma*, which contains a cavity, also of *sarcoma of the glands, of the vessels, &c.*

All these forms of tumours are malignant and dangerous. Wheresoever they develop themselves they grow with excessive rapidity, and they may press through the surrounding tissues (which they disturb) if they cannot press them aside.

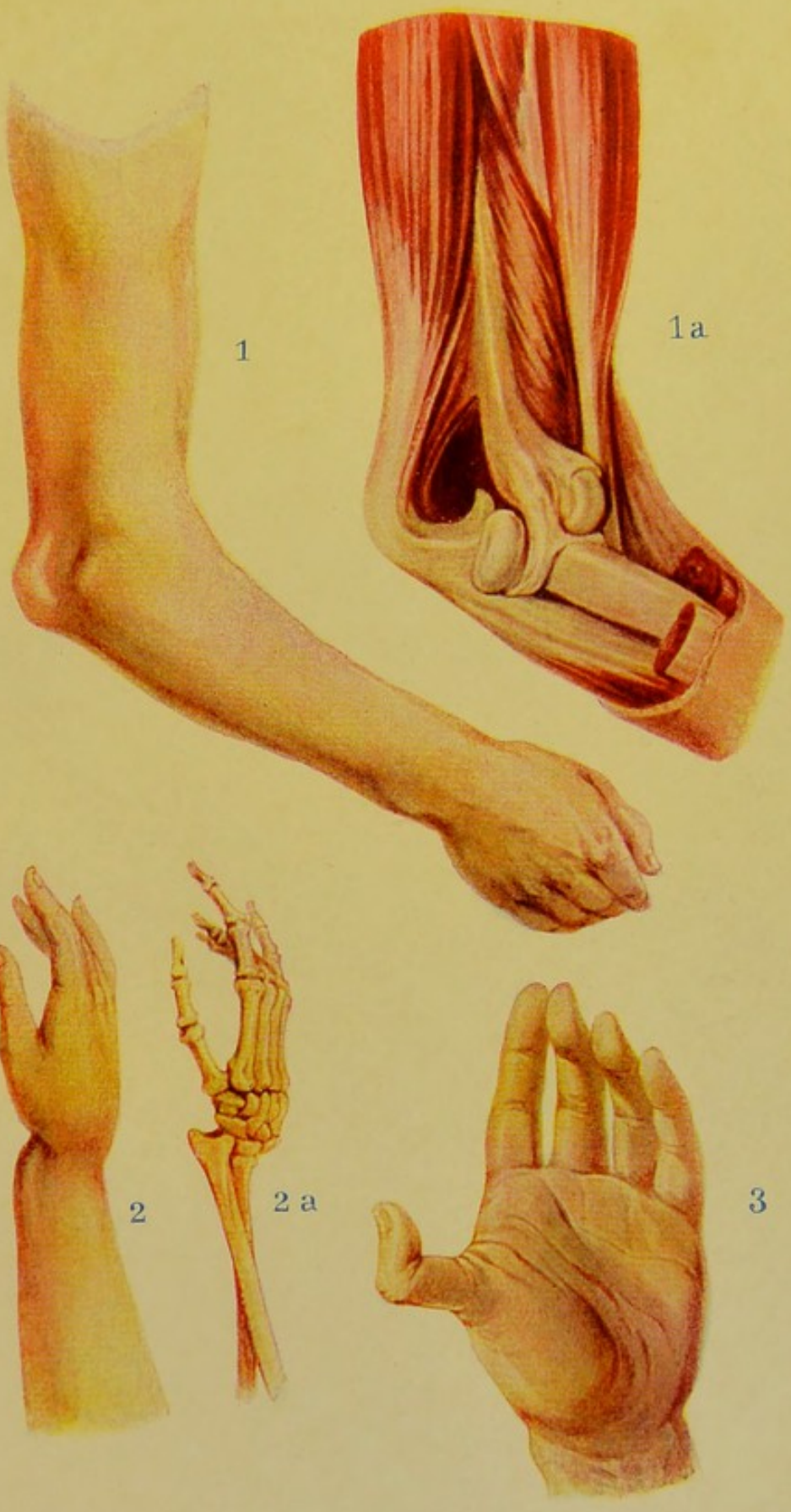
The size of these tumours varies much. They may become as large as a man's head. But after certain dimensions have been attained, death of the substance of the saniously degenerating tumour sets in, and if portions are transferred by the blood to other localities these develop new foci of sarcinoma (called secondary deposits). It is easy for anyone to see plainly from this how important it is that an operation should be performed as soon as possible.

Carcinoma (cancer) is the commonest form of new growth of tissue on the human body. Carcinoma is always a malignant proliferation of the epithelium, that is to say of that very delicate uppermost layer which covers both the surface of the external skin, the mucous membrane, and the gland-ducts. According to the point of its commencement and its locality, we divide carcinoma into carcinoma of the external skin, of the mucous membrane, and of the glands.

In spite of diligent investigations we have not yet succeeded in discovering what the causes of the commencement of carcinoma are. By some it is considered to be due to infectious germs; as in consequence of this to be infectious, and directly transmissible from one person to another. Others believe that they have discovered the cause to be mechanical or chemical irritation. Others refer it to physical or mental strains, heredity, and senile degeneration. In short the conjectures—that is what they are—are so numerous as to leave us at a loss, and to make it seem prudent to place no confidence in any of them.

It is true that a certain *heredity* in cancer has been observed for a long time past. Cases are known in which cancer has appeared in grandmother, mother, and daughter. Cancer also shows a certain definite behaviour, for it is distinctly commoner in the female sex. But our investigations are far from concluded. At present *we do not know the cause of cancer.*

Next to explain in what the nature of this much-feared malady consists. This is a proliferation of cells beginning from the epithelium. These cells proliferate into the neighbouring tissues. They first of all use them as a supporting base (cancerous *stroma*) for the new growth, *until the proliferated cancerous cells sooner or later break down by ulceration*, whereupon the connective tissue stroma perishes also.



Dislocation.

1. 1*a* Dislocation of the elbow joint.
2. 2*a* Dislocation of the right wrist.
3. Dislocation of the thumb.

The danger of the cancerous ulcer lies in its degeneration, and in the transference of cancerous portions, by way of the circulation, to other parts of the body where new foci of carcinoma are developed—exactly as we observed in the case of sarcoma. In addition to this every attack of carcinoma in time produces a severe disturbance of the general health, and an uninterrupted loss of strength (cancerous cachexia), which brings the patient to his death generally about the end of the second year, unless an operation is performed as soon as possible.

Respecting the parts of the body most frequently affected, and the way in which the malady begins, we know that cancer may develop upon all parts where skin or mucous membrane exists. But an observation based upon a large number of cases proves that in the female sex cancer is commonest on the breast, the vagina, and the womb; whilst in the male sex cancer is developed principally on the tongue, the œsophagus, the larynx, in the stomach, the large intestine, and the rectum.

In all cases the malady begins with a hard painful place. In superficial carcinoma of the external skin it can be felt through as a firm knob. This knob develops gradually and then breaks through as an ulcerating cancerous sore with a foul smelling discharge, which in cancer of the abdomen, is almost always mixed with blood.

The various terms *scirrus*, *colloid carcinoma*, *fungus medullaris*, are only of secondary interest, and refer to the subsequent behaviour of the cancerous tumour, which sometimes remains hard and rigid for a longer time. This generally occurs in carcinoma of the glands, whilst other forms (and particularly carcinoma of the skin) rapidly decay ulcerously, with pulpy degeneration, gelatinously, &c., under which circumstances purulent germs from without can certainly also contribute to the malady.

Treatment. All cancerous tumours (further description of whose forms would be here quite useless) are new growths dangerous to life. The only wise way of dealing with them is to have them removed as quickly as possible, which can be done only by a surgical operation.

CHAPTER XVIII.

Female Disorders.

I must begin this chapter, dedicated entirely to the female sex, with some general remarks.

A great many of what are called "female disorders" are more or less due to the habits and customs of our modern life, or perhaps I should rather say to modern social conditions; and it is only too true to say that many mothers are themselves principally to blame for the maladies from which they themselves and their girls suffer.

Whilst there has been, happily, in recent years a great improvement in the general education and bringing up of girls—at any rate in the upper and middle classes—with a wider realisation of how necessary fresh air and exercise are for them, a great deal yet remains to be done in this direction; and a proper attention to their healthy physical development, the very thing that can fit them to perform satisfactorily their future duties of wives and mothers, is by no means so universal as it should be. Anæmia and chlorosis are by far too common; and, though the subject is a delicate one, I feel it my duty to say that very often sufficient care is not taken to spare girls, and not to overtax their forces at the delicate moment of their first puberty.

And, after marriage, a young woman who finds herself about to become a mother too often knows by far too little about her own condition, and the simplest necessary rules with which she ought to conform.

Among the less well-to-do classes another cause of frequent serious consequences is the anxiety of the mother on the fourth or fifth day only after the birth of her baby to leave her bed and resume her domestic duties before she is at all fit to undertake them. One of the commonest consequences of this is falling of the womb.

The womb, the most important of the female organs, lies between the bladder and the rectum, in the centre of the pelvis, and consists of a thick-walled hollow muscle in the form of an inverted pear. The

interior is traversed by a canal lined with mucous membrane, which widens above into a triangular hollow, and is connected on the right and left with the Fallopian tubes. The lower end of the canal leads directly into the vagina. The womb is divided into three portions. The superior and strongest part is called the *fundus of the womb*, the central part the *body of the womb*, and the lower part, much narrower than the rest, the *cervix*.

The *ovaries* are of a longish oval, slightly flattened form. They lie on both sides of the womb, in a fold of the peritoneum, named the uterine ligament. As the organs which prepare the ova, they are by far the most important part of the whole reproductive system. The ovaries consist of a fibro-vascular mass, which is called the *stroma*. It is covered with a delicate skin, smooth before the menses appear, but afterwards puckered and uneven. As the years advance the ovaries become small and unimportant, and about fifty shrivel into hard bean-like forms.—In the above-named stroma of the ovaries are many thousand small round completely closed vescicles. They contain a clear transparent liquid, and have been named after their discoverer, the Graafian follicles. The anatomist Henke gives their number in a girl of eighteen as six-and-thirty thousand. The greater number of these dwindle away; only a comparatively small number are ripened. These Graafian follicles become larger and more perfectly developed as they advance towards the surface of the ovaries. They have on one wall of their integument a slight thickening in the form of a minute disc, which is called the germinal disc.

The Fallopian tubes extend on both sides from the fundus of the womb. They are two canals with interior mucous coats that run along the upper border of the wide uterine ligament, and open free immediately above the ovaries. They end in a fringed process to which a tremulous motion is ascribed, by means of which they draw to themselves the ovum emerging ripe from the ovary, to pass it through the canal of the Fallopian tube into the womb.

As the weight of this system of organs, and especially of the womb itself during pregnancy, is very considerable, they are supported and held in their position by an appropriate system of ligaments. The most important of these (in addition to the broad uterine ligament which as a fold of the peritoneum contains within itself the superior and central portions of the womb and connects them directly with the neighbouring organs) are the round uterine ligaments, which, as strong tendinous strands, pass upwards from the fundus of the womb and are attached to the lateral walls of the pelvis.—The ovaries are also kept in their place by stout, short ligaments which are attached

to the womb.

The whole of the reproductive organs are, from the fringes of the Fallopian tubes to the labia externa, lined with mucous membrane. This mucous membrane is provided with a number of very small glands, secreting mucous, which keeps the interior of the organs moist, and like all mucous membranes is exposed to various inflammations, which will be presently discussed.

The breasts consist of an accumulation of clusters of lobular glands, which excrete the milk towards the nipple by from sixteen to twenty ducts. The whole forms a hemispherical protuberance on the anterior wall of the chest extending from the third to the sixth rib. They develop their function of producing milk at the close of pregnancy and after parturition, and not before puberty. In old age they become atrophied.

Diseases of the Female Organs of Reproduction.

It may appear to many readers absolutely superfluous to say that the womb is an extremely delicate organ, or to insist that every woman should pay the greatest attention to its rightly performing all its functions, and to any disturbance of them that may occur. But I feel it imperative here to insist upon these simple truths, because they are so frequently overlooked. A moment's reflection must convince any one that the organs whose construction and functions so far transcend those of all the others that they do not, like the rest, merely co-operate in the maintenance of the organism, but possess the unique power of producing a new being, must be of a most complex and delicate nature, and capable of satisfactorily performing their duties only when in the most perfectly sound and healthy condition. But this is not all. A woman invariably suffers, more or less seriously, the moment that any mischief is set up in these distinctively feminine organs—often suffers severely in the general loss of health and of spirits, even when she does not feel any actual pain. For these reasons I must first of all say expressly that no woman with any regard for her health will treat lightly any of the maladies of which I am here about to speak; and I must further add that it is only common prudence *in every case* to take early medical advice. Serious disorders may arise which will make prompt medical assistance absolutely indispensable; and it will be by no means always possible for the patient herself to distinguish whether she is suffering from one of them, or from some milder indisposition which her medical adviser

will be able (after a few words of counsel) to leave to be treated by her own prudence.

Catarrh of the vagina, known also as leucorrhœa or "the whites," is a very common malady. In many respects it can be hardly distinguished from other inflammations of the mucous membrane, with which we have already become acquainted in either acute or chronic forms. The malady, which almost always occurs in a chronic form, consists chiefly in a greatly increased excretion from the mucous glands, and a more or less abundant throwing off of very small epithelial cells, whose mixture with the mucous, itself transparent, gives the fluid a cloudy milky or yellowish colour.

The cause of the malady need not be invariably a local irritation or chill, as is often supposed. *General anæmia*, a *sedentary life*, *chronic constipation*, and particularly *neglect of regular cleanliness* may occasion it.

The symptoms of the acute catarrh are principally a burning smart, strangury, and a feeling of increased heat. Patients suffering from the chronic form almost always complain of a general lassitude, heaviness in the limbs, and of becoming easily tired. Sunken faded features invariably accompany the disorder, and show how much the organism is suffering from the loss of fluids, which must naturally be exhausting.

The treatment. In every case of increase of the flow from the vagina it is important to know whether the mucus proceeds from the mucous membrane of that organ itself, or from the womb situated above it. To determine this, professional medical assistance is necessary. Should the malady prove to be a true vaginal catarrh, the next most important question is what has caused it, as local treatment will be useless unless the occasion of the malady is removed.

In addition to general treatment, the only local treatment which will be in the patient's own hands is washing. In acute catarrhs a few washings with luke-warm water, with some mild antiseptic or astringent salt, almost always suffices to put a stop to the troublesome some feelings and to the discharge.

Chronic cases often last for years before the patient can make up her mind at last to take some measures, because she feels that the malady is constantly weakening her more and more. In these cases stronger remedies are necessary. Powdered alum (one tea-spoonful to a quart of water), and decoctions of oak-bark (a handful to a quart of water), can be recommended. Washing with permanganate of potash, or with one per cent carbolic water (to be used with caution), is also often serviceable. The washing should be performed with a douche (irrigator or syringe).

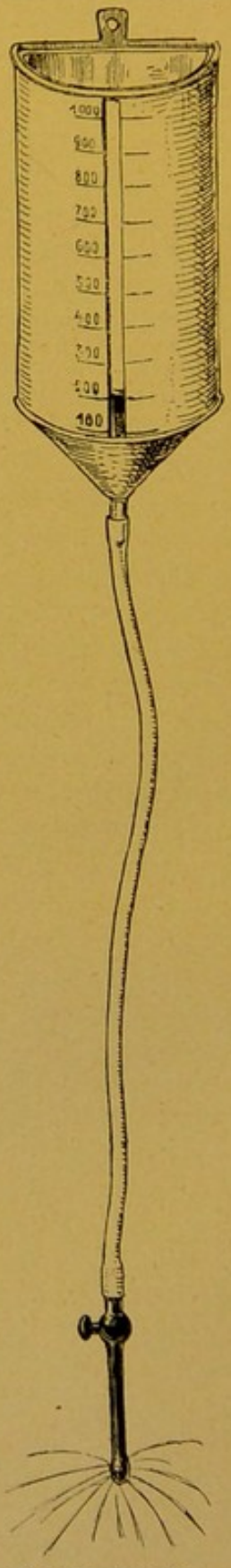
Disorders of the womb. Next to the vagina the womb is, of the whole reproductive system, the organ most liable to disorders. This will not seem strange if we reflect how this hollow muscle, abounding in vessels and nerves, is exposed to many possibilities of injury connected with the menses, pregnancy, shocks, pressure from loops of the intestines, &c.

The recurrent character of these disturbances would lead us to suspect that most disorders of the womb develop themselves slowly and gradually; and this is the case—with the exception of the dangerous feverish inflammations, which will be discussed under puerperal fever. Most of the disorders are of a chronic kind, and continue for years without the patients knowing what they are, until this is at last discovered with medical assistance. In the case of the many nervous maladies from which women suffer, some connection with a chronically disordered womb must be always suspected, as the womb and the nervous system stand in close relation with each other.

I will begin with a few words on catarrh of the womb. In its nature and beginning it resembles leucorrhœa, with which it is often confused, until medical advice is taken.

The malady almost always assumes a chronic form, and is most often the consequence of imprudent behaviour at the period of the menses. It may be also a consequence of chronic constipation, or appear as a secondary disorder following general anæmia. But severe catarrhs follow also sinking or prolongation of the womb, leading almost always, after a time, to the formation of catarrhal ulcers on the os uteri. These become painful and oppressive, whereas generally the non-purulent catarrh of the mucous membrane of the womb causes no particular local inconvenience.

The subsequent symptoms of chronic catarrh of the womb are naturally not to be lightly regarded. Unfortunately, many women think that as they do not suffer much pain from their malady it



Simple douche with gauge.

cannot be of any dangerous kind. This, however, is a complete mistake. The constant loss of fluid matter infallibly undermines the health, and certainly brings the patient in time into a sickly condition,

Catarrh of the womb may be distinguished with tolerable certainty from leucorrhœa by the following symptoms. The mucous excreted in leucorrhœa is always acid and pungent, and in a short time causes large, sore, smarting places upon the inner surfaces of the thighs. It is also clouded and has a foul smell. The mucous of the womb is scentless, without the same biting qualities, and of a bluish, gelatinous appearance.

The treatment. After the malady has been correctly diagnosed by a medical man, often only a little simple advice is needed to effect permanent cure. For example, raising the slightly displaced womb, the insertion of a well fitting pessary, or cure of an obstinate constipation will suffice to remove in a short time a catarrh produced by mechanical pressure.

Washing, exactly in the same manner as for leucorrhœa, is strongly to be recommended. But it must be remembered that the actual locality of the malady cannot be reached, and that the washing is therefore rather generally than locally beneficial to the patient. Half-baths (see the chapter on baths) and wet packs of the abdomen at night duly applied, produce an extraordinarily good effect, not only lessening the catarrh itself, but influencing the nervous system, the digestion, the appetite, and the general health favourably.

The alarm some women feel when informed that they are suffering from a chronic catarrh of the womb is exaggerated. It is by far better that the nature of the mischief should be known and the malady combated than that the patient should expose herself to an existence comparable to that of a plant fading for want of moisture, when a properly directed treatment will quickly restore her health.

Inflammation of the womb, which may also be either acute, or gradually developed in a chronic form, is a much more serious malady than a simple catarrh.

This disorder is, unfortunately, extremely common. It may be occasioned by any of the injuries which cause catarrh, but in this case the injury is not limited to the mucous membrane, but affects also the muscular substance of the womb. Other serious factors may also be present, of which I will speak briefly, after having first explained the nature of the disorder, and the symptoms of both its acute, feverish, and very common chronic form.

As in all acute inflammations so in this feverish inflammation of the womb (acute metritis) we find four principal symptoms—*swelling*,

redness, *pain*, and *fever*. The womb, distended with blood, and considerably swollen, gives the patient severe dragging pains, which shoot into the sacral and lumbar regions, and also in the directions of the bladder and rectum. The pulse is accelerated. The temperature shows a rise of several degrees Fahrenheit; and a severe thirst. headache, great general languor—often accompanied by nausea—plainly indicate an acute inflammatory irritation, demanding immediate appropriate treatment to prevent the inflammation from spreading to the peritoneum.

The first thing necessary in acute metritis (in which no sensible patient will think of neglecting to procure medical assistance) is complete rest in bed with cold wet packs of the abdomen, light diet, open bowels, and possibly local bleeding (best with leeches), according to the situation of the malady. *Also after the symptoms have ceased* (after some weeks) *rest in bed is still necessary for another six days or more, so that the organ may return from its swollen to its normal state. Should the patient rise too soon there is a danger of the womb becoming permanently enlarged, and of a chronic state of inflammation following.*

Chronic inflammation of the womb, which, as we have just seen, may be developed out of the acute form, is the commonest of all female disorders, and is rendered serious for the patient by the fact that in the course of time other maladies may associate themselves with it. It has neither so violent a course, nor symptoms by any means so marked as the acute form. But on the other hand, on account of the length of its duration, and the multitude of its various symptoms, it is practically a serious disorder.

It reveals itself at first but gently and gradually, but always more and more permanently and clearly as time advances in a feeling of fulness and heaviness in the pelvis, in pains in the sacral region whilst walking, and more particularly if the patient leads a sedentary life, in chronic constipation, and general dull pains in the abdomen, which increase at the period of the menses. Later—perhaps after years, and particularly when no treatment is applied—general fatigue invariably appears after the smallest physical exertion, loss of appetite, emaciation, anæmia, nervous irritability, and many other symptoms, partly due to the malady itself and partly to the inevitable secondary disorders.

As chronic inflammation of the womb is always connected with *a marked swelling* of this organ abounding in blood-vessels and nerves, the numerous symptoms of disease already alluded to are easily explained. In consequence of being swollen the womb, to put it shortly, on the one hand exercises a mechanical strain upon the other

organs, and on the other hand upon itself. The consequence of this is that in the course of time not only sinking and displacements ensue, but a chronic catarrh of the mucous membrane sets in with all its usual consequences.

Respecting the causes of inflammation of the womb it must be confessed that in most cases the patients are principally to blame for their own misfortunes ; but more in consequence of ignorance, indifference, and carelessness than of anything else.

The chief causes of the malady are mistakes and imprudences at the period of the menses. At this time the womb is in a state of irritation, overcharged with blood and enlarged, and, of course, in consequence requires to be spared and to be treated with consideration. But the frequent return of the period leads in time to less attention being paid to it than at first, and sooner or later almost every girl and woman suffers somehow or another in consequence, either from a chill, or from a dance, or from exerting herself too much.

Another frequent cause of the malady is the mistaken conduct of young mothers during child-bed, particularly in wanting to get up too soon. It is impossible to give too serious a warning against this. Chronic enlargement of the womb is inevitable, if the organ, which during the period of pregnancy has been much distended, is not allowed a sufficient time to recover its normal dimensions. Miscarriage, imprudences during pregnancy, severe constipation, and similar easily avoidable mischiefs, can also occasion chronic inflammation of the womb.

The treatment. The seriousness of the malady makes early medical assistance indispensable. The symptoms which I have mentioned do not suffice to enable the patient to discover, without professional advice the exact situation of the disorder, which not seldom effects the peritoneum, or the broad ligaments, and may be connected with inflammatory accumulations of fluid, exudations, and adhesions.

The general treatment naturally demands much patience, and a careful rule of life. Generous living, of an appropriate kind, a gentle water treatment, easy digestion, rest during the menses, and refraining from moving or carrying heavy weights, and going up and down stairs is the best advice that can be given in all cases. But this advice must be supplemented by that of the medical man according to the circumstances of the case.

Displacement of the female organs effect either the vagina or the womb.

Displacement of the vagina can only result from the organ being detached from its place and simultaneously thrust downwards by pressure from above. There may be either a complete subsidence,

affecting the whole organ, or a partial one affecting either the inferior or superior part. In serious cases we speak of a prolapse of the vagina, a portion of the organ becoming externally visible. In these severe cases the womb is also involved as the subsiding vagina must draw that organ after it.

Cases most commonly occur with women who have borne children. The hours of parturition and a difficult passage of the head of the child mark in many cases the first step towards the loosening and subsidence of the walls of the vagina. But tenesmus, habitual lifting of heavy weights, and warm half-baths can also occasion the malady.

As the malady is not only disagreeable but also dangerous (the mucous membrane of the vagina being exposed to infection) the patient should *immediately procure medical advice*, so that the mischief may at any rate proceed no further.

Sinking of the womb, also consists in a subsidence of the organ, and may in severe cases develop into *prolapse of the womb*. It results either from rising too soon from child-bed, or from habitually lifting heavy weights, which produces a relaxation of the ligaments.

The mischief shows itself particularly by pains in the lumbar region, chronic constipation, pain during the menses, and a feeling of general collapse. A long continued sinking of the womb is also invariably accompanied by catarrh of the womb.

The treatment consists in the application of a properly fitted pessary.

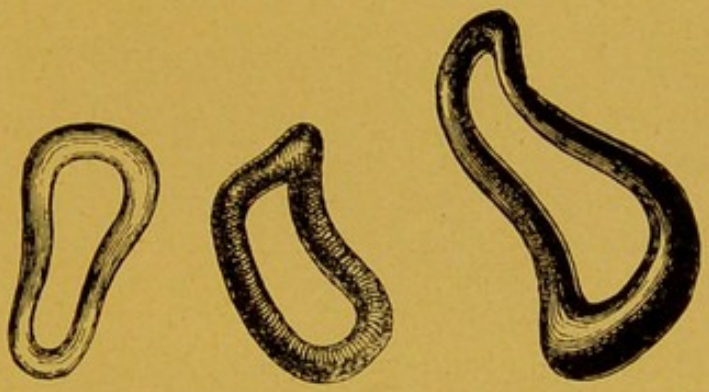
Pessary.

If the pessary fits well the patient should be unconscious of its presence. Ill fitting pessaries do a great deal of mischief, and the pessary should be chosen by a medical man, and at first placed in position by him. Subsequently the patient will be able to do this for herself. I recommend that during the first three months the pessary should not be removed, so as to give the loosened womb time to become again firmly fixed in its proper locality. Afterwards the ring is best laid in clean water during the monthly period.

Flexions of the womb consists in the womb becoming bent at an angle near the *os uteri*. In consequence of this the body of the organ sinks either forwards or backwards. The mischief is generally a consequence of rising too soon from child-bed. But a number of other things may cause it—general anæmia, too early marriage, parturitions in rapid succession, mistakes accompanying miscarriage, &c.

The symptoms of the malady are of very manifold kinds. The bladder or rectum may suffer from a direct mechanical pressure,

accordingly as the body of the womb is thrust forwards or backwards ; and from these disturbances in evacuating the bladder or rectum, respectively, inevitably follow. It is also self evident that a constriction of the canal of the womb must follow. In consequence of this the patients suffer from difficult and painful periods, as the passage is obstructed. Sometimes a constipation of mucous, arising from the same cause, also occasions true attacks of colic of the womb, an extremely painful disorder, much dreaded by women who have once suffered from it.



Different forms of pessary for misplacement of the womb.

The treatment aims first at rectifying the bent womb ; afterwards at maintaining it in its true position.

There are numerous pessaries of various forms for maintaining the womb in its place ; and I give an illustration of some of the commonest forms. They effect a satisfactory result only when a proper form is chosen ; and medical assistance is absolutely necessary.

The menses were formerly mistakenly regarded as a kind of natural self-purification of the organism ; but are simply the direct consequence of a periodically repeated process known as ovulation. A Graafian follicle ripens in the ovaries every four weeks. Upon its bursting and emptying its contents into the Fallopian tubes, and thence into the womb, the blood vessels of the latter become so stimulated that they burst and extravasate their contents.

During the days of the monthly period both the nervous system and the vascular system of the abdomen are in a state of great irritation ; and as the mucous membrane of the womb is at the same time relaxed and swollen (so that it is much more susceptible of injuries and irritation), every girl and every woman should at this epoch beware of any severe mental or physical exertion, and be particularly careful to keep the abdomen warm. It is the duty of mothers to give their

daughters instructions about the rules and the caution which they should observe—a duty too often neglected. At the conclusion of the period ample washing of the organs with cool clean water is to be strongly recommended.

The normal period of recurrence is on the twenty-eighth day. With healthy girls it should begin between the fourteenth and fifteenth birthday. It is at first irregular, and generally painful, but assumes its typical character in about a quarter of a year; and under healthy conditions continues regularly until it ceases, generally about the age of fifty.

As this period is a perfectly natural and healthy phenomenon, it might have been anticipated that it would be unaccompanied by any disturbance of the organism. But in point of fact there are few girls or women who do during the time feel perfectly well. On the contrary, almost all complain, particularly during the first two days, of a feeling like cramp, of pains in the sacral region, and of general debility, not seldom also of headache and nausea.

There are, however, a great many girls, unmarried woman, and women of middle age who, in addition to the pains already mentioned, which are of a tolerable kind, suffer in much severer ways. They suffer from real colic of the abdomen, and from spasms, are uninterruptedly tormented with vomiting and retching, are unable to take a morsel of food, and show by their whole condition that the general health is seriously disturbed. These painful periods (known as dysmenorrhœa) are observed most generally in nervous patients disposed to hysteria. But purely local causes may be the occasion, and a suspicion is always aroused of some flexion of the womb, or even of a congenital constriction of the *os uteri*, which is not rare, and may occasion the severest menstrual convulsions in consequence of engorgement. Every patient who suffers in this way should certainly consult a medical man. In any case rest in bed and warmth applied to the abdomen (warm fomentations) are best for painful periods.

But we have also to consider the phenomenon of *irregularity*—which is often so serious that it must be occasioned by some definite cause.

In the first place we occasionally but very rarely meet with cases of the menses in quite early years. These should always be enquired into as soon as observed, as it is self-evident that they imply direct danger to healthy physical and mental development.

Far more frequent than the phenomenon of the menses appearing too soon is that of their being delayed, and becoming so irregular that sometimes several months, and sometimes only a fortnight intervene. Apart from malformation the cause of delay is either

anæmia or chlorosis, but especially consumptive disease (tuberculosis). These maladies hinder the development of the ovum, and so render the subsequent consequences impossible.

It will be self-evident that under these circumstances, taking medicines to hasten the recurrence of the period is pure foolishness. The principal thing is not to do that, but to attend to the general strengthening of the body, after which the rest will follow of itself. But in any cases when the menses fail—except in consequence of pregnancy—medical advice must certainly be obtained in order to ascertain whether any local malady of the organs exist, or a severe general disturbance—so that if a tuberculosis is latent it may at once be attacked as energetically as possible.

An unhealthy increase or frequency of the period, from which both girls and women up to middle life, suffer, is almost always a consequence of some local malady of the womb; unless general fulness of blood, excitable temperament, constipation of the bowels, or similar causes are the occasion.

Particularly a chronic inflamed condition of the mucous membrane of the womb, or of the womb itself, and also new growths in it (under which carcinoma is often latent), almost without exception occasion increased effusion of blood from the mucous membrane of the womb. The last fact alone will suffice to convince any prudent reader that it is wise to procure medical advice as soon as possible in order to determine what the cause of any increase in the menses may be.

It is by no means a matter of small importance to health if the body, instead of losing a certain normal quantity of blood every twenty-eight days, is losing twice as much or more. The result is often a severe anæmia.

I purposely give here only general advice, and recommend acid drinks, rest in bed, or in a horizontal position on a sofa, and cool wet compresses on the abdomen; but must insist emphatically that every irregularity, whether it be "too often," "too much," or "too long," should be referred to a medical man.

I shall conclude the subject with some remarks upon "the change of life." On an average, the age at which the period gradually disappears is from forty-eight to fifty. But there is here a good deal of variation without any ill health being implied. Thus, on the one hand, a distinct diminution in quite strong women is sometimes observed even at the beginning of the fortieth year; whilst, on the other hand, it is no unusual thing for women to reach their fifty-second year without any change—and to have to be assured that their consequent anxiety is groundless, and that they are enjoying perfect health.

If the period commences either somewhat late or early in girlhood it is not strange that it should continue a correspondingly longer or shorter time.

That "the change of life" is a distinctly dangerous epoch for women I distinctly deny. The time is critical only if women do not during it spare themselves, but attempt all kinds of exertions.

That new growths and tumours (about which I here say nothing, as they must, under all circumstances, be examined and treated by a medical man) are commoner at this epoch, as is often asserted, is not at all true. They are equally frequently found at a younger age. Carcinoma, which has a peculiar tendency to attack the abdomen in women, does certainly occur frequently about fifty. That, however, has no connection with "the change of life," for it is about the same age that cancerous new growths appear in the rectum, stomach, and larynx in men.

Pregnancy, its course, and its disturbances.

During the reproductive period of life, a Graafian follicle is ripened in the ovaries of every healthy women once every four weeks. Upon the bursting of the follicle the human ovum contained in it is freed and passes by the Fallopian tube into the womb. Here it imbeds itself in the mucous membrane of the womb, relaxed by the period.

In most cases the ovum within a few days perishes in the mucous of the womb. But in others it is fructified, and the development of a new organism thereupon commences.

But fructification does not always take place in the womb. It is possible for a spermatozoon passing from the womb into the Fallopian tubes to encounter the ovum near the ovary. *Abdominal pregnancy*, happily rare, then ensues. The fœtus in these cases is after a while atrophied. Cases of *tubal pregnancy* when fructification takes place in the Fallopian tube are commoner. In consequence of the rupture of the tube, and the ensuing internal bleeding they represent a grave danger to the pregnant woman.

Another departure from the normal fructification must be mentioned. As every one knows it is by no means uncommon for a mother to produce twins. Occasionally three, and even four and five are born at the same time. Such children are almost always born dead or soon perish from general weakness. In such cases either a simultaneous fructification of several ova must take place (and we might then assume that both ovaries had at the same time furnished a

ripened ovum), or else we must assume that a single Graafian follicle can contain more than one ovum ready for fructification, just as, to mention a parallel case, now and then two yolks are found in one egg.

We may next consider the symptoms from which we may conclude that fructification has taken place, and I may at once say that is by no means so easy a thing to make sure of a pregnancy during the first months. There are certainly a number of symptoms which show that a state of pregnancy probably exists. But even all of them taken together are not infallible, and only the sound of the beating of the fœtal heart, and the first movements of the child absolutely set all doubts aside.

From the earliest times the suspension of the menses has been regarded as the best known evidence of pregnancy. And in the case of women whose periods have been previously regular, their abrupt cessation does at once suggest pregnancy. But on the one hand the period may be for a considerable time suspended from other causes; and on the other, it is by no means an uncommon thing for the period to continue for some months in spite of pregnancy; so that we are first informed of the pregnancy by other symptoms.

Exterior symptoms given by the organs themselves are, a distinct swelling, an increase in the secretion of the mucous of the vaginal mucous membrane, and its change of colour into a darker one tending towards blueish. These are probable indications of pregnancy. Other discolorations of the skin hint at pregnancy—the appearance of spots on the face (see p. 394), the dark colouring around the nipple, and the appearance of a dark line which extends from the naval towards the pubic symphysis. Swelling about the regions of the throat, and especially an enlargement of the breasts often occur in the very first months of pregnancy, and may be accepted as tolerably certain symptoms.

After the first months ensues also the externally visible enlargement of the womb. This shows itself with increasing plainness by the anterior prominence of the abdomen; and makes pregnancy more and more probable. But it must be mentioned that there are a whole series of forms of tumours whose symptoms can be confused with those of pregnancy.

Other symptoms of pregnancy approach indications of indisposition. Many women show from the very first day an alteration of their usual disposition. Some exhibit a tendency to give way to tears, to melancholy thoughts, and low-spirited reflections, and suffer also from disturbances of hearing, and from hallucinations. Others, who were

previously easily put out of humour, and irritable, become bright and tranquil, and feel both physically and mentally stronger than they ever felt before. The nausea frequently occurring during pregnancy, the peculiar fancy for all kinds of dainties, and a number of similar symptoms, must be regarded as indications of the heightened excitability of the nervous system; and are certainly reflex irritations producing this alteration in the sensibility of the pregnant woman.

But pregnancy is not in any way an unhealthy condition, but a perfectly natural physiological one, needing nothing but a prudent, healthy rule of life. Unhappily, in what are called the upper classes very grave offences against the rules of prudence and health are frequently committed, and the majority of miscarriages and premature confinements are due to ill-advised conduct during pregnancy. Tight lacing is continued. Social amusements and dancing are indulged in—even a little more than usual, in anticipation of the approaching interruption of these pleasures by confinement; and submission to a rule of diet which will be conducive to the well being of both mother and child is flatly refused.

The general rules to which every pregnant woman should conform are the following:

1. She should regard her condition as a perfectly natural one, and do her best to be cheerful and comp sed. Exhibitions of temper, agitation, and despondency—and in particular excessive excitement may be directly injurious to the child.
2. The diet should be generous and digestible. Alcoholic drinks and flatuent, as well as indigestible nourishment, are to be avoided.
3. Physical and mental exertion are to be avoided, particularly after the fourth month.
4. Attention should be paid to digestion. Constipation should be combated rather with mild aperients (honey, rhubarb, fruit) than by injections.
5. Comfortable warm clothing should be worn that exercises no pressure either upon the abdomen or the chest.
6. Regular washing of the abdomen and generative organs should be used twice a week after the fifth month, and the breast washed thoroughly in the evening with diluted French brandy.—*Warm rinsings, warm half-baths, or hot foot-baths are to be strictly avoided, as they involve danger of miscarriage or premature birth.*

The normal duration of pregnancy is nine months. But exceptions occur in both directions. Children capable of being reared are born from women who have been only seven months pregnant: and birth may take place after 300 days. The probable date of birth is most

Medicinal plants.

1. Juniper. 2. Club moss. 3. Lavender. 4. Castor-oil plant.

easily reckoned from the cessation of the menses, and from the first distinctly felt movement of the fœtus—"quickening." From the cessatian of the menses 280 days are to be reckoned. From the day when the first movement is felt twenty weeks.

It may be, however, freely confessed that the calculation of an exact number of days with an almanack is often a somewhat troublesome process. For that reason a calendar is given below which will enable any expecting mother to judge without any difficulty about what date she may reasonably expect her baby to be born. There are many little circumstances in life which make it highly desirable to be able to fix this date in advance. Very probably a mother has promised her daughter, who is feeling anxious about her first confinement, to come and visit her, and to afford her her assistance in her first childbed. But in the case of people whose circumstances impose upon them household cares that make leaving home difficult, a visit of this kind is not so easily arranged as by others who have servants to wait upon them, and can leave home when they please. It may be a matter of great importance for the mother to know certainly some time beforehand when her assistance is likely to be required by her daughter, and uncertainty may also involve questions of expense that may be serious for persons whose means are not too abundant. To add that busy people are apt to have many engagements that require to be taken into consideration in all their plans may appear superfluous. But it is evident enough that such engagements mean that all plans that are to be carried into execution must be well thought out and arranged long beforehand. And, to conclude, nothing is more common than for the little stranger to make his appearance some weeks before he was expected, and before his mother herself was ready for him, or has had time to finish the preparation of "baby's things."

In this respect young mothers are always at a disadvantage compared with others who have already borne two or three children. Experience enables many women to conclude from certain physical indications, not always easy to describe, when they are again pregnant. Some, and particularly highly sensitive women, can recognise certainly within the first few days that pregnancy has taken place—they are conscious of a sort of warmth moving about their persons, of slight feeling of dragging in the lower limbs, and of a general sense of lassitude; or some even slighter indications suffice to convince them of their condition. Under these circumstances a much more exact determination of the probable date of birth is evidently possible. But there are many other women (and all young married

women who have not yet had any experience of motherhood must, of course, be included amongst them) who are aware of no such immediate indications of pregnancy. The fœtus during the first months is very small. All external indications of pregnancy are probably absent; and under these circumstances the future mother has nothing more certain to rely upon than the cessation of the monthly period, and the first movement ("quickening") of the child in the womb. These two dates are shown in the subjoined calendar, and the expectant mother will draw her conclusions from a consideration of both of them.

The simplest and safest way of calculating the probable duration of the pregnancy, and the date of its conclusion, that is to say the day of birth, is to reckon, from the *first* day of the last period which took place, two hundred and eighty days, and from the first movement of the child, twenty weeks. The second date may be found either to confirm the one previously fixed, or to correct it. The prudent mother will, of course, be careful to be ready for her baby rather too soon than too late. With the following calendar no difficulty should be found in fixing the date of birth with probable exactitude. The first column shows the day on which the last monthly period commenced; the second that of the child's first movement; the third the day of birth.

CALENDAR.

JANUARY: 31 Days.

Last period began	First movement.	Birth.
1. January.	20. May.	7. October.
2. ,,	21. ,,	8. ,,
3. ,,	22. ,,	9. ,,
4. ,,	23. ,,	10. ,,
5. ,,	24. ,,	11. ,,
6. ,,	25. ,,	12. ,,
7. ,,	26. ,,	13. ,,
8. ,,	27. ,,	14. ,,
9. ,,	28. ,,	15. ,,
10. ,,	29. ,,	16. ,,
11. ,,	30. ,,	17. ,,
12. ,,	31. ,,	18. ,,
13. ,,	1. June.	19. ,,

JANUARY: 31 Days (continued).

Last period began.	First movement.	Birth.
14. January.	2. June.	20. October.
15. ,,	3. ,,	21. ,,
16. ,,	4. ,,	22. ,,
17. ,,	5. ,,	23. ,,
18. ,,	6. ,,	24. ,,
19. ,,	7. ,,	25. ,,
20. ,,	8. ,,	26. ,,
21. ,,	9. ,,	27. ,,
22. ,,	10. ,,	28. ,,
23. ,,	11. ,,	29. ,,
24. ,,	12. ,,	30. ,,
25. ,,	13. ,,	31. ,,
26. ,,	14. ,,	1. November.
27. ,,	15. ,,	2. ,,
28. ,,	16. ,,	3. ,,
29. ,,	17. ,,	4. ,,
30. ,,	18. ,,	5. ,,
31. ,,	19. ,,	6. ,,

FEBRUARY: 28 Days.

Last period began.	First movement.	Birth.
1. February.	20. June.	7. November.
2. ,,	21. ,,	8. ,,
3. ,,	22. ,,	9. ,,
4. ,,	23. ,,	10. ,,
5. ,,	24. ,,	11. ,,
6. ,,	25. ,,	12. ,,
7. ,,	26. ,,	13. ,,
8. ,,	27. ,,	14. ,,
9. ,,	28. ,,	15. ,,
10. ,,	29. ,,	16. ,,
11. ,,	30. ,,	17. ,,
12. ,,	1. July.	18. ,,
13. ,,	2. ,,	19. ,,
14. ,,	3. ,,	20. ,,
15. ,,	4. ,,	21. ,,

FEBRUARY: 28 Days (continued).

Last period began.	First movement.	Birth.
16. February.	5. July.	22. November.
17. ,,	6. ,,	23. ,,
18. ,,	7. ,,	24. ,,
19. ,,	8. ,,	25. ,,
20. ,,	9. ,,	26. ,,
21. ,,	10. ,,	27. ,,
22. ,,	11. ,,	28. ,,
23. ,,	12. ,,	29. ,,
24. ,,	13. ,,	30. ,,
25. ,,	14. ,,	1. December
26. ,,	15. ,,	2. ,,
27. ,,	16. ,,	3. ,,
28. ,,	17. ,,	4. ,,

MARCH: 31 Days.

Last period began.	First movement.	Birth.
1. March.	18. July.	5. December.
2. ,,	19. ,,	6. ,,
3. ,,	20. ,,	7. ,,
4. ,,	21. ,,	8. ,,
5. ,,	22. ,,	9. ,,
6. ,,	23. ,,	10. ,,
7. ,,	24. ,,	11. ,,
8. ,,	25. ,,	12. ,,
9. ,,	26. ,,	13. ,,
10. ,,	27. ,,	14. ,,
11. ,,	28. ,,	15. ,,
12. ,,	29. ,,	16. ,,
13. ,,	30. ,,	17. ,,
14. ,,	31. ,,	18. ,,
15. ,,	1. August.	19. ,,
16. ,,	2. ,,	20. ,,
17. ,,	3. ,,	21. ,,
18. ,,	4. ,,	22. ,,
19. ,,	5. ,,	23. ,,
20. ,,	6. ,,	24. ,,
21. ,,	7. ,,	25. ,,

MARCH: 31 Days (continued).

Last period began.	First movement.	Birth.
22. March.	8. August.	26. December.
23. ,,	9. ,,	27. ,,
24. ,,	10. ,,	28. ,,
25. ,,	11. ,,	29. ,,
26. ,,	12. ,,	30. ,,
27. ,,	13. ,,	31. ,,
28. ,,	14. ,,	1. January.
29. ,,	15. ,,	2. ,,
30. ,,	16. ,,	3. ,,
31. ,,	17. ,,	4. ,,

APRIL: 30 Days.

Last period began.	First movement.	Birth.
1. April.	18. August.	5. January.
2. ,,	19. ,,	6. ,,
3. ,,	20. ,,	7. ,,
4. ,,	21. ,,	8. ,,
5. ,,	22. ,,	9. ,,
6. ,,	23. ,,	10. ,,
7. ,,	24. ,,	11. ,,
8. ,,	25. ,,	12. ,,
9. ,,	26. ,,	13. ,,
10. ,,	27. ,,	14. ,,
11. ,,	28. ,,	15. ,,
12. ,,	29. ,,	16. ,,
13. ,,	30. ,,	17. ,,
14. ,,	31. ,,	18. ,,
15. ,,	1. September.	19. ,,
16. ,,	2. ,,	20. ,,
17. ,,	3. ,,	21. ,,
18. ,,	4. ,,	22. ,,
19. ,,	5. ,,	23. ,,
20. ,,	6. ,,	24. ,,
21. ,,	7. ,,	25. ,,
22. ,,	8. ,,	26. ,,
23. ,,	9. ,,	27. ,,
24. ,,	10. ,,	28. ,,

APRIL: 30 Days (continued).

Last period began.	First movement.	Birth.
25. April.	11. September.	29. January.
26. ,,	12. ,,	30. ,,
27. ,,	13. ,,	31. ,,
28. ,,	14. ,,	1. February.
29. ,,	15. ,,	2. ,,
30. ,,	16. ,,	3. ,,

MAY: 31 Days.

Last period began.	First movement.	Birth.
1. May.	17. September.	4. February.
2. ,,	18. ,,	5. ,,
3. ,,	19. ,,	6. ,,
4. ,,	20. ,,	7. ,,
5. ,,	21. ,,	8. ,,
6. ,,	22. ,,	9. ,,
7. ,,	23. ,,	10. ,,
8. ,,	24. ,,	11. ,,
9. ,,	25. ,,	12. ,,
10. ,,	26. ,,	13. ,,
11. ,,	27. ,,	14. ,,
12. ,,	28. ,,	15. ,,
13. ,,	29. ,,	16. ,,
14. ,,	30. ,,	17. ,,
15. ,,	1. Octob er.	18. ,,
16. ,,	2. ,,	19. ,,
17. ,,	3. ,,	20. ,,
18. ,,	4. ,,	21. ,,
19. ,,	5. ,,	22. ,,
20. ,,	6. ,,	23. ,,
21. ,,	7. ,,	24. ,,
22. ,,	8. ,,	25. ,,
23. ,,	9. ,,	26. ,,
24. ,,	10. ,,	27. ,,
25. ,,	11. ,,	28. ,,
26. ,,	12. ,,	1. March.
27. ,,	13. ,,	2. ,,
28. ,,	14. ,,	3. ,,

MAY: 31 Days (continued).

Last period began.	First movement.	Birth.
29. May.	15. October.	4. March.
30. ,,	16. ,,	5. ,,
31. ,,	17. ,,	6. ,,

JUNE: 30 Days.

Last period began.	First movement.	Birth.
1. June.	18. October.	7. March.
2. ,,	19. ,,	8. ,,
3. ,,	20. ,,	9. ,,
4. ,,	21. ,,	10. ,,
5. ,,	22. ,,	11. ,,
6. ,,	23. ,,	12. ,,
7. ,,	24. ,,	13. ,,
8. ,,	25. ,,	14. ,,
9. ,,	26. ,,	15. ,,
10. ,,	27. ,,	16. ,,
11. ,,	28. ,,	17. ,,
12. ,,	29. ,,	18. ,,
13. ,,	30. ,,	19. ,,
14. ,,	31. ,,	20. ,,
15. ,,	1. November.	21. ,,
16. ,,	2. ,,	22. ,,
17. ,,	3. ,,	23. ,,
18. ,,	4. ,,	24. ,,
19. ,,	5. ,,	25. ,,
20. ,,	6. ,,	26. ,,
21. ,,	7. ,,	27. ,,
22. ,,	8. ,,	28. ,,
23. ,,	9. ,,	29. ,,
24. ,,	10. ,,	30. ,,
25. ,,	11. ,,	31. ,,
26. ,,	12. ,,	1. April.
27. ,,	13. ,,	2. ,,
28. ,,	14. ,,	3. ,,
29. ,,	15. ,,	4. ,,
30. ,,	16. ,,	5. ,,

JULY: 31 Days.

Last period began.	First movement.	Birth.
1. July.	17. November.	6. April.
2. ,,	18. ,,	7. ,,
3. ,,	19. ,,	8. ,,
4. ,,	20. ,,	9. ,,
5. ,,	21. ,,	10. ,,
6. ,,	22. ,,	11. ,,
7. ,,	23. ,,	12. ,,
8. ,,	24. ,,	13. ,,
9. ,,	25. ,,	14. ,,
10. ,,	26. ,,	15. ,,
11. ,,	27. ,,	16. ,,
12. ,,	28. ,,	17. ,,
13. ,,	29. ,,	18. ,,
14. ,,	30. ,,	19. ,,
15. ,,	1. December.	20. ,,
16. ,,	2. ,,	21. ,,
17. ,,	3. ,,	22. ,,
18. ,,	4. ,,	23. ,,
19. ,,	5. ,,	24. ,,
20. ,,	6. ,,	25. ,,
21. ,,	7. ,,	26. ,,
22. ,,	8. ,,	27. ,,
23. ,,	9. ,,	28. ,,
24. ,,	10. ,,	29. ,,
25. ,,	11. ,,	30. ,,
26. ,,	12. ,,	1. May.
27. ,,	13. ,,	2. ,,
28. ,,	14. ,,	3. ,,
29. ,,	15. ,,	4. ,,
30. ,,	16. ,,	5. ,,
31. ,,	17. ,,	6. ,,

AUGUST: 31 Days.

Last period began.	First movement.	Birth.
1. August.	18. December.	7. May.
2. ,,	19. ,,	8. ,,
3. ,,	20. ,,	9. ,,

AUGUST: 31 Days (continued).

Last period began.	First movement.	Birth.
4. August.	21. December.	10. May.
5. ,,	22. ,,	11. ,,
6. ,,	23. ,,	12. ,,
7. ,,	24. ,,	13. ,,
8. ,,	25. ,,	14. ,,
9. ,,	26. ,,	15. ,,
10. ,,	27. ,,	16. ,,
11. ,,	28. ,,	17. ,,
12. ,,	29. ,,	18. ,,
13. ,,	30. ,,	19. ,,
14. ,,	31. ,,	20. ,,
15. ,,	1. January.	21. ,,
16. ,,	2. ,,	22. ,,
17. ,,	3. ,,	23. ,,
18. ,,	4. ,,	24. ,,
19. ,,	5. ,,	25. ,,
20. ,,	6. ,,	26. ,,
21. ,,	7. ,,	27. ,,
22. ,,	8. ,,	28. ,,
23. ,,	9. ,,	29. ,,
24. ,,	10. ,,	30. ,,
25. ,,	11. ,,	31. ,,
26. ,,	12. ,,	1. June.
27. ,,	13. ,,	2. ,,
28. ,,	14. ,,	3. ,,
29. ,,	15. ,,	4. ,,
30. ,,	16. ,,	5. ,,
31. ,,	17. ,,	6. ,,

SEPTEMBER: 30 Days.

Last period began.	First movement.	Birth.
1. September.	18. January.	7. June.
2. ,,	19. ,,	8. ,,
3. ,,	20. ,,	9. ,,
4. ,,	21. ,,	10. ,,
5. ,,	22. ,,	11. ,,
6. ,,	23. ,,	12. ,,

SEPTEMBER: 30 Days (continued).

Last period began.	First movement.	Birth.
7. September.	24. January.	13. June.
8. ,,	25. ,,	14. ,,
9. ,,	26. ,,	15. ,,
10. ,,	27. ,,	16. ,,
11. ,,	28. ,,	17. ,,
12. ,,	29. ,,	18. ,,
13. ,,	30. ,,	19. ,,
14. ,,	31. ,,	20. ,,
15. ,,	1. February.	21. ,,
16. ,,	2. ,,	22. ,,
17. ,,	3. ,,	23. ,,
18. ,,	4. ,,	24. ,,
19. ,,	5. ,,	25. ,,
20. ,,	6. ,,	26. ,,
21. ,,	7. ,,	27. ,,
22. ,,	8. ,,	28. ,,
23. ,,	9. ,,	29. ,,
24. ,,	10. ,,	30. ,,
25. ,,	11. ,,	1. July.
26. ,,	12. ,,	2. ,,
27. ,,	13. ,,	3. ,,
28. ,,	14. ,,	4. ,,
29. ,,	15. ,,	5. ,,
30. ,,	16. ,,	6. ,,

OCTOBER: 31 Days.

Last period began.	First movement.	Birth.
1. October	17. February.	7. July.
2. ,,	18. ,,	8. ,,
3. ,,	19. ,,	9. ,,
4. ,,	20. ,,	10. ,,
5. ,,	21. ,,	11. ,,
6. ,,	22. ,,	12 ,,
7. ,,	23. ,,	13. ,,
8. ,,	24. ,,	14. ,,
9. ,,	25. ,,	15. ,,
10. ,,	26. ,,	16. ,,

OCTOBER: 31 Days (continued).

Last period began.	First movement.	Birth.
11. October.	27. February.	17. July.
12. ,,	28. ,,	18. ,,
13. ,,	1. March.	19. ,,
14. ,,	2. ,,	20. ,,
15. ,,	3. ,,	21. ,,
16. ,,	4. ,,	22. ,,
17. ,,	5. ,,	23. ,,
18. ,,	6. ,,	24. ,,
19. ,,	7. ,,	25. ,,
20. ,,	8. ,,	26. ,,
21. ,,	9. ,,	27. ,,
22. ,,	10. ,,	28. ,,
23. ,,	11. ,,	29. ,,
24. ,,	12. ,,	30. ,,
25. ,,	13. ,,	31. ,,
26. ,,	14. ,,	1. August.
27. ,,	15. ,,	2. ,,
28. ,,	16. ,,	3. ,,
29. ,,	17. ,,	4. ,,
30. ,,	18. ,,	5. ,,
31. ,,	19. ,,	6. ,,

NOVEMBER: 30 Days.

Last period began.	First movement.	Birth.
1. November.	20. March.	7. August.
2. ,,	21. ,,	8. ,,
3. ,,	22. ,,	9. ,,
4. ,,	23. ,,	10. ,,
5. ,,	24. ,,	11. ,,
6. ,,	25. ,,	12. ,,
7. ,,	26. ,,	13. ,,
8. ,,	27. ,,	14. ,,
9. ,,	28. ,,	15. ,,
10. ,,	29. ,,	16. ,,
11. ,,	30. ,,	17. ,,
12. ,,	31. ,,	18. ,,
13. ,,	1. April.	19. ,,

NOVEMBER: 30 Days (continued).

Last period began.	First movement.	Birth.
14. November.	2. April.	20. August.
15. ,,	3. ,,	21. ,,
16. ,,	4. ,,	22. ,,
17. ,,	5. ,,	23. ,,
18. ,,	6. ,,	24. ,,
19. ,,	7. ,,	25. ,,
20. ,,	8. ,,	26. ,,
21. ,,	9. ,,	27. ,,
22. ,,	10. ,,	28. ,,
23. ,,	11. ,,	29. ,,
24. ,,	12. ,,	30. ,,
25. ,,	13. ,,	31. ,,
26. ,,	14. ,,	1. September.
27. ,,	15. ,,	2. ,,
28. ,,	16. ,,	3. ,,
29. ,,	17. ,,	4. ,,
30. ,,	18. ,,	5. ,,

DECEMBER: 31 Days.

Last period began.	First movement.	Birth.
1. December.	19 April.	6. September.
2. ,,	20. ,,	7. ,,
3. ,,	21. ,,	8. ,,
4. ,,	22. ,,	9. ,,
5. ,,	23. ,,	10. ,,
6. ,,	24. ,,	11. ,,
7. ,,	25. ,,	12. ,,
8. ,,	26. ,,	13. ,,
9. ,,	27. ,,	14. ,,
10. ,,	28. ,,	15. ,,
11. ,,	29. ,,	16. ,,
12. ,,	30. ,,	17. ,,
13. ,,	1. May.	18. ,,
14. ,,	2. ,,	19. ,,
15. ,,	3. ,,	20. ,,
16. ,,	4. ,,	21. ,,

DECEMBER: 31 Days (continued).

Last period began.	First movement.	Birth.
17. December.	5. May.	22. September.
18. ,,	6. ,,	23. ,,
29. ,,	7. ,,	24. ,,
20. ,,	8. ,,	25. ,,
21. ,,	9 ,,	26. ,,
22. ,,	10. ,,	27. ,,
23. ,,	11. ,,	28. ,,
24. ,,	12. ,,	29. ,,
25. ,,	13. ,,	30. ,,
26. ,,	14. ,,	1. October.
27. ,,	15. ,,	2. ,,
28. ,,	16. ,,	3. ,,
39. ,,	17. ,,	4. ,,
30. ,,	18. ,,	5. ,,
31. ,,	19. ,,	6. ,,

Towards the end of the first month the fœtus is not larger than a walnut; in the fourth it has a length of $5\frac{1}{2}$ inches, and the sexes are already clearly distinguished. After the seventh month the child may be not only born alive but also reared. It weighs scarcely two pounds and a-quarter, and needs the assistance of artificial heat. In these prematurely born children the nails are not yet developed, and in the case of boys the scrotum is empty, the testicles being still in the inguinal canal (compare page 9). The fontanelles are distinctly wider than in children born at the normal time. In the eighth month the fœtus attains a length of 15 inches, and an average weight of three pounds. In the ninth month the fœtus is 17 inches long, and has an average weight of four to five pounds. Finally in the tenth month of pregnancy the length is 19 inches, and the weight six to seven pounds.

In the mother's womb the child is nourished by the placenta. This is a flattish, spongy disc, abounding in vessels, which is developed in the third month of pregnancy, and attached on one side to the wall of the womb, from the other side the umbilical cord proceeds to the fœtus The placenta is composed of maternal and fœtal formations, and the circulation of the unborn child is so arranged that the oxygen of the maternal blood passes into the fœtal blood by an exchange of gases in the placenta, and is hence conducted into the organs of the child by the arteries of the umbilical cord.

The umbilical cord is a gelatinous cord of various lengths. It connects the mother and the child indirectly, and contains in its interior two arteries and veins. It is carefully detached after the birth of the child. The connection between mother and child thereupon ceases, and the pulmonary respiration of the child at the same moment begins its functions.

The umbilical cord and the placenta not rarely occasion a difficult pregnancy, and disturbances at birth, in consequence of misplacement and bleedings. The placenta requires sometimes to be removed by the medical man, if it does not come away of itself (afterbirth). It must be also mentioned that the fœtus lies enveloped in three integuments known as fœtal membranes, which must be broken through to permit its exit. These are the *chorion*, which originates from the ovum, and in the womb takes part in the formation of the placenta; the *amnion*, which forms a completely closed sack in which the fœtus lies enclosed; and thirdly, the *decidua*, which is merely a layer of the mucous membrane of the womb. At the end of pregnancy it shows by fatty degeneration the moment of the completed development of the fœtus.

In order to protect the fœtus contained in these integuments from injury, the innermost of them (the amnion) is filled with fluid (the *liquor amnii*), which at parturition is evacuated at the moment when the first pains of travail burst the fœtal membranes.

The position of the fœtus in the womb is in at least ninety per cent. of all cases that are known as the cranial, that is to say the head of the child is first presented at birth.

Probably this position, which presents the most favourable prospect of a rapid and easy parturition, is due to the greater weight of the head, which towards the end of the seventh month of pregnancy sinks downwards.

The other commonest positions are the coccygeal (breech position) and transverse position. Both these positions, as well as the fall of a foot or arm, require medical assistance.

Considerable prominence of the abdomen towards the end of pregnancy need not, as is sometimes supposed, indicate a very large child; and should on no account awaken fears of a painful delivery. The great prominence is often caused merely by the presence of an excessive quantity of the amniotic fluid.

In some cases the prominence of the abdomen assumes a peculiar form, becoming pendant over the pubic symphysis. This is generally a consequence of previous rickets, and consequent contraction of the pelvis. This position of the womb may be the occasion of all kinds

of unpleasant feelings, and it is advisable to support the abdomen in these cases with a band. The contraction of the pelvis, caused by rickets, is often the cause of great protraction of labour, and of the death of the child, so that pregnant women who find the abdomen thus pendant, must understand that they will have to reckon with these difficulties, and should early arrange for medical assistance in child-birth.

Towards the end of the pregnancy the external appearance of the abdomen changes in so characteristic a manner that a woman who has previously borne several children feels plainly that the hour of labour is approaching. The child "sinks," as midwives say, some ten days before birth, and if a woman, about the same time, feels slight drawing pains ("previous pains") in the abdomen, and a pressure downwards, and in the direction of the rectum, she will do well to remain at home, and to be ready at any moment for her delivery. All these signs indicate a descent of the womb, and that the child is fully developed, and the womb about to present it to the world.

Unfortunately, in contradistinction to the favourable conclusion of the period of pregnancy, which I have thus described, a number of cases occur in which pregnancy is more or less suddenly terminated by miscarriage. Our attention must be turned to these cases on account of their great importance.

I have already mentioned some of the causes of miscarriage. But they are so numerous, that no one could be surprised at the occurrence of many cases, particularly among the labouring classes. Though the opinion of some authors, who consider a miscarriage a real delivery, may appear somewhat exaggerated, yet every experienced practitioner knows how often women announce that the menses have reappeared, after having been interrupted for several months. Examination shows not seldom a plainly enlarged womb, and an opened *os uteri*, which indicate either that a miscarriage has taken place, or is about to ensue, In these cases it is best for the patient to take ten days strict rest in bed. If the fœtus has been already aborted, which often happens without the pregnant woman noticing it, the womb needs the ten days repose to recover its normal condition; and if, on the contrary, the fœtus still remains in the womb, the rest is then of the greatest importance, as, under the influence of the rest in bed, a cessation of the bleeding often follows, so that it is possible to hope for an avoidance of miscarriage. It appears to me of great importance to call attention to what are called *imperfect* or *protracted* miscarriages, which, on account of decomposing remnants of the *membranes* remaining in the womb, may be directly dangerous to the life of the patient, and

lead to long continued bleeding.

No pregnant woman should in these cases neglect to procure medical assistance as soon as the bleeding commences, and any increase of temperature appears. *She must be strictly warned against undertaking any internal ablutions for herself*, as the vessels are open, and the least impurity may induce a severe purulent inflammation. Only a medical man is competent to deal with a miscarriage in such a manner that no permanent bad results may ensue.

For the rest the course of a miscarrage, as regards its duration, the labour pains, and all the other symptoms is exactly the same as that of delivery in the tenth month; and I can only give the patient, who has to get through a miscarriage, the advice to behave exactly as she would in the case of the birth of a completely developed child. She will then escape injury: or at least has not herself to blame if in spite of all her precautions any disorder of the abdomen follows the miscarriage—which, unhappily, often happens.

To proceed to parturition itself. The delivery is divided into three periods of time that follow immediately after one another; the first, the *period of opening*, which lasts from the beginning of the pains until the complete opening of the *os uteri;* the second the *period of expulsion*, which is concluded by the completed birth of the child; the third the *afterbirth* period, concluding with the ejection of the *placenta* and the *membranes* attached to it.

All three periods are characterised by the pains and their effects, and it may be unhesitatingly asserted that *the sharper, more continuous, and more rapid the pains the sooner is parturition completed.* "The pains," generally so called on account of the pain being the most prominent fact to the woman, are really contractions of the muscular wall of the womb, quite independent of the will of the woman, by which the opening of the *os uteri* is first affected, afterwards the expulsion of the child, and finally the ejection of the afterbirth.

It is hardly worth while to attempt to say anything about the average length of the time of parturition. The variations are so great that the most experienced midwife, and the cleverest specialist in midwivery, are quite unable to say beforehand how long parturition may in any given case take. It is impossible for them to know beforehand whether any sudden relaxation of the pains will ensue, or whether the afterbirth will show a distinct tardiness. In general experience shows that women have to suffer somewhat longer in bearing a first child. Also the age of the mother at her first confinement (in the case of women who bear their first child when they are no longer young) exercises some influence over the duration of the

Medicinal plants.

1. Camomile. 2. Valerian. 3. Sage. 4. Marsh mallow.

time of parturition, in consequence of the organs having become somewhat less elastic. Abnormal presentation and constriction of the pelvis are also calculated to lengthen the duration of parturition.

How far it is advisable to procure medical assistance in child-bed is often difficult to say, and depends upon each individual case. As child-birth is a perfectly natural and physiological function (as has been said above), it might be assumed that medical assistance could be always dispensed with—at least when an experienced midwife is present. But daily experience shows that not only do a number of obstacles to delivery exist, with which only the hand of a medical man can deal, but that also during a delivery that has begun quite normally, sudden accidents may occur which demand instantaneous medical assistance—I need mention only severe hæmorrhage or relaxation of the pains, involving direct danger to the life of the child, &c.—In many cases the midwife will be able to say whether medical assistance will be necessary: for instance, if she finds a transverse or breech position; or that the placenta is affixed at a very low point; or that the pregnant woman has a very narrow pelvis, so that the child's head is unlikely to pass without artificial assistance with instruments.—Immediate medical assistance is necessary in all accidents that occur during child-birth, and summoning a medical man must not be delayed until the child is almost dead, or the mother almost exhausted by loss of blood.

When the period of expulsion is ended, and the new born child announces by a strenuous cry that it is alive and strong, a short pause of repose almost always ensues for the mother. During it the doctor or midwife fastens off the umbilical cord. The afterbirth period which announces itself some twenty minutes afterwards by slight pains lasts generally but a few minutes. It is however not seldom subject to some disturbances, if either the placenta is so firmly attached that it does not come away, or if the *os uteri* which contracts rapidly closes so as to prevent its descending, so that assistance is necessary. In both cases medical help is essential.

The lying in which ensues must last at least nine days. During it not only does the mother recover from the strain of child-birth, but also the womb, which has become enormously distended during pregnancy, has the necessary time given it for an undisturbed return to its previous dimensions—a matter of primary importance.

It is distressing to see again and again so many mothers (either because they have no one to provide for them, or to look after their other children) compelled after three or four days again to resume their household duties; because, as I have previously remarked, so

many chronic inflammations of the womb, and above everything else the majority of displacements and prolapses of the female organs, are due to women arising too soon from child-bed.

On this account I must most urgently press upon all young mothers to submit to the counsels of the medical man and the midwife, who will advise that no woman should on any account leave her bed before the ninth day. It must be remembered that during the whole of this time a large portion of the interior of the womb is a wounded surface which heals only gradually, and must be protected from the shaking which accompanies walking.

The excretions of the womb during this period are called the cleansings. Under the influence of rest and the after pains, which are often felt for some days, they diminish rapidly. During the first days after delivery the excretion consists almost entirely of blood, and large black clotted masses of blood are often evacuated, about which the mother has no occasion to alarm herself. But from the fifth day the discharge assumes a more watery and clearer appearance. After the first week it becomes almost clear until the time when it gradually ceases.

It is always a sign that something is amiss if the discharge remains bloody for a longer time, or if it has a fetid smell. Under such circumstances, *medical assistance should be procured without delay even if the midwife does not consider it necessary.*—For the rest, the lying-in days should be days of complete rest for body and mind; that is to say not only should all noises and disturbances be kept far from the mother, but she should do her best not to excite and disturb herself about trifles, and to be in good spirits. —*Her diet should be easily digestable but generous and strengthening.* It is a complete mistake to imagine that a lying-in woman during the first days after her confinement should only take watery soups and similar slight nourishment. To suppose that she can form milk from such poor thin food is an error. Naturally heavy constipating mealy diet, and flatulent vegetables are to be distinctly avoided, but no objection can be made to good roast or boiled tender meat, eggs, rice, butter, white bread, and jam from the very first day—particularly if the digestion is in good order. It may be assisted about the third day with a luke-warm injection.

Particular importance must be attached to the mother's taking a plentiful and regular quantity of liquid, as the child should be brought up at the breast whenever that is possible. The breasts begin to prepare themselves to perform their functions, as soon as the first months of pregnancy are passed, by becoming distinctly enlarged. In the case of healthy well-developed pregnant women a liquid, first of all

watery, but gradually assuming more of the qualities of milk, trickles from the nipples some months before confinement; and in such cases it is advisable to wash the breasts daily with cold water, and to lay a little clean wadding on the nipples, so that the nipples may not be chafed by the clothes wetted with milk.

The milk generally appears very soon after birth, so it is necessary to bring the child early to the breast. In cases of necessity (*e.g.*, that of a child born dead) a milk-pump should be used.—Should chaps or any other small injuries appear on the nipples, redoubled attention should be paid to cleanliness, and the breasts well washed with clean water after every meal that the child takes, so that "bad breasts" may not ensue, which are both very painful, and, during the lying-in, dangerous to the health of the mother. The malady is occasioned by an inflammation of the tissue of the glands by microbes, which make their entry by the chaps, and almost always set up purulation; unless the inflammation is checked at the commencement by compresses, and by sparing the breasts, and by supporting them.—They should be held up by a shoulder-belt.

By far more serious than the infection of the breasts is that in which infectious germs reach the pelvic organs of the patient and set up the happily rare but so much dreaded *puerperal fever*.

I give no description of this malady, but only the most stringent caution, that if any rise of temperature is perceived during the days which first follow child-birth (and particularly on the fourth and fifth day, which are critical for this disorder), medical aid must be immediately procured, no matter what the midwife may say. It is only at the commencement of this malady that even medical aid can afford effective assistance. If the bacterial products of decomposition become transferred to the circulation, and a severe blood-poisoning arises, death, or a long and serious illness, is inevitable.

The return to work from child-bed (quitted at first only for an hour at a time) should always be gradual. Physical exertion, going up and downstairs, and lifting and carrying, must be avoided during the first weeks after a confinement. Women who work in factories, or gain their bread by daily work, must be strongly advised not to return to their employments until at least six weeks have elapsed, and to devote themselves to the child and to duties at home, so that the organism may have time to recover from the strains placed upon it by pregnancy and child-birth.

CHAPTER XIX.

Remedies.—Various methods of treatment—and general notes.

The aim of this chapter is to give a general survey of the numerous means at our disposal for the preservation of health, and for the alleviation of pain.

All the means at our disposal, medicines, massage, water treatment, and all the rest, *and all the skill of the most experienced medical man do not always, it is true, effect a cure* in the sense in which the public understand that word.

But if it be asked, "Of what use are they then?" the answer is easy. The cure, when it can be effected, is really a result of the action of natural forces. But, in many cases, these natural forces require, or are much assisted by the direction which we are able to give them. The fundamental principle of all medical treatment is that it supports the efforts of nature by all the means at our command.

Let us take an example. A child has fallen, and both dislocated and broken one of his arms—a thing that can easily happen

If we leave nature unassisted, what will happen? The broken portions of the arm will, by the formation of a callus, grow together again in whatsoever position they happen to lie, whilst the callus is forming, either straight or crooked, and regardless of the subsequent utility of the limb. As for the dislocation, that is an injury with which nature has no way of dealing, unless by making a false joint, and the limb may be consequently completely useless, without the assistance of the medical man, who remedies the dislocation, or sets the fracture in good position, so that in a short time the bones resume, as nearly as possible, their normal position.

But the medical man's task is no easy one. The number of maladies is so great, and the symptoms so varied, and the determination of what remedy can be best applied in a given case, often requires so much penetration, and such wide knowledge, that it is often impossible for anyone to assist the patient who does not perfectly understand the structure and functions of the human body, the various maladies and

the peculiarities of the courses which they take, and all the remedies which can simplify and hasten cure, or even make it possible.

The use of drugs compared with that of other methods of treatment.

From the very earliest times with which we are acquainted a tendency to fall into grooves in the treatment of disease has been remarkable. Often some particular method of treatment has for a great number of years obtained a hold upon the popular mind, and has become practically a fashion that has almost excluded other remedies. For example, at the present moment the hydropathic method (treatment with water) has obtained a high degree of popularity in Germany, and is being proclaimed by a number of enthusiasts as not only the best, but the only rational method of treating almost all diseases. In England, on the other hand, outside the ranks of the medical profession, and even within them, the use of what are called "general methods" finds comparatively little favour, and makes its way but slowly. On the contrary we find among the general public a mistake equally dangerous. Nine people out of every ten, as soon as they are convinced that they are "out of sorts"—a conclusion at which they are loth to arrive, as long as they can avoid it, with the consequence that the salutary rule of checking mischief in the earliest stages is generally neglected, much to their own disadvantage—regard their situation from some such point of view as this. "There is something or another wrong. The doctor will know what it is, and will give me something to take that will cure it."

To say off hand what the malady is from which a patient may be suffering is not always possible. I have already had occasion more than once to mention that fact, and to explain the reasons which may make a diagnosis difficult. But the patient is always dissatisfied when his malady cannot be immediately called by the right name, and begins forthwith to believe that the medical man does not know much more about the matter than himself.

But if, on the contrary, the medical man does at once see what is the matter, or, when he succeeds at last in detecting the nature of some tiresome complication of disorders, the patient then does not want to hear any advice about general lines on which he should regulate his life. To be informed that he is in the habit of smoking too much, that he does not take sufficient exercise, or that he takes too much in the way of stimulants, puts him out of humour—especially the last,

which is in too many cases the painful truth. He did not go to the doctor to hear that, nor to be recommended to alter his ordinary habits of life. To pay a fee for advice of that kind is sheer waste of money. What he wishes to have is—a bottle of medicine that will "make him well."

This conviction that all the physical ills of humanity can be successfully combated by a prescription is, however, a mistaken development of the last half-century. Before that, blood-letting, the lancet and the cupping glass, were resorted to on every possible occasion. The universal belief in "a bottle of medicine," that is to say in the use of drugs, has probably been largely fostered by the growing circulation of cheap newspapers, swarming with advertisements of patent medicines. Here it is well worth while to remark that these advertisements are most adroitly worded in a manner calculated to entrap the general reader, whose knowledge of the real nature of disease is either of the smallest, or absolutely none at all. A number of symptoms, common to almost any disturbance of the bodily functions, are ingeniously set forth, with the natural consequence that almost any one who reads the advertisement can immediately find what he recognises as a description of his own trouble. And he is of course delighted to have learned that "so and so's pills," or "some one's ointment," is the sovereign remedy for his disorder. Fortunately, the majority of these extensively advertised nostrums are of feeble action. Some of them are quite inert, and really produce no effect at all. But some, chiefly of the purgative class, are drastic remedies, and, if taken in ignorance, may do much harm. This is also true of drugs used for reducing temperature, and of others for producing sleep. Of late years this has been very forcibly brought to the notice of medical men. The ease with which the public can, and do purchase drugs such as antipyrin, antifebrile and phenacetin, as well as others of the same class, either in the shape of tabloids, or in some similar form, leads to their being taken without medical advice to an alarming extent. In the case of sleep producing drugs the state of affairs is still worse. Anyone can purchase from the druggist a bottle of sulphosel tabloids, and other preparations of a similar description. But the use of these, except under proper medical supervision, is positively dangerous.

I have no intention here of minimising in any way the value of drugs in the treatment of disease. Every properly qualified and experienced medical man knows quite well that they are, when rightly used, inestimably valuable. But the medical man knows also why he is using them, and what effects are likely to result from their use. He

can also observe how far that result is obtained. He can increase or decrease the dose in correct proportions as soon as he thinks it necessary to do so. Or he can substitute another drug for that whose effects have not satisfied him. And it is because he thus understands the natures of his medicines, and can watch their operation, that the drugs are in his hands so powerful and useful an aid in the treatment of disease. The patient will do well to reflect how different the case is when he gives himself doses of some advertised mixture.

But drugs cannot do everything. And the curious fact remains that at the present time, at any rate in England, the ordinary patient is with difficulty persuaded to attach serious importance to general measures, such as a special diet, exercise, massage, baths, and especially to any alteration of his ordinary habits. It is only when he puts himself to the expense of consulting a specialist that the ordinary Englishman is willing to be dictated to in these respects. Under all other circumstances a bottle of medicine that will cure him limits his horizon of the treatment of disease.

For this reason, whilst proceeding here to speak of certain common drugs and their uses, I must beg the reader to attach quite equal attention to what I shall have to say in another place about the use of water treatments, massage, &c., and to bear in mind what I have remarked in more places than one about the importance of making use of *all* the means of recovering and preserving health which nature has placed at our disposal.

Medicines, with Special Reference to Home Remedies.

Every one knows that medicines can be purchased at a druggist's shop, and that the druggist keeps also the various chemicals of which medicines are composed. Of these some can be purchased by anyone. Others are sold to the public only when ordered by a medical man.

The whole number of substances used in medicine, some hundreds in all, are registered in a work known as the "Pharmacopœia."

Of these are composed an infinite number of remedies, some fluid, some solid, some to be applied externally, some internally, some alone, and some to be used simultaneously with others, according to the peculiar circumstances of the individual case for which they are intended. The medical man who prescribes them requires an intimate acquaintance with the peculiar effect of every one of the components of the prescription; and all persons using the style of "Pharmaceutical Chemist" are required by Act of Parliament

to pass a series of examinations in evidence of their competence to deal with drugs.

In proceeding here to take a review of the medicines which are most effective and most to be recommended, I shall especially turn attention to those which can be purchased by the public, and are simple and economical home remedies. I have thought it most convenient to arrange and describe the various remedies in groups, taking their principal *effects* as the guiding principal of the classification.

Aperients.

I have already when discussing chronic constipation (p. 175), and also in the section on flatulence, spoken of various remedies for the tiresome malady of sluggishness of the bowels, which is by no means unimportant, and very common especially among women.

When mentioning these remedies I did not omit to add a warning respecting their habitual use, particularly in cases of chronic constipation, as the intestine in the course of time becomes easily accustomed to these medicines, and requires constantly stronger and stronger doses to affect it.

In the case of young children it is necessary to be doubly cautious about the use of medicinal aperients, as regulation of the diet and luke-warm injections produce the desired result equally quickly and surely. For adults a number of remedies were recommended which will in time give relief from even severe constipation.

Next to name remedies which may be given as aperients to quite little children. I would mention first *milk sugar* (half a teaspoonfull in milk thrice daily), and what are called *children's powders* (rhubarb and magnesia; it is best to give as much as will cover the point of a knife in the children's milk). Also *soap suppositories*, and *glycerine suppositories*, which are inserted in the anus of the child, are prompt remedies.

For older children from six to twelve may be recommended, *gingerbread cakes*, *honey* (eaten morning and evening on bread), *rhubarb*, *manna syrup* and *castor oil*, Manna syrup is procured from the Sicilian manna ash, by wounding the bark of the tree. It should be given a teaspoonful at a time, and is a very mild aperient for children producing no subsequent troublesome symptoms.

Rhubarb. Rhubarb syrup can also be purchased. A teaspoonful should be given, and produces its effect after about four hours.—*Castor oil* is one of the most trustworthy mild aperients. It is procured

by pressure from the seeds of the commou Ricinus communis, and is a thick transparent oil which has by no means the disagreeable taste attributed to it. A simple device for getting children to take it is to put it into their soup. It can be also very well drunk with coffee. A preparation called aromatic castor oil can be purchased. Respecting the quantity, children may, according to their age, take from half to a whole dessertspoonful. Adults should take at least a large tablespoonful.

Aperients for adults are best divided, according to their efiects, into mild and drastic, as they open the bowels slowly and without any attending disturbance, or with symptoms resembling those of diarrhœa, somewhat rapidly and loosely.—To begin with the mildest I shall first mention dietetic remedies, which are really no medicines, as they have nothing to do with the apothecary's stores. These are *honey* and *boiled fruit*, which produce excellent effects.

If these do not have the desired result *tamarind sauce* may be tried. This is a dark brown fruit-sauce that has a pleasant acid taste: or *calcined magnesia* (about 75 grains with a mouthful of water; it has an excellent effect upon heart-burns). To these may be added the aperients already named for children, of which both rhubarb and castor oil have an excellent effect upon adults. To these may be added mineral waters and their salts.

Saline mineral waters occupy a middle place between mild and drastic aperients, accordingly as they contain sulphate of soda or sulphate of magnesia. The sulphates are not contained in the same quantity in the different waters, and their amount determines their effect. The best known of the sulphate of magnesia waters are the Marienbad, Carlsbad, Püllna, Apenta, and Hunyadi, to which must be added Friedrichshall and Kissingen. Other watering-places boast of their natural mineral waters, which are distributed all over the world, and can be purchased from druggists.

To which of these waters a preference shall be given, and whether it is worth while to give them a trial, depends upon the particular case and the constitution of the patient who meditates using them. It is simpler and much more economical instead of procuring these waters to dissolve a stout dose of sulphate of soda or sulphate of magnesia in a glass of luke-warm water early in the morning, and to drink it in five or six small draughts whilst walking up and down. *Artificial Carlsbad salts* are also a cheap remedy that works quickly. A teaspoonful should be dissolved every morning in water.

There are, however, more powerful remedies, which may be called *drastic aperients*, of which I will mention a few.

The best known one is *senna.* As a household remedy senna is taken in the form of the tincture—or the syrup or the infusion—all of which the druggist supplies with proper doses for different ages.

To conclude with a remedy, which is not to be very much recommended to the public at large, I shall mention *aloes*, the thickened juice of an African plant. It works at first very slowly, and also occasions a certain hyperæmia in the great vessels of the lower abdomen Aloes is used as a tincture and as an extract, and is a principal ingredient of many patent pills. These are not to be recommended, as the patient soon becomes accustomed to them, and has to take more and more to produce any result.

Antiseptic Remedies.

The reader has often heard of bacilli, microbes, bacteria, and infectious germs not only in the discussion of infectious diseases, but also on other occasions, and particularly where pus has been mentioned, and no doubt has a horror of them.

The microscope and the experiments of later years have shown incontestably that in reality the greater number of maladies are caused by the invasion of extremely small invisible living organisms (partly of an animal and partly of a vegetable nature), which can develop destructive action, so that their destruction is of the greatest interest not to the medical man alone but to the whole of humanity.

The greatest enemies of these small organisms are *heat* and *cleanliness.* The greatest part of them are immediately destroyed by heat, and cleanliness hinders their multiplication and migration.

In daily life we make frequent use of both means. The disinfection of clothes after infectious disorders consists in nothing more than passing steam through them. Similarly we boil children's milk with the same intention of freeing it from all microbes and infectious germs with which it may have become polluted in the cow-stall, or on its way into the hands of the purchaser.

It was the English surgeon Lister that first, some thirty years ago, pointed out the importance of killing all infectious and septic germs. Since then every medical man has learned to make the operating hand and the instruments used free from germs (sterile), and to provide for the most scrupulous cleanliness in all operations. In consequence the severest operations have lost their terror, and hospital gangrene and puerperal fever, previously so common, have become actually rare.

But a comprehension of the rules of antiseptic treatment is of the greatest interest not to the medical man alone, but also to the public at large. By means of the observations of a few rules, in some ways of a very simple nature, they will be able both to avoid the communication of infectious diseases and also to obviate a great number of very different maladies which arise from the invasion of infectious germs, amongst which I may here mention by way of example only, thrush, inflammation of the eyes of recently-born children, and all sorts of purulating wounds.

The germ-destroying and antiseptic remedies are, however, not dangerous to the infectious germs and purulent microbes alone, destroying them in a short time; but have properties poisonous also to man if they are used in a mistaken way or too strong, so that they must be used with caution, and only in the hands of adults.

The commonest antiseptic remedies used by medical men are *perchloride of mercury* and *carbolic acid*. Both remedies are extremely poisonous if not diluted in a proper manner, and are by no means to be recommended to the public, as the most serious accidents have resulted from these substances being confused with medicines.

Perchloride of mercury, of which a solution of one grain in five thousand times that quantity of water is fatal to bacilli, is a compound of mercury and chlorine. It is sold in the form of small tabloids, which is very convenient for medical men, as it can in this shape be easily carried about and conveniently turned to use.

Carbolic acid is a product of coal tar, and is sold both as *raw* and as *purified carbolic acid*. The raw carbolic acid is used only for disinfecting stables, privies, &c. The purified carbolic acid is a valuable antiseptic remedy in all external maladies which are connected with purulation. It is sold to the public in a one per cent. and two per cent solution; and is used for compresses, small bandages for wounds, inhalation and disinfection.

Solutions of carbolic acid containing *more* than five per cent. of the acid are directly dangerous as they act very caustically and poisonously. Respecting carbolic acid poisoning see p 474.

Of antiseptic remedies which the public may use without hesitation I may mention *boracic acid*, *permanganate of potash*, *iodoform*.

Boracic acid is a fine white powder which is dissolved in twenty-five times its own quantity of cold, or three times its own quantity of warm water. It is a mild antiseptic remedy. It is best used in a watery solution (one teaspoonful to half a pint of luke-warm water), and may in this form do good service for compresses over the eyes, for rinsing the vagina (leucorrhœa), and the ears (purulent catarrh), as

well as for gargling water (inflammation of the pharynx).

Permanganate of potash is an equally cheap and valuable disinfecting remedy which ought not to be wanting in any house. The substance is purchased in the form of small dark blue needle-like crystals. Only a few need be dissolved in some water to make a rose coloured water for washing the mouth or for damping bandages. This substance is most useful for all rinsings, bandages, gargling, and washing.—The solution should not be made too strong. It should allow the light to shine clearly through it; and should be rather pale rose coloured than bluish red.

Iodoform is a yellow, sharp scented powder, with strong antiseptic properties. It is used either just as it is for blowing into purulent cavities, or as *iodoform* gauze for plugging them. but not in a water solution. In the form of iodoform ointment it is a valuable remedy in bandages for wounds, and particularly for those caused by burns. But I must not omit to mention that there are people who cannot bear iodoform, and as soon as it is applied to their skin not seldom develop a disagreeable iodoform rash, with formation of vesicles (iodoform eczema).

There are a countless number of substances which produce similar effects, and it would be an easy thing to give the reader the choice of some hundred antiseptic powders. But I think it by far better to recommend the public, in cases where they have to assist themselves without the help of a medical man, only a few trustworthy remedies than to set out a long list of these mostly artificial chemical products, many of them possessing very hard names.

Remedies for Flatulency.

Already, when treating of flatulency, I have mentioned along with the general treatment some simple and economical household remedies. The malady is a very tiresome one, occurring most frequently in elderly women, but also often attacking quite little children so severely that it becomes a kind of colic (wind colic), occasioned by the accumulation of gases imprisoned in the intestines.

The best known remedies for flatulency are sal-volatile (a solution of carbonate of ammonia), peppermint, and ginger.

These remedies, given in from two to six drops, according to the age of the patient, upon a lump of sugar, suffice to relieve the flatulence, particularly if a clyster is also taken to assist.

Ground nutmeg is also an effectual remedy for flatulency, but can be

recommended only for adults. A small dose should be taken with a draught of meat broth.

Chlorodyne, and *tincture of valerian* (fifteen drops upon a lump of sugar) also deserve a trial, particularly if disturbance of the menses, and pains in the abdomen, accompany the flatulence.

Blood Making Remedies.

When I mention blood making remedies it must on no account be imagined that these remedies, when taken internally, immediately turn into blood—which a great many ignorant patients seem to imagine, supposing that by taking a few boxes of iron pills they can immediately conjure into themselves no one knows how much new blood. If blood making were as easy as that, many a patient in a critical condition could be certainly rescued, and many an anæmic girl helped, who can scarcely crawl for weakness, and, nevertheless, has "taken" ever so many remedies for the severe disturbances of nourishment under which her organism is suffering. What false notions a great many people have about "taking something," and about the manner in which medicines produce their effect! How can any remedy form blood? All that medicine enables us to do is *to stimulate blood formation;* and this can be successful, and result in the formation of blood only if various other conditions are complied with. The body requires free albumen, in order to be able to use it for making blood, also, to a certain extent, an excess of nutritive materials or of reserved albumen, without which all blood forming remedies are absolutely useless.

What then is the preliminary condition of any treatment with blood making remedies? This: that during many months the body must be fed upon very digestible and nourishing diet; that the generally poor appetite of the patient must be increased; that exercise, bathing to strengthen the skin, and moderate development of the muscles must be insisted on—in fact, that the body may be put into a condition to form new blood.

Nothing is more mistaken than to want immediately to treat any case of anæmia with all kinds of remedies containing iron. The patient who regards medicine as the thing of most importance, and then, as much as possible, neglects the general treatment, only receives injury from the medicine taken too soon, and loses confidence because he perceives no result.

But afterwards—when the necessary conditions of formation of

blood have been first complied with, and when the body has a certain excess of albumen at its disposal, it will respond gratefully to the stimulation to form blood; and then *iron* certainly stands high above all other remedies.

Everyone knows that a host of preparations of iron exist, iron wine, iron pills, iron powders, iron chocolate, and many others daily recommended by advertisements as remedies against chlorosis, anæmia, general weakness, and all sorts of other maladies.

Some of the preparations distinctly deserve recommendation, and can be easily obtained from any chemist—the citrate of iron and ammonia, the common citrate of iron and quinine—and a large number of varying formulæ made up in tabloids or palatinoids, in which iron is combined with arsenic, nux vomica, &c., by various manufacturers. Hommel's Hæmatogen also deserves special mention as a very active agent.

Blaud's iron pills may also be recommended. Two pills should be taken thrice daily. And I might add several others.

Cod liver oil deserves also to be mentioned here along with iron. It has for long enjoyed a great reputation as a blood-forming remedy, particularly in cases of weakly, scrofulous, and rickety children.

Cod liver oil, which is obtained from the liver of the codfish, mostly caught on the coast of the Lofoden Islands, is characterised by being extraordinarily digestible if well prepared. It is a palish yellow, thin, fluid oil, sold in various qualities as purified cod liver oil, or aromatic cod liver oil. Various admixtures with maltine, and with salts of lime, &c., in the form of phosphates, making what are known as cod liver oil emulsions, are largely used, and are very valuable. From a teaspoonful to a dessertspoonful should be taken thrice daily.

This remedy may be strongly recommended also to adults who suffer from consumptive maladies. But the remedy is best not used in the height of summer in feverish conditions, or when disturbances of the intestines exist.

Experience proves that different preparations of cod liver oil should be recommended to different patients, the particular emulsion which one individual can easily digest being often digestible only with difficulty by another, whilst the oil in the form useful to the latter disagrees with the former—though both preparations may have been compounded with equal care and skill. A trial of the different emulsions, &c., of good manufacture can alone show which is most suited to the particular patient.

In order to be freed from the disagreeable greasy after-taste which the oil leaves in the mouth (the aromatic cod liver oil is without this)

it is best immediately after taking the dose to chew a piece of bread for a while and then to spit it out. Gargling with black coffee or with vinegar water may be also recommended. Children are sometimes particularly nauseated by cod liver oil, and can hardly take it, even when they try. It is best not to force such children to use the remedy. On the contrary, many well-made modern emulsions, are palatable to children, who frequently get quite fond of them, and ask for more.

Styptic Remedies.

In checking bleeding we have first of all to consider the locality and the character of the bleeding which we desire to staunch. There are a number of effusions of blood which appear to be directly advantageous to the body, and these must not be checked, as they represent a kind of self-purification of the body, as we have seen in the case of the menses.

These, however, are exceptions from the rule, and in a hundred cases of bleeding it is desirable in ninety at least to close as quickly as possible the place from which the precious stream of life is flowing.

The most important thing of all in all cases of bleeding is rest—and complete rest. Whether a hæmorrage occurs in the lungs or in the stomach, or from some breaking of an artery, or in consequence of some severe external injury with a great loss of blood, nothing is worse or more foolish than to be rushing about trying one remedy after another. Any bleeding generally stops of itself if the patient is put to bed in some appropriate position, so that the place at which the blood is being extravasated is placed as high as possible. In the chapter on first help for the wounded advice has been already given how the wound should be bound up, and the great vessels constricted so as to staunch the bleeding with a temporary bandaging.

But there are a great number of hæmorrhages which cannot be staunched either by placing the patient in a certain position or by bandaging; but can, on the other hand, be often favourably influenced by some very simple home remedy, until the medical assistance, absolutely necessary in severe cases, can be obtained. On account of the great importance of the subject I will here arrange in order the most important cases of bleeding that can occur, so that the reader may immediately be able to seize upon an advisable way of proceeding, according to the nature of the case.

1. *External bleeding.* Place the locality of the bleeding high up

In case of bleeding in the limbs constriction above the wound, and treatment as on p. 426. Bandage with wads dipped in perchloride of iron, vinegar water, or solution of alum. Lay on cold compresses.

2. *Bleeding from the nose.* Draw up into the nose by inhalation cold water, or vinegar water, or lemon water. Hold the head back. Do not speak. A cold, damp cloth upon the nape of the neck and around the neck. Plug the nose with a wad dipped in chloride of iron. Warm foot baths.

3. *Bleeding in the lungs.* Rest in bed in a horizontal position. All excitement of the patient must be avoided. Speaking as little as possible. Not too many people about the patient's bed.—Cold, wet compresses around the whole chest. See also p. 224.

4. *Bleeding of the stomach.* Lying down horizontally. The corset and dress to be loosened. Wet cold compresses on the region of the stomach. The patient should swallow small lumps of ice; or a few drops of tincture of opium on sugar. Nothing should be eaten or drunk for at least six hours. See also p. 166.

5. *Bleeding of the bladder.* Ice water compress on the lower abdomen, and complete rest in bed. Cold emetics.

6. *Bleeding of the intestines.* Injections of warm water (103° Fahrenheit, 40° Centigrade). Afterwards cold compresses on lower abdomen. Opium. Rest in bed.

7. *Bleeding piles.* Only in case of severe, exhausting bleeding, to be checked by cold half-baths. Woollen wad to be deeply inserted.

Emetics.

I have already pointed out when discussing poisoning how important it may be in many cases of sudden malady to know some remedy by which an immediate evacuation of the contents of the stomach may be effected. But also in cases of great mistakes of dieting, of accumulations of mucous in the trachea, and of danger of suffocation in croup, a strong emetic is often desirable to afford the patient relief.

As an emetic for children, ipecacuanha wine is best. This can be purchased ready prepared. It should be given by teaspoonfuls until the desired result is obtained.

For adults two remedies deserve especial consideration: *ipecacuanha* (a Brazilian plant), and tarter emetic (a combination of antimony). They are often prescribed together by medical men. Both remedies require to be used with caution, as, if given in large quantities, they

Medicinal plants.

1. Wormwood. 2. Arnika. 3. Gentian. 4. Peppermint.

produce disagreeable complications.

But a ready prepared *ipecacuanha wine* can be produced and taken by teaspoonfuls. The fourth teaspoonful generally produces the desired result.

Febrifuges.

We have seen that the normal temperature of a healthy man under all circumstances, whether in the cold north or at the equator, is 99° Fahrenheit (37·5° Centigrade), and that the organism in a sound condition has the power of keeping exactly at this interior temperature, no matter how low that of the exterior atmosphere may be.

The case is, however, otherwise, when the body is out of health, and particularly when infectious germs have attacked it. The organism then exerts itself by increased metabolism, and by an increased internal temperature, to release itself from the invaders, whose products of decomposition are flooding the blood, and at the same time poisoning it.

Seeing that fever must be, to a certain extent, regarded as an effort of self-defence on the part of the affected organism, it is by no means necessary immediately to attack with all the artificial remedies at our disposal every slight increase of temperature which the clinical thermometer indicates. On the other hand, we may reasonably hope that, so long as the thermometer does not indicate dangerous temperatures of 103° Fahrenheit (40° Centigrade) or more, that the enemy may be overcome by the efforts of nature without any of these remedies—the more as we have a valuable ally in water treatment, which will, in many cases, render the use of any other remedy superfluous. But water treatment does not always, nor in all cases, alone suffice. Severe maladies exist which render the use of what are called febrifuges necessary; and in these cases the efforts of nature must be seconded by them, if the patient is to be rescued.

We can easily understand the effect of a cold compress or of a cold bath; they directly withdraw warmth from the body. But we do not know in what manner the febrifuges are able to affect the regulation of the temperature of the body. It must be conjectured that they are able to affect the central nervous system—in consequence of which many may be also used as remedies that mitigate headache—but of this there is no doubt that we possess a whole series of medicines that reduce the temperature of the body in a remarkable manner.

To begin with the best known of these remedies, I will first mention antipyrin. This is an artificial chemical preparation, largely used as

a medicine, and proved serviceable in a great number of maladies, of which I may name rheumatism of the joints, influenza, inflammation of the lungs, and typhoid. It is particularly to be recommended for adult patients, and is taken in doses of ten to fifteen grains, once or twice daily.

As it produces, if mistakenly used, weakness of the heart, it should not be taken unless prescribed by a medical man, and particularly not by children.

Phenacetin has the same effects as antipyrin. I prefer it to antipyrin because I have never seen it produce the injurious secondary effects upon the heart, and because this remedy generally frees the head from pain. Adults take ten to fifteen grains. Children under six should not take more than three grains. But on the whole I advise that this remedy should not be given to quite little children. With them it is better to try phosphoric acid. This remedy, in connection with cool baths and packs, will almost always produce the desired effect. (Sixty drops of dilute phosphoric acid, three ounces of water, and three-quarters of an ounce of raspberry juice. One teaspoonful every hour).

The oldest of all febrifuges is quinine, which is now generally sold as a powder. The chincona tree, whose bark contains this very powerful quinine, grows in South America, and now in India, and the natives, hundreds of years ago, duly appreciated the medicinal value of the plant, which they regarded as sacred. On account of its rough, bitter taste children have a horror of quinine, and will make a great resistance to taking it. But it can be given wrapped in wafers, which do not dissolve until they reach the stomach, and the bitter taste is then imperceptible. *Quinine not only works as a febrifuge, but also strengthens the stomach and the digestion, and removes nervous disturbances of the intestines and flatulence,* and is, therefore, a most valuable remedy, particularly when taken in conjunction with others of a similar character. It may be taken either in the form of a powder (for adults, two to five grains twice daily), or in the form of tincture of chincona—or in the form of the decoction, or of the well known ammoniated tincture of quinine.

Naturally every druggist has for sale a number of preparations of quinine. Of these I will name only *compound tincture of quinine* (consisting of quinine bark, gentian, orange peel, cinnamon and alcohol; and quinine wine, compounded of quinine bark and red or orange wine).

Diuretic Remedies.

Diuretic remedies are principally derived from the vegetable

kingdom, and taken in the form of infusions or tinctures. They occasion, by a stimulation of the heart's action, a corresponding increase in the action of the kidneys, and so a larger excretion of urine, and are of immense value in many maladies, particularly in those that present symptoms of engorgement with dropsy.

Not to enter too copiously into the diuretic remedies of the vegetable kingdom I name only *digitalis*, *juniper*, and *squills*.

The first of the remedies named *fox glove* (digitalis), which is used also for maladies of the heart, and has the property of strengthening the heart, is a very dangerous remedy in unprofessional hands. It should be left to be prescribed by a medical man alone, as if misapplied it possesses very poisonous qualities.

Squills, which are always kept at hand by many prudent housewives, are in many ways a valuable home remedy. Decoctions of this plant are effective not only as diuretics, but also for strengthening the heart, and for mitigating coughs.—The best, or at any rate the simplest plan is to use *syrup of squills*, which can be purchased of any druggist.

The druggists have for sale a large number of artificial chemical diuretic remedies prepared in accordance with medicinal recipes. I may mention potassium nitrate (sweet nitre) and potassium acetate, simply for the sake of making the reader acquainted with them.

Cough Remedies.

The man who supposes that a cough remedy must be always something that relieves the cough, is as much in error as he who imagines that a cough is always a malady and must be got rid of as soon as possible. So far is this from being the case that there are a number of maladies in which a sturdy cough is to be welcomed; though on the other hand there can be no doubt that a continuous irritating cough may be a great torture to the patient, and one which must be mitigated.

Accordingly as the cough is to be encouraged or mitigated, we must divide cough medicines into those which *provoke* a cough and those which *allay* it.

Medicines for stimulating a cough may be often very necessary for old people or for children if they have not of themselves sufficient strength to remove the accumulation of mucous on their chests. Amongst these medicines certain preparations of ammonia are the most deserving of attention, of which I may mention volatile salt of

hartshorn (carbonate of ammonia) and sal ammoniac (chloride of ammonium).

Except in case of a medical recipe, *carbonate of ammonia* is best used in an aqueous solution which anyone can prepare for himself (30 grains dissolved in a large cup of sugar and water. A teaspoonful to be taken every two hours for bronchial catarrh). *Sal ammoniac* can be bought in prepared *sal ammoniac pastilles.* One should be from time to time allowed to dissolve in the mouth. A solution of 75 grains of *sal ammoniac* in five times the weight of spirits of wine, with the addition of 15 grains of anise oil, has an almost better effect. A few drops of this solution given on a lump of sugar at once produce the effects of loosening the mucous and causing a cough.

Ipecacuanha also, which has been already mentioned amongst the emetics, if rightly applied, has the effect of only producing a cough : and *ipecacuanha wine* and *tincture of ipecacuanha*, which can be purchased ready for use, deserve to be mentioned here ; though I must add that these remedies should be used only when prescribed by a medical man.

Cough tincture distinctly stimulates a cough. But on account of the marsh-mallow, which is one of its components, it has this advantage, that the cough takes a gentle course, so that this good and highly recommended home remedy may be used without hesitation. (One dessertspoonful should have two cups of boiling water poured upon it).

The composition of other cough tinctures is as follows: eight parts of marsh-mallow, three of Russian licorice, and two of anise. But it is unlikely that anyone will take the trouble to prepare the mixture for himself, as it can be purchased at the druggist's.

If we now turn to the remedies which allay cough or mitigate the irritation, we shall find that though all produce the same effect they do not all work in the same manner. Some act soothingly on the larynx, others loosen or liquify the phlegm. Others diminish the pain. It will be self-evident that we prefer, therefore, to combine the remedies so as to obtain a more complete effect.

In case of any feverish malady I would advise everyone on no account to be guided by their own judgment, but always to follow the more experienced counsels of the medical man ; as it is not possible for anyone who has not received a medical education always to know whether it is advisable to mitigate the cough. But there are, on the other hand, cases of chronic cough in which anyone may quite reasonably decide for himself to do something to ameliorate his own condition.

Of the sedative remedies opium (or morphia, its active principal) or codeine must be assigned the first rank. When rightly prescribed all

three, used in accordance with medical directions, may have extraordinarily beneficial effects. Taken in any excessive quantity, or habitually, they have unhappily become a curse to mankind, and have contributed much to bring all medicinal remedies into discredit with a number of timid people.

Of household remedies which loosen and relieve coughs, I may mention first some cough tinctures which are particularly suitable for patients suffering from chronic coughs—that is to say, for continued use. For example, *marsh-mallow tea* (one hundredth part marsh-mallow leaves, one fiftieth part marsh-mallow root, one twenty-fifth part licorice root, one tenth part mallow leaves); also *Iceland moss tea* (Iceland moss, licorice root, and fennel in equal parts; a dessertspoonful is enough for three cups of the tea), or *sage tea* with some *honey* added.

But in addition to these there are also many remedies for relieving a cough that may be recommended, together with which genera treatment should on no account be left out of sight—good diet, compresses at night, &c.

For example, what are called *cough mixtures* are, rightly, very popular. They mostly contain marsh-mallow syrup, syrup of squills, ammoniac of anise, sal ammoniac, Spanish licorice, &c. They can be purchased from the druggist, and should be taken according to the age of the patient and the severity of the cough by teaspoonfuls or dessertspoonfuls.

Stomachic Remedies.

By far the larger number of the approved stomachic remedies are composed of a series of vegetable bitters, such as are contained in gentian, Quassia, Colombas, orange rind, &c. But they are all of them able to produce their effect only when the most important condition of a good digestion exists, that is to say, when the muriatic acid in the contents of the stomach are neither excessive nor too small.

Already when discussing digestion, and elsewhere I have pointed out the curious fact that free muriatic acid is formed in a healthy stomach. This appears to be necessary for digestion; and both an increase of the quantity of this acid and its presence in too small quantities produces maladies of the stomach.

To give an example of pathological increase of muriatic acid in the stomach, I may mention that this is the cause of what are called "heart-burns." A diminution of the quantity of the acid takes place in all feverish maladies, so that a furred condition of the tongue, as a symptom of sympathetic affection of the stomach, almost always accompanies fever.

I must here again remind the reader that, as I have already said, all remedies which are below enumerated as capable of strengthening the stomach are unavailing if the formation of muriatic acid is in any way disturbed.

Anyone who is not so well informed as a medical man who has made a speciality of diseases of the stomach, is, it must be confessed, often in the case of chronic disturbances of digestion reduced to conjectures and experiments.

Let us assume that the stomach produces too much muriatic acid. In this case we shall first of all avoid sour foods and drinks. On the other hand we shall neutralise a part of the excess of muriatic acid by alkalies, and most simply in the following manner by taking daily as much calcined magnesia as will cover the point of a small knife, or an equal quantity of bi-carbonate of soda. After this an improvement of the disturbed digestion will shortly ensue—that is provided that our assumption is true.

But if no improvement ensues then in most cases the amount of muriatic acid contained in the stomach is too small, and we remedy this mischief by taking daily after the mid-day meal a few drops of diluted muriatic acid in sugar water. It is beneficial in these cases to take, in addition to the muriatic acid, also a little pepsine. Pepsine lozenges can be purchased from the druggist; and are well worth trying as a remedy in cases of weakness of digestion, loss of appetite, bad taste in the mouth, foul flatulence, &c.

After having thus discussed these necessary preliminary details we may now proceed to the actual remedies for strengthening the stomach, which are capable of mitigating a chronic weakness of that organ by their influence upon the nerves of its mucous membrane. I shall not mention every one of the numerous bitters that might be named, but prefer to give some of the most useful mixtures which are mostly prepared with brandy, and constitute both strong and inexpensive "stomach bitters."

1. The following is a recipe that may be recommended to be taken with good brandy.

20 parts orange rind
20 parts wormwood
10 parts gentian root
3 parts cinnamon

To be chopped up and mixed with a quart of brandy and kept for ten days in a well-closed vessel—best in a stone jug. The whole then to be strained through fine muslin and poured into a bottle. Half a liqueur glass to be taken before or after meals.

2. Recipe for a stomachic bitter.

20 parts wormwood
6 parts orange peel
4 parts gentian
2 parts cinnamon

To be corked up in a quart bottle with half-a-quart of brandy poured upon them. After 10 days ready for use. The herbs remain in the bottle which may be several times refilled with brandy.

3. If the above recipes seem too alcoholic, or if something more delicate is desired, I recommend the following stomach drops.

2 parts gentian
3 parts orange rind
3 parts marsh trefoil
25 parts diluted spirits
65 parts cinnamon water

Thirty drops to be taken thrice daily.

Nerve Remedies.

It is self evident that the more a given organ is exposed to different maladies, the more remedies for the different maladies will have been sought after. So I need not say that the remedies for disorders of the nerves are countless.

The nervous system is a structure very easily influenced and excited, and also most delicately constructed. It might be compared to a very sensitive man who takes offence on every possible occasion, and is affronted at everything, even when no slight has been intended.

I will not here enter into a dispute about the use or uselessness of remedies that act upon the nerves. That many of them (alcohol for example) have become, in consequence of their enormous dissemination, a positive curse to humanity may be immediately granted. But others must be confessed to be indispensable aids in the treatment of maladies, and unadulterated blessings in the hands of the medical man and the nurse.

But almost all nerve remedies are two edged instruments. Used in small quantities they act upon the heart and nerves as stimulants and supports. Taken in quantities or habitually they are weakening, exhausting, and numbing, and finally wreck the nerves.

This is no reason for condemning them and entirely rejecting their use. No one is compelled to use an excessive quantity of these remedies so as to be injured by them instead of deriving benefit from them. No one is obliged to become a slave to alcohol, tobacco, morphia, or opium. At that rate we should have to renounce every

glass of beer, every pipe of tobacco, and every cup of coffee, whose stimulating effect is universally acknowledged.

But intemperance, and human weakness, and the completely false way of living of the present day, which seeks only for enjoyment physical or mental, and, particularly in the large towns, has become a perfect rush for "pleasure," and the excessive demands which modern existence daily and hourly makes upon both mind and body—all these together have made us "neurotic," and drive us to the tempting nerve-stimulants, which promise to lighten the burden of our lives.

The remedies are also pleasant to the taste, and in consequence people assert that they *cannot* do without them. But they *can* do without them if they choose, only they do not choose.

But now to come to them.

I begin with those which must be used only in accordance with medical prescription. These are used either as anæsthetics to produce complete insensibility during an operation, or to allay pain, or finally as soporifics to produce sleep and repose.

1. *Sulphuric ether* and *chloroform*. Both are strong smelling transparent liquids, which are used either alone or mixed with each other to produce a state of insensibility. The patient inhales the vapour of the respective anæsthetics; consciousness after a time disappears completely, and the operation, or parturition, or what not else, takes place without the patient's feeling anything. Danger of the patient's not recovering from the state of insensibility there is, thanks to our modern science, practically none; and the boons which these anæsthetics place within the reach of the practised surgeon's hand are indescribable.—I may mention that care should be taken that a surgeon does not, if he can help it, use chloroform and operate alone, but always has an assistant at his side, but in country districts this cannot always be procured.

A satisfactory condition of the general health, and a sound heart, are necessary conditions of the use of anæsthetics.

2. *Opium*, *morphine*, *cocaine*.

The opium and morphine are used internally, cocaine is used externally.

Opium is the dried juice of the unripe poppy head of Asia Minor. It is a brown sticky substance, which is much prescribed by medical men, either in the form of tincture of opium (laudanum), or in the form of powders. One of its principal effects is that it is a binding medicine, and it is accordingly one of the principal ingredients of diarrhœa mixtures, cholera drops, &c. But it is also an anodyne, a nerve sedative, and a soporific, and in these particulars resembles its

alkaloid morphine.

Morphine is a white powder, obtained from opium, which is soluble in water, and has remarkable properties as a sedative. It is used by medical men, either in the form of drops, or as a powder, or in the form of hypodermic injection, in various maladies, and is of immense service. It is intensely poisonous, and should be used only by medical men.

Cocaine is the effective constituent of the leaves of the coca, a South American shrub. It is used almost exclusively in an aqueous solution, and either poured in drops or painted with a pencil upon portions of the mucous membrane which it is desired to render temporarily insensible. The remedy works very quickly and certainly, and in the hand of the medical man is a most valuable auxiliary in small painful operations; for example in handling the eyes or œsophagus.

All three remedies can be used only for a certain time, only in definite quantities, and only by a medical man. Habituation to these drugs produce serious injuries of the nervous system (morphinism, cocaïnism), which can be cured only by treatment in institutions, and only when the patient is resolutely determined to recover.

3. *Chloralhydrate* and *preparations of bromide.* These medicines, less dangerous, and milder in their effects than those which I have just described, are rather nerve soothing medicines, which can be used, in cases of necessity, even by unprofessional hands, if it is desirable to quiet some condition of nervous excitability quickly.

Chloralhydrate (a white, colourless crystal of a bitter rough taste) is easily dissolved in water. It is especially used in cases of excessive sleeplessness, in delirium tremens, in convulsions, and states of mania, and is given in beer or water.

More than forty-five grains in a single dose, or more than ninty in the course of the day is inadmissable and dangerous.

The preparations of bromide (potassium bromide, ammonium bromide, and sodium bromide) are best given in a combined mixture. They constitute a most excellent sedative for all states of nervous excitement. They can be best, most safely, and most cheaply procured as Sandow's effervescing salts of bromide, which is sold with directions for use. The remedy should be taken only so long as it is absolutely needed, and with occasional intervals, not only because under other circumstances the effect is diminished, but also because it seems sometimes to produce weakness of the memory.

If any one considers the remedies above mentioned too dangerous, and wishes, in sudden or pressing cases, to know of some remedy which he can himself use without applying to a medical man; we have

also at our disposal some valuable products of the vegetable world which act as stimulants and sedatives upon the heart and nerves.

I may place foremost *coffee* and *alcohol*. Both are excellent remedies for *fainting*, *weakness of the heart*, and *exhaustion*.

Coffee is procured from the tropics. The soft seed, commonly known as the "bean," is contained in pairs in a membrane. These require to be dried, roasted, ground, and an infusion made from it with boiling water, before the brown beverage is procured. The fruit is imported in immense quantities into Europe, where it has become a universal drink.

The efficacious constituent is caffein, which stimulates both heart and brain to a greater activity, and, in consequence, not only makes the whole organism more capable of work, but also capable of working with pleasure.

As both tea and coffee rather agitate some men than stimulate them, such persons should be advised to drink them *weak*, and to render them harmless by adding milk to them. The plan of adding to coffee *roast barley*, *roast chicory root*, or *roast beet* (adopted partly out of economy), is by no means to be condemned. Warm coffee is much more to be recommended for working men than the dram, without which many honest and capable workmen unhappily believe themselves incapable of getting through their daily duties.

Coffee is to be avoided in cases of severe weakness of the heart, and in conditions of great excitement. It can also, if taken in too large quantities, or too strong, occasion palpitation of the heart, feelings of faintness, and disorders of the digestion.

Alcohol (Arabic, al Koh'l = the essence), also known as spirits of wine, is an organic, or hydrocarbon compound with a sharp smell, which has a great affinity for water or aqueous vapour, and is hardly ever prepared absolutely without any admixture of water. Absolute alcohol is not quite pure, the spirit amounting to only about 97 per cent.

Alcohol is the factor which determines the strength of all intoxicating drinks, whether wine, beer, brandy, or whatsoever else they may be. The amount of alcohol contained in each varies. (See p. 146).

Taken in small quantities all these beverages have a warming, stimulating, and cheering effect. If taken in excessive quantities they produce symptoms of both acute and chronic poisoning—too well known as drunkenness and chronic intoxication to need any description here.

On the sick bed *port wine* (taken in teaspoonfuls), *brandy* (taken in drops, or with weak tea), and *champagne* afford valuable assistance,

not alone in cases of sudden weakness, but also in all maladies that take a critical course, when it becomes necessary to economise the heart's forces if the organ is, on the day of the crisis, to be equal to the strain which will be put upon its strength.—During convalescence in chronic cases of general weakness, in chlorosis and anæmia, and during the nursing of a child at the breast, red wine (old French wine is best) is a most important strengthening remedy, of which from half-a-glass to a whole glass should be taken daily. Cheap red wines—to put the fact quite plainly—do not serve the same purpose, as they are adulterated with all kinds of inferior vegetable acids, and diluted with coloured water.

Should there be any timid parents or patients who will have nothing to do with these nerve stimulants which I have just named (coffee, tea, and alcohol), we are still able to suggest others; and I shall, in conclusion, name some very mild and agreeable sedatives, which we reckon among medicinal vegetables; these are *valerian*, *arnica*, *peppermint*, and *chamomile*.

Valerian is a plant that grows all over Europe, and possesses in its root a substance which acts as a distinct sedative upon the nervous system, and is best extracted by pouring water upon the root. Valerian can be purchased in the form of *tincture of valerian* (20 drops daily on a lump of sugar) or as *etherated tincture of valerian* (10 drops thrice daily). But it can also be used most advantageously in the form of a tea; and this form has the advantage that other medicinal plant which have favourable effects can be added to it. Thus, for example, Heim's nerve tea, which is much used as a household remedy against hysteria and general weakness of the nerves, is composed of

Valerian root Orange peel Peppermint leaves Marsh trefoil leaves	In equal parts.—Three cups of hot water should be poured upon a dessertspoonful of the tea, well mixed. To be drunk cold.

Arnica is a plant found commonly in Europe. It is a flower with a tall stalk, and bright yellow radiating flowers, and as a household remedy is highly esteemed. The flowers are the part of which we make use. It can be used most simply in the form of tincture of arnica, which can be purchased ready for use, and is particularly suitable for external application on damp bandages in case of bruises.

Combined with formic spirit (30 per cent. tincture of arnica and 70 per cent. formic spirit) it furnishes a good remedy for embrocation in cases of rheumatism of the joints and of violent pains in the joints and limbs—arthritic pains. Finally an infusion of arnica flowers, combined with oil of anise and salts of hartshorn, are given in

conditions of great weakness, in faints, and when there is danger of excessive bronchial secretion.

Peppermint (mentha piperita) is principally used as a household remedy in the form of peppermint leaf tea. The leaves which have a powerful aromatic smell contain about one per cent. of peppermint camphor. It suffices to pour two cups of boiling water on one dessertspoonful of the tea. The tea is an excellent remedy in cases of cramp of the stomach, colic, flatulence, and also in diarrhœa.

Preparations of peppermint can be purchased from the druggist ready for use, in the forms of *peppermint syrup*, peppermint oil (contained in peppermint lozenges), *peppermint spirit*, and *peppermint camphor* (menthol), which is much used externally in face-ache, rheumatism, migraine and all other similar maladies, in the form of a pencil with which the painful part is well rubbed.

Also in many snuffs, which are used as remedies for nasal catarrh, the really effective constituent is menthol.

Chamomile (chamomilla vulgaris), a plant whose flowers contain an aromatic bitter, and also an oil (chamomile oil) exercises a most favourable influence over nervous irritations. It is one of our most familiar, most popular and most favourite home remedies, and is often used both in the external forms of dry herb cushions, and damp compresses, also as a gargle, an eye water, and for rinsing, and as an addition to bath water, and also internally. In the form of a tea, to be drunk as warm as possible it is particularly beneficial in cases of chills, rheumatism, and chills of the stomach, when the patient can take rest in bed. It not only frees from pain but also produces a free perspiration of the external skin. It is also of value as a remedy for flatulency (see p. 172); and I add here in particular a recipe for a water for relief of flatulency in which chamomile flowers are the principal effective ingredient.

100 parts chamomile flowers 30 „ orange peel 30 „ citron 30 „ peppermint 30 „ cummin 30 „ coriander seed 30 „ fennel.	To be steeped a whole day in two quarts of water. The whole then boiled; and taken from the fire as soon as it boils, and poured through a cloth. (Two dessertspoons, morning and evening). May be sweetened with honey.

Sudorific Remedies.

It has been known for many years that both in feverish maladies,

and also in a number of chronic complaints it may be most advantageous for the patient to stimulate the skin to perspiration, that is to open the pores artificially, and so at the same time to increase the circulation, the excretion of perspiration, and the cutaneous respiration. It is not so long since the treatment of all maladies began with producing artificial perspiration, which was followed by a considerable letting of blood with a view to removing the "bad humours" from the body.

Since those days our scientific knowledge has advanced, and we have given up this notion of "bad humours," but, to mention an example, I have had occasion when treating of influenza to point out distinctly that a good perspiration cure is quite capable of checking the malady in the bud; and I might add many other examples, as almost all maladies resulting from chills can be put to flight by a good perspiration.

In cases when we desire to bring about a free perspiration of the skin, we are happily not limited to water treatment alone, but can second it by several effective household remedies. This is particularly fortunate for those patients who can ill endure a pack to produce perspiration. Our simplest remedies, but ones that produce excellent effects are again two teas—lime blossom tea and elder tea. Both can be gathered by the housewife at the right season of the year free of cost, and prove useful at the time when a malady is threatening.

Lime blossoms (flores tiliæ) are too well known for it to be necessary for me to say anything about them. They are given as a tea especially to children, and to pregnant women as a remedy for excessive thirst. They constitute a very mild sudorific household remedy. A dessert-spoonful should be used for a large cup of the tea. The leaves should not, however, be left too long in the water "to draw," a mistake which is often made, as the tea in these cases loses both its taste and colour. The decoction should be made quickly; and the tea when ready should have a bright yellow colour.

If it is desired that the tea should have not only the effect of producing perspiration and allaying thirst, but also serve to strengthen the heart, for this purpose from half-a-teaspoonful to a whole tea-spoonful of brandy may be added.

Binding Medicines: Remedies for Diarrhœa.

As I have explained in the discussion of feverish catarrh both in the cases of children and of adults, diarrhœa, as we call a pathologi-

cally increase of the quantity of the fæces, generally of a loose nature, is in many cases nothing more than an effort of nature to relieve the irritated intestinal canal. In such cases nothing can be more mistaken than, when a diarrhœa of this kind has set in, to attempt to arrest it by all sorts of possible and impossible means. On the contrary, so long as the fever lasts, it is better to try to effect a thorough cleansing and emptying of the intestine either with a spoonful of castor oil or with an essence, and only after this to think that probably some soothing remedy may with advantage be administered to the irritated intestinal canal.

The best and most economical remedy for all cases of diarrhœa is—hunger; as it is evident that what is not eaten cannot be evacuated. Summer diarrhœa, which so frequently comes under our notice in consequence of the patient's taking unripe fruit, sour milk, dirty water, cucumber salads, and so many other things, would be by far more easy to treat if the patient would only have some common sense, and would only for a single day refrain from eating.

Of binding medicines opium, which I have already mentioned, stands certainly first. Taken in drops (for an adult 20 on a lump of sugar) it immediately produces the desired effect, and may be taken without hesitation. It cannot be purchased without a medical man's certificate; but in cases of necessity what are called cholera drops (20 on a lump of sugar) may be used. These can be purchased, and have quite as good an effect as the opium, which, in point of fact, they contain.

Naturally it is imprudent to give these drops to children. And diarrhœa in children is always, and as quickly as possible, to be treated with medicinal remedies, because in childhood a severe cholera may rapidly develop out of what is at first but a harmless diarrhœa. To attempt to treat the cholera without medical assistance would be, of course, the height of imprudence.—Medical men have at their disposal remedies for cases of cholera in childhood.

Calomel (a combination of mercury and chlorine) occupies an important place among these remedies. It is a perfectly innocent-looking white powder; but when I mention that 1-150th, or even 1-1500th of a grain has an immediate effect upon the child's intestine, any reader will at once understand that this is a medicine to be treated with respect. In reality in cases of severe disturbances of the digestive canal this remedy has saved the lives of many babes; a truth that is indisputable proof of the use of this valuable medicine in spite of anything that may be said by fanatics opposed to all medicinal treatment.

As the causes of a great number of different kinds of diarrhœa are gross, single or repeated errors of diet, it is self-evident that the most excellent remedy will prove resultless so long as these mistakes are continued. For this reason I particularly recommend all parents, particularly in cases of continued diarrhœa in childhood, always to control the diet of their children carefully, and to discover also whether the children are secretly eating some kind of rubbish, or procuring unwholesome sweets from some unsuspected hand.

Respecting simple household remedies it is best to try first gelatinous soups, broths, &c.—Water gruel, barley water, and rice soup, with well-boiled calves' bones. Arrowroot may also be tried, which can be purchased from all the druggists, and has a distinctly binding effect both with children and adults.

For enemas in cases of catarrh of the large intestine, thin decoctions of starch enema (a dessertspoonful to half-a-pint of water) is very suitable. I recommend the addition of a few drops of tincture of laudanum, according to the age of the patient.

Finally I may mention also the binding effect of bilberries. These may be eaten indifferently either fresh or dried, and either raw or cooked, to produce the same binding effect, and I can distinctly advise their being tried in all cases of chronic diarrhœa.

Some Approved Ointments.

I have already mentioned that the druggist, in order to present the effective constituent of a given medicine in the most convenient shapes, makes up his medicines in different forms, so that the medicinal substance is sometimes presented in the form of a powder, sometimes as a pill, or a plaster, and sometimes also as an embrocation or salve; as the nature of the drug, the character of the malady, or the age of the patient may require.

To say a few words about the use of *ointments* in general, and about those of them which are most commonly used, I may mention first that they are mostly employed in those maladies where it is necessary to protect some pathological process from the external air, or to bring the requisite remedy permanently into close contact with the external skin.

Formerly, ointments were divided into fatty, glycerine, and parafin ointments. At present, *lanolin*, which is prepared from the wool of sheep, is used as the basis of all the best ointments. This substance, in the first place, does not become rancid, and, in addition, is well

absorbed by the skin, so that the drug, which is incorporated with it in the ointment, produces a practical effect.

Ointments are divided, according to their effects, into *healing ointments*, *ointments for stimulating the skin*, and *ointments* which, by being rubbed into the skin, transfer their medicinal contents to the tissues and the circulation. Of this last kind we had an instance in the mercurial ointment mentioned in the discussion of infectious disorders.

Of healing ointments, producing excellent effects, I may here mention *boracic ointment*, *zinc ointment*, *lead ointment*, and Hebra's *diachylon ointment*. All of these can be purchased from the chemist, and produce very good results in chronic eruptions, spots, chapped hands, and burns. For the last, iodoform ointment may be also used.

Of ointments that stimulate the skin, which may be sometimes necessary to stimulate the exhausted skin, and to support its recovery, I may name *resin ointment* (basilicum ointment), *turpentine ointment*, and *Spanish fly ointment*. The last is especially used for bandaging wounds in cases when it is expedient for the patient that the wound should for a long time be kept in a state of suppuration. (Formerly this was effected by a seton. This use of setons is now practically discarded).

The third class of ointments, used in cases when we desire that the skin should plentifully absorb the medical substances laid upon it, is best represented by *iodine ointment*, the grey mercurial ointment, and Ichthyol ointment. The first of these is used in cases of swelling of the glands, and of new growths (struma), the mercurial ointment in secondary infectious disorders, the third for foci of chronic inflammation, such for example as frequently occur in the lower abdomen with women.

In addition to these ointments a whole series of mild, almost non-stimulating, ointments exist, which serve rather as preservatives for the skin than for any medicinal purpose. They serve, like vaseline for instance, to make the skin soft and supple, but have no curing powers.

In conclusion, I will not omit to mention that recently what are called *ointment muslins* and *plaster muslins* have been prepared according to the prescriptions of the specialists, Unna and Hebra. These muslins contain special medicaments, are excellently suited for all kinds of bandaging, and seem likely, in time, completely to supplant the use of ointments.

Plasters.

By plasters we understand a doughy mixture of fats, resins, lead

compounds, and medicinal substances, which can be spread uniformly upon linen or leather, and laid, with some particular healing purpose, upon the external skin.

As we know that a healthy skin is only in a small degree permeable and capable of absorbing matter, it is quite certain that we must not attribute a very high value to plasters. At the conclusion of the last section I also mentioned plaster muslins, which make the personal preparation of plasters completely unnecessary. These can be purchased for a small sum of all druggists, in any quantity required.

A kind of plaster, formerly very popular, was *Spanish fly plaster*, which was used, and still is used, to produce irritation of the external skin. It is applied as a powerful abducent remedy in cases of violent face-ache, sciatica, tooth-ache, and similar maladies. It produces redness in from three to four hours, and the formation of blisters on the skin in from eight to twelve.

I may mention here some other good plasters, whose composition guarantees their effect.

These are *mercury plaster*, *salicylic soap plaster*, and *horse-radish plaster*. All three can be purchased as *plaster muslins* by the inch. The first is frequently used for swellings of the glands. The second is serviceable when it is desired to soften certain parts of the skin—it is very good for corns. I have frequently used horse-radish plasters applied to the skin in cases of pleurisy, chronic rheumatism, and of lumbago.

It is only right that I should here say a few words about *sticking-plaster* also. This is often of the greatest service to us in many different cases of the drawing together the edges of wounds. Various sorts of sticking-plaster are made; of these the various makes of rubber sticking-plaster may be recommended as the best kind of adhesive plaster.

Embrocations.

Whilst ointments and plasters act gently upon the skin, and therefore also for a considerable time, the nature of embrocations is this that they are rubbed on the surface of the skin more or less energetically, so that the skin is influenced not alone by the medicinal substances contained in the embrocation (generally spirits of some kind with oils), but also mechanically by the rubbing.

If we enquire for what maladies embrocations are particularly employed, these are mostly all the forms of rheumatism, in paralyses, in nervous pains, and stiffness. It may be justly concluded that in all

such disorders, massage is also useful as well as the embrocations, and serves, when applied either by the hand of the patient or by some one else to rub the remedy well into the skin.

A number of embrocations exist, mostly compounded of various remedies that stimulate the skin. Of these remedies I may mention *opodeldoc* (containing camphor, soap, spirit, and rosemary, and technically known as soap liniment).

To anyone who wishes for a strong compound I can recommend the following recipe for an embrocation which I have often found serviceable, but the patient must be prepared to find it make him smart—as it is very penetrating:—¼ oz. spirits of mustard, 1 oz. tincture of horse-radish, 1 oz. of chloroform, and 10 drops of oil of mustard.

There are a number of other official liniments, many of them of great value:—Liniment of belladonna; liniment of chloroform, these two often very useful in combination; simple liniment of camphor,; and the compound camphor liniment, which has ammonia in its composition and is a powerful stimulant; aconite, turpentine, and potassium iodide also enter into the composition of well known liniments. All liniments should be labelled "POISON," as many fatal accidents occur from their being by mistake taken internally.

Mouth-waters and Gargles.

I have already indicated the most important remedies (permanganate of potash and chlorate of potash), which should be used for rinsing out the mouth and gargling, when the aim is to check sepsis. But in the reader's interest I am unwilling to omit here the mention of some other practically useful remedies that may be applied to the mouth, and are beneficial also to the pharynx and gums. Of these I may name *sage*, *thymol*, and *tincture of myrrh*.

Sage (*salvia*) contains in its leaves, in addition to a tannin that acts as an astringent upon the mucous membrane of the mouth, also a stimulating volatile vegetable oil (sage oil), so that it is an effective household remedy. Decoctions of sage leaves, which can be purchased anywhere, are used advantageously as a gargle at the beginning of all inflammatory irritations of the pharynx.

Thymol is obtained from oil of thyme, which is contained in the flowering branches of wild thyme (*thymus vulgaris*), and is used medicinally in various maladies. Thus, to mention some examples, it is used as *spirit of thymol* (1 grain of thymol to 100 grains of spirit) for embrocations, also as an ointment for old ulcers and bed-sores, and

in the form of a powder as a vermifuge.

It does, however, good service also as a gargle, and for inhalations in disorders of the pharynx. That it may be used for cleansing the mouth and keeping it in order (thymol spirit in water) is demonstrated by the fact that dentists strongly recommend it for strengthening the gums.

Tincture of myrrh is a reddish yellow bitter tincture procured by a combination of spirits of wine with the finely-powdered gummy resin of the *Balsamea myrrha*. This is also a favourite medicament for preserving the mouth and teeth.

It is seldom used alone, but mostly in combination with other substances already mentioned which possess similar properties, and in the interests of all readers who may wish to know of a water that will not injure the teeth and will strengthen the gums, I recommend the two following recipes.

1. Tincture of ratany, 50 parts Tincture of myrrh 15 ,, Diluted spirits 30 ,, Peppermint spirit 5 ,,	}	Of this mixture daily 30 drops in a glass of luke-warm water for rinsing the mouth and gargling.
2. Tincture of myrrh, 4 parts. Pure tannic acid 1 ,, Thymol 1 ,, Peppermint oil 1 ,, Spirits of wine 193 ,,	}	Half a teaspoonful in a large glass of luke-warm water.

Of artificially prepared mouth-washes, the best is Odol. This preparation is not only destructive of septic germs in the mouth, but has also the merit of producing more permanent effects than any other. It conduces also to the healthy preservation of the teeth. The preparation is sold with full directions for use.

Approved Remedies for Preserving the Skin.—Cosmetics.

I do not know whether my female readers will be grateful to me for adding to this long list of remedies for internal and external use some recipes for the skin and complexion.

It is no sign at all of vanity to endeavour to keep the skin in as healthy and perfect a condition as possible. I have already in its proper place pointed out the superlative importance for health of the most careful attention to the skin.

But to proceed to my cosmetics.

1. For redness of the skin, spots, &c.

Carbonate of bismuth,	150 grains.	To be painted on in the evening, and the following morning washed off with luke-warm water.
Talc	300 ,,	
Rose-water	975 ,,	
Eau de Cologne	75 ,,	

2. (Another remedy for rough complexion).

(a)	Benzoïn tincture	60	grains.
	Carbonate of potash	15	,,
	Spirits of camphor	15	,,
	Tincture of musk	37½	,,
	Eau de cologne	3750	,,
or (b)	Powdered borax	150	,,
	Chlorate of potash	75	,,
	Glycerine	750	,,
	Rosewater	3750	,,
	Spirits of wine	300	,,
	Rose oil	1	drop.

3. (A lotion for spots on the face, acne, &c.)

Precipitate of sulphur	180 grains.	To be rubbed on in the evening, and washed off in the morning.
Camphor	15 ,,	
Gum Arabic	90 ,,	
Lime water	1500 ,,	
Rose water	1500 ,,	

4. Water for scurf on the head.

Eau de cologne,	1455 grains.	One half of a teaspoonful to be rubbed on the skin of the head every morning.
Tincture of quinine,	150 ,,	
Tincture of Spanish fly,	30 ,,	
Balsam of Peru,	15 ,,	
Spirits of soap	1500 ,,	

The Use of Water in the Art of Healing.

Like everything else in the world the methods of treating disease have been always subject to fashions. What fifty or sixty years ago was regarded by our grandparents' medical men as an irrefutable result of experience in the province of therapeutics, is, in these days of the microscope, compassionately derided as completely mistaken, and entirely rejected; and the disappearance from the remotest corner of Europe of the cupping-glass, and blood-letting (formerly in such high estimation) to make room for modern methods of treatment is a mere question of time.

Water treatment (which by the way is nothing new, but on the contrary very ancient) must also, as a part of the science of therapeutics, be regarded as very much a matter of fashion, having both its bright and dark sides. It is able to exercise a beneficial influence not upon all maladies, but upon a limited number only; and is perfectly certain sooner or later to vanish from the scene, no doubt to make room for some new ruling star in the firmament of therapeutics, just as it has itself for some time past, at least in Germany, attempted to put all other methods of treatment out of countenance by proclaiming itself under the sonorous name of "the natural method of cure."

Water treatment is without doubt able to exercise an extraordinarily beneficial effect upon a number of maladies, and it may be warmly recommended and without hesitation to any one who will regard it from a rational point of view, and will not ask from it more than it is able to effect. So used it will certainly do good. But the man who fanatically thrusts aside all other approved methods of treatment, and is resolved to cure all maladies with water alone, will certainly sooner or later have to face an unpleasant disillusion, and also suffer a permanent diminution of his health and strength, that may teach him—possibly too late—that water alone is not capable of effecting everything.

The honour of having restored water treatment (which had almost dropped out of recollection) to consideration and respect belongs to a large extent to Vincenz Priessnitz, the son of a homely peasant, who was born in 1799 and died in 1851. Having discovered and learned to value the beneficial effect of water compresses upon his own person when in ill-health, he erected a hydropathic establishment in his own town of Gräfenburg, and started a method of water treatment of his own, which was after his death continued by his pupils.

As Priessnitz was a simple man of the people, without any real education, and absolutely without the slightest conception of the structure and functions of the organs of the human body, we need not wonder, and perhaps ought not to regard it as a slur upon the man, that he explained the effects of water treatment after a fashion of his own, that he mistakenly in a great many cases over-shot his mark, and sent many patients away very much worse than they were when they came to him. He had the most complete faith in the correctness of his own method of curing, and when he sent his patients to break a hole in the ice in the winter, and to bathe in the water which they found underneath it, he was entirely ignorant of the danger of this mad proceeding, which no human being would in these days recom-

mend.

But he did not recommend bathing alone, but used packs, compresses, douches, partial baths, &c., in the forms in which they are still, with very little alteration, recommended; and the man's memory well deserves to be perpetuated.

More recently many more devotees were won to the belief in water treatment by Sebastian Kneipp, a German clergyman; and it is perfectly certain that it was he who first won for his methods not only the serious attention of the general public, but that also of medical men sufficiently open-minded to accept anything that might prove beneficial to their patients wherever it could be found. "Father" Kneipp's genial personality probably did quite as much to create his immense popularity as his actual method; which, if we examine it closely, resembled that of Priessnitz. But a debt of gratitude is due to him for simplifying the methods recommended by Priessnitz, and bringing them into a form in which they can be used by persons of moderate means in their own houses. Of his quite childish notions about the use of water it is unnecessary to speak; but many of his counsels deserve attention, and particularly this one, that all delicate persons should use water treatment with the greatest caution, and at least at first only in the mildest forms.

He advised also that cold baths should be of as short duration as possible when they produced a feeling of chill or indisposition, and that exercise should be used immediately afterwards.

But, as it has been my aim throughout this book to furnish my readers with explanations of what I recommend, and so far as it is possible, to enable them to see for themselves the reasonableness of the various methods of treatment before I proceed to detail the various kinds of water treatment, I shall give a short description of the manner in which water acts upon the human organism.

What is the effect of cold water?

Cold water withdraws heat from the body, and by doing so stimulates the organism to an increased development of heat—because the organism always exerts itself to maintain its normal internal temperature of 99° Fahrenheit (37° Centigrade). This increased development of heat amounts to the same thing as an increase of metabolism, and a vigorous activity in the formation of blood. The cold water also disburdens the vessels of the skin and makes the blood circulate more vigorously in the interior of the body. But *cold water has also a most important and distinct subsequent effect.* In consequence of the re-warming of the body after the bath, and the return of the blood to the surface of the organism, a refreshing stimulation of the nerves is effected,

which is felt as a sensation of health. *For anyone who, after taking a cold bath, does not rapidly again become warm* (exercise and use of the muscles favour this return of warmth) *cold water is of no use.*

What are the effects of warm water?

Warm water brings warmth into the body, and consequently for a time relieves the exertion of metabolism. It sooths the nervous system. It alters the distribution of the blood in the body, drawing it from the interior organs to the skin, whose vessels it distends. It stimulates the action both of the great interior digestive glands and also that of the glands of the skin. In consequence it not only increases the excretion of water from the body, but also alters the locality of the excretion, the water passing through the skin instead of through the kidneys; and by distention of the sudoriferous ducts facilitates the evaporation of injurious substances.

We may now proceed to consider the commonest ways of using water, with particular attention to those methods which can be applied at home, and without any great cost. It will be worth while to arrange the order in which the different uses of water shall be taken, and I propose to speak of (1) *baths*, (2) *rubbing down and washing*, (3) *douches*, (4) *compresses and damp packs*, (5) *steam baths.*

1. *Baths.* These shall be divided into full baths, half-baths, and partial baths.

The full bath. A full bath is meant in this book wherever bath is simply mentioned without any qualification. The temperature of the bath for feverish patients, from whom warmth is to be withdrawn, must not exceed 65° to 75° Fahrenheit. It is best taken in as large a bath as possible, for which, in case of necessity, the largest washing-tub in the house may serve. The water must not be poured over the patient, but the whole body, with the exception of the head, must be covered by the water.

Feverish patients whose temperature is to be reduced must not remain longer than two to three minutes in the bath, and immediately after rising from it, or being lifted out of it, must be rubbed dry with a towel, so as to hasten the recovery of warmth in the surface of the body, which is necessary.

The use of this bath is particularly beneficial in typhoid, but is also useful in cases of inflammation of the lungs, and in other feverish complaints. In inflammation of the lungs the patient must not lie at full length in the water, but should sit. Only in this case somewhat cooler water must be constantly poured over the shoulders, the chest, or the back, so as to artificially stimulate the lungs to activity.

The luke-warm bath is a modification of the full bath. It does not

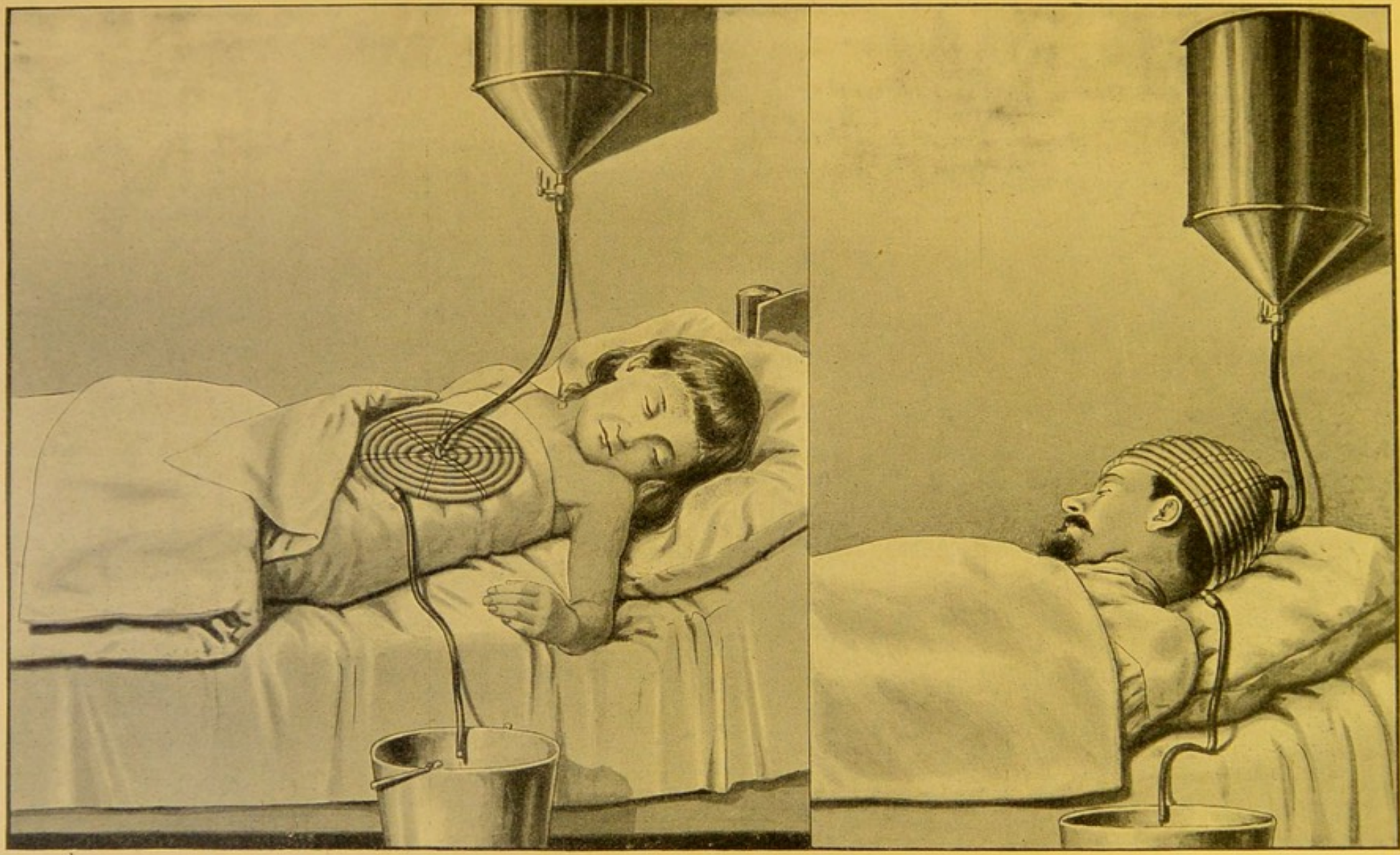
serve to diminish temperature, but simply to allay irritation, to diminish pain, and to act generally in a soothing manner upon the nervous system. Its temperature should be about 78° to 82° Fahrenheit (26° to 28° Centigrade), and the bath should last from five to eight minutes. This bath is to be recommended for all forms of nervousness, neuralgia, sciatica, rheumatism, and sleeplessness.

In the full bath the water should completely cover the whole body with the exception of the head which should be wrapped in a damp cloth. After the bath to obviate a feeling of relaxation and fatigue a cool douche should be given or some water of the temperature of 64° Fahrenheit (18° centigrade) be poured over the patient for a few moments only.

The cold dip bath, also a variation of the full bath, deserves a brief

Rubbing after a Water Treatment.

mention. It is suitable for all who are devotees of a strengthening and hardening water treatment, and more fitted for those in sound health than for invalids. The bath should not be filled quite to the



Automatic Cooling Apparatus, supplanting ice bag. The cold water flows from the reservoir above, through an india-rubber tube, coiled in a spiral; and after cooling the heart or brain runs off into a bucket.

brim. The temperature should be 60° Fahrenheit (16° Centigrade); and the bath should not last more than two minutes. Before entering the bath the bather cools his head well with cold water, then jumps quickly into the bath, and immediately ducks his head under the water. Then sitting in the bath he splashes his breast with the water, rubs himself with the water on the arms and legs, meanwhile again immersing his head; kneads the skin of the chest, and of the thighs and calves, splashes the water well on his face, and then after not more than two minutes jumps briskly out of the water.

The drying with a towel should be brisk and thorough, and the clothes should be put on quickly. Caution about going out is hardly necessary as the bather directly after dressing feels himself thoroughly lissom. This kind of bath is particularly hardening and strengthening, especially if taken directly after rising from bed.

It may be particularly recommended to all who are compelled by their calling to lead a sedentary life indoors and have not much time for regular physical exercise or for gymnastics.

Children's baths. In accordance with a promise made at the beginning of this book, I here add some special remarks upon children's baths.

I advise all parents to lay seriously to heart the great importance (for a proper attention to the skin, and for the general good development of the body) of a daily cleansing and invigorating bath for the suckling. Concerning this bath I recommend:—

1. The bath should be given every day at the same hour, and best before noon.
2. The temperature up to the end of the first twelve months should not be below 90° Fahrenheit (32° Centigrade).
3. The child should not be bathed upon a full stomach.
4. The child should not be in the water more than five minutes.
5. Directly after the bath the child should be fed and allowed to sleep.

To place salt or strengthening herbs in the bath is certainly never a mistake, but it is not necessary so long as the child is perfectly healthy.

In cases of scrofula, general debility, rickets, or chronic cutaneous eruptions, the following additional advice must be added:—

1. *Malt bath* for general strengthening. From four to five pounds of barley malt are boiled for a whole hour in five quarts of water. The strained malt water is added to the bath.
2. *Salt baths*, for cases of scrofula and rickets For a child's bath, nothing is better than the well known Tidman's sea salt. This is the

actual salt evaporated from sea water and preserved in a suitable form. Full directions for quantity to be used will be found on the packets as sold. The water may be used for two baths. Soap must not be used.

3. *Aromatic herb bath*, for paralyses, or weakness. Either chamomile,

Pouring water on the child's back in the bath.

sage, or peppermint is used. Two handfuls should be boiled in five quarts of water. The decoction is added to the bath water. Or an artificial mixture of what are called aromatic herbs can be bought from the druggist (peppermint, thyme, lavender).

Other medicated baths for children, mustard bath for weakness of the heart, mercurial bath for diseases of the skin, brimstone baths, &c., are to be used only when recommended by the medical man.

After the conclusion of the first year the temperature of the bath water may of course be gradually altered. It is also unnecessary to bathe the child more than twice a week; later, once will suffice. But washing of the whole body, to take the place of the bath, must not be neglected.

The half-bath occupies a middle place between the full-bath and the partial-bath. The temperature of the water should be only a few degrees above or below 75° Fahrenheit (24° Centigrade), and the bath should last from five to twenty minutes, according to its object. One or

two persons are required to assist, also according to the circumstances. It is most convenient to use as comfortable and large a wooden bath as possible. Before the patient steps into the bath, or is lifted into it, a damp cold wrap is placed about the head, and the breast and neck are well wetted.—The patient now assumes a sitting position in the bath, and water is poured freely over his back, chest, shoulders, and head, either by the bath attendant or by the person who is waiting upon the patient.—Meanwhile the patient rubs and massages himself; which must, in case of weakness, be done for him by another attendant. After two or three minutes the abdomen and lower limbs are similarly treated, by pouring water upon them, and by thorough rubbing.

Before the patient leaves the bath cold water (53° Fahrenheit, 12° Centigrade) is poured on him. He then goes quickly to bed. In many cases the half-bath is given after a damp pack.

The half-bath is the one by far most frequently used in the treatment of patients. Exact rules for the different distinctions of duration and temperature can hardly be given; as of course the effect differs very much with them.

But in general it is best to begin with a temperature of 75° Fahrenheit (24° Centigrade), and a bath of five minutes' duration; and then to observe whether the patient shivers after the conclusion of the bath, or easily recovers his warmth of himself, which is absolutely necessary if the bath is to have its desired effect.

For feverish patients the temperature should be somewhat lower, 64° Fahrenheit (18° Centigrade). In chronic complaints the bath should last somewhat longer, eight minutes. For nervous patients the temperature should be higher, about 75° Fahrenheit (24° Centigrade).

The half-bath is one of the most excellent forms of water treatment; but in most cases a palpaple result is obtained only after regular bathing for several weeks.

The partial-bath extends only to some particular part of the body. The portion bathed needs not to be by any means that which is in some way out of health. For example, in the familiar case of the warm foot-bath, we by no means aim always at treating an affected foot, but probably wish to draw the blood downwards from the lower abdomen. The partial-bath may be a *sitz-bath* (hip-bath), *hand-bath*, or *foot-bath*, and in many cases does excellent service.

I take hand and foot baths first. These are used either very cold as low as 49° Fahrenheit (13° Centigrade), or as warm as possible, 102°—110° Fahrenheit, accordingly as it is desired to produce an effect of distending or of contracting the vessels, and so modifying

the distribution of the blood in the body.

Hand-baths influence the quantity of blood in the head, and in the organs of the chest; foot-baths influence that in the organs of the lower abdomen. This fact alone makes the rules of application tolerably plain, showing us, that in cases of blood pressure upon the heart or head, the heart or head may be relieved by hot hand baths; whilst on the contrary cold hand baths will supply blood to these organs (fainting, weakness of the heart). The effect of foot-baths is similar. Hot foot-baths withdraw blood from the lower abdomen; and cold foot-baths serve to fill the lower abdomen with blood.—The effect of these baths is increased by alternation. By an *alternating foot-bath*, when the feet are put now into hot and now into cold water the blood vessels are compelled first to expand and afterwards to contract.

All patients who suffer from severe anæmia are to be warned against using hot or cold hand-baths or foot-baths. They are to be avoided also by pregnant women on account of the danger of subsequent miscarriage or premature birth.

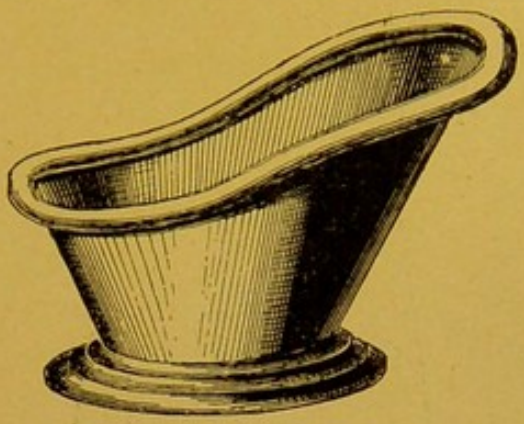
The sitz-bath (hip-bath) is a fairly strong form of water treatment; and as its effect is quite different according to the temperature of the water. I need hardly say that it is necessary to be fully acquainted with the results produced by the sitz-bath in order to make use of it with advantage. The bath is best taken in a bath of a proper form, ordinary baths being ill adapted for it.

I must here mention that I have several times treated women with this remedy, who have only after a long time informed me that in spite of the use of sitz-baths for months they have found their sufferings only increased. On enquiring into the particulars of their baths, it became almost always plain that they used too warm water and remained in their baths too long.

As sitz-baths exercise a most marked influence upon the nerves of the lower abdomen, and are especially used by women suffering from abdominal disorders, I may say at once that warm sitz-baths of twenty minutes duration can never refresh, but only relax. In consequence they are to be used *only* when it is desired to mitigate pain or to allay cramp.

The case is entirely different with the cold sitz-bath (58° to 61° Fahrenheit, 14° to 16° Centigrade), the cool sitz-bath (61° to 64° Fahrenheit, 16° to 18° Centigrade), and the luke-warm sitz-bath (64° to 68° Fahrenheit, 18° to 20° Centigrade). These have a strengthening and hardening effect, increase the secretions of the great digestive glands, stimulate the activity and movements of the intestines, and so further digestion, promote easy motions, produce

a healthy stimulation of the nerves of the lower abdomen, and are regarded by many patients as directly conducive to sleep.



The best form of a Sitz-bath.

The duration of all cold sitz-baths should be short, from three to four minutes, unless there is some special reason to the contrary.

Warm sitz-baths (for disturbances of the menses, colic, pain, &c.) may have a duration of ten minutes. Careful drying is necessary after both warm and cold sitz-baths.

Rubbing down and washing are the simplest, most agreeable, and almost the most effective forms of water treatment. They are frequently preliminary to other methods of using water (for example before the half-bath), or are given after damp packs. They serve not alone for hardening and general strengthening (as is often assumed), but, if properly applied, can be of great service to the patient, as they are not only capable of exercising a great influence upon the distribution of the blood in the body, but must be further regarded as checks to inflammation and mitigants of fever, at least if the water used for the rubbing down is cold enough.

If a washing of the body is to affect its general aim of strengthening or cooling, the water must on no account be above the temperature of 64° Fahrenheit (18° Centigrade). The temperature may without hesitation be brought down to 53° Fahrenheit (12° Centigrade) or even lower, without any fear of a chill.

The principal thing is that *the washing should be quick*, which may be secured if necessary by the help of an assistant; and that afterwards *a vigorous rubbing dry* should ensue, so that the bather may not have too long to wait for the return of a sensation of warmth.

Rubbing down and washing are particularly suitable for effecting general hardening, but also for cases of *catarrh resulting from congestion*,

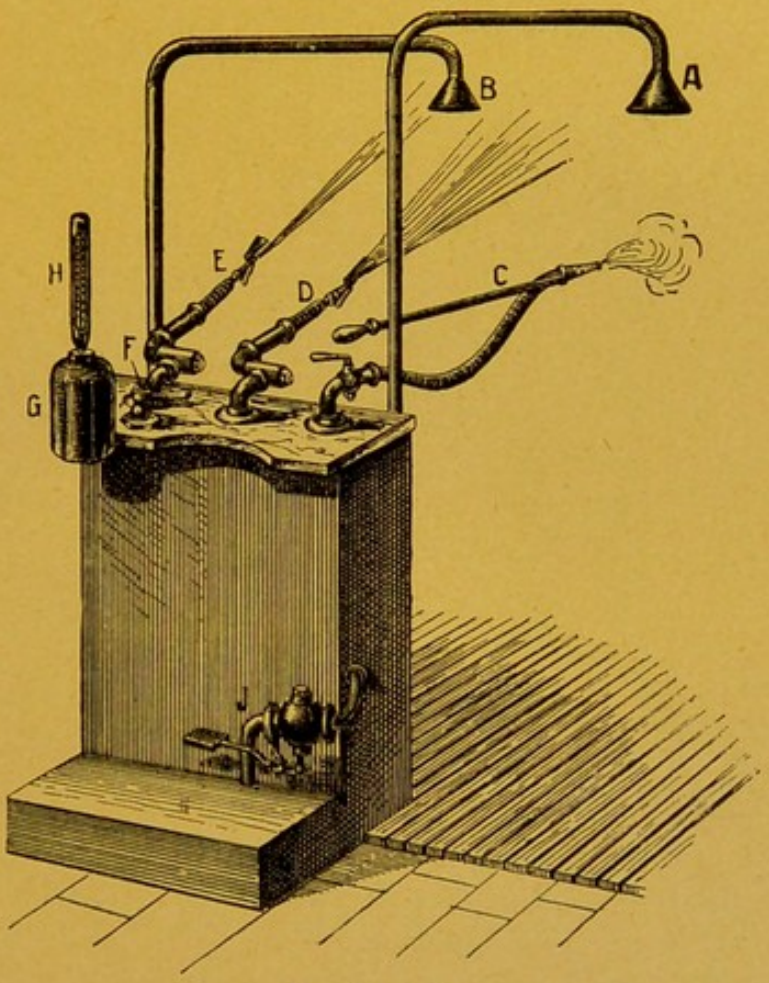
of initial tuberculosis, irregular distribution of the blood, fatty degeneracy of the heart, and for all feverish maladies, if they make the use of a bath difficult.

Shower-bath.

Shower baths and douches represent those forms of water treatment in which the water is poured from a certain height and with some degree of pressure, either in one single strong stream or in a number of small streams upon the surface of the skin. It follows from this that douches produce their effect not alone by the stimulation resulting from heat or cold, but also by the mechanical pressure, and imply a powerful stimulation of the nervous system of the skin.

Single streams of water are most simply administered with an ordinary watering-can from which the rose has been removed. The water (which in hydropathic institutes is poured by the bath attendant) can be poured by any of the patient's people. But for douches an apparatus is always necessary. This apparatus will depend upon the means which a man has at his disposal. It may consist simply of a

bucket with holes pierced in its base, hung in such a position that the patient may place himself under the shower descending from it; or it may be an elegant "douche desk" in which we have united streams of water, vapour douches, fan douches, and ray douches, to be used in any form or way required.



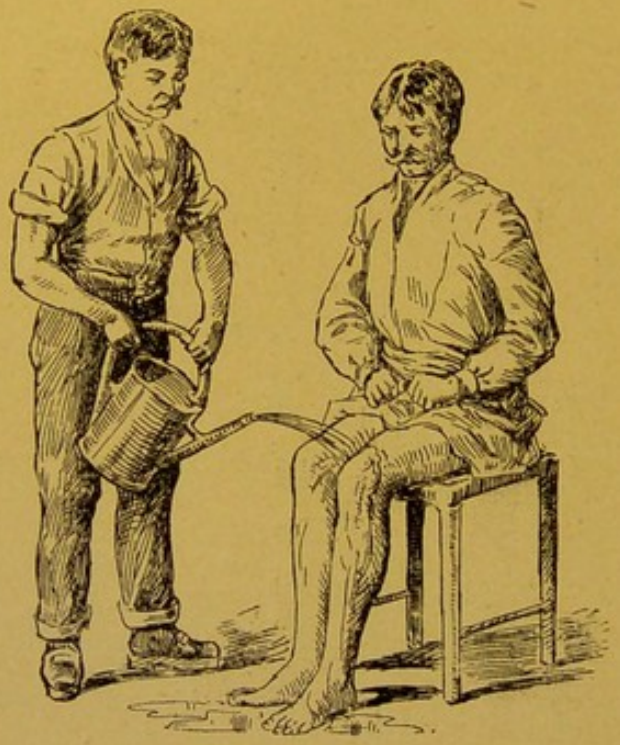
Douche desk.

A.B. Douches for shower-baths. C. Vapour douche. D. Fan douche. E. Ray douche. F. Regulator for vapour douche. G.H. Gauge and thermometer. J. Regulator for cold water douches, to be worked by the operating doctor's foot.

Respecting the streams of water poured from a can (which was Kneipp's method) I would point out that though they may be simpler than the shower douches of our hydropathic institutions they have the advantage of allowing the water to fall in different directions, and so with different effects upon the body, according to the position in which the watering-can is held.

Kneipp distinguished the different ways of applying streams of water by the parts upon which they were poured, knees, thighs, back,

chest, or over the body generally, &c.; and recommended that generally streams of this kind should be applied to different parts in rapid succession. But he insists that the patient should use them only when he feels properly warm; and advises re-warming the body



Stream of water for the knees.

directly afterwards—best by suitable exercise. Only cold or cool streams are used, and principally for cases of chronic disturbances of nutrition and disorders of metabolism.*

Douches differ from Kneipp's simple plan of pouring water by working in a much more delicate and precise manner. The two plans differ somewhat as hand labour and machine labour; as the pressure and force of the water in a douche can be regulated at pleasure in the simplest manner. The commonest forms of douches are the *shower-*

* Metabolism. The reader may like to have an explanation of this word. The nourishment which is taken into the body in various forms of food and drink is, by means of the various chemical operations performed in the digestive canal (described above in chapter VI, p. 137, etc.), changed into forms by which the organism is nourished. We call these changes *metabolic changes*, and the whole process *metabolism*; a single word thus saving us the trouble of frequently repeating some such long phrase as "the change of food by the digestive canal into such chemical combinations as the tissues are capable of assimilating."

bath, the *moveable fan douche*, the *rising rose-jet* (applied in cases of piles; the patient sitting upon a pierced stool, through which the water is thrown upwards as from the inverted rose of a watering-can), and the *Scotch douche*, in which the streams of water, alternately hot and cold, play upon the same part, producing an alternating expansion and contraction of the vessels of the skin.

It would naturally occupy us too long were I to attempt to describe at full the application of each particular kind of douche. And for home use the only one which we have to consider is the ordinary chamber shower-bath used for the purpose of refreshment. A warning must be given against permitting too strong showers of water to fall upon the nape of the neck and the head, a mistake often made in hydropathic establishments.

Compresses and packs will here be spoken of together, their use being almost similar. They constitute a very important and simple but also very effective form of water treatment—particularly for home use.

They are divided, according to their aim, into warm and cold compresses, just as the purpose may be to produce a warming pain-relieving quieting effect (in colics or inflammations with commencing suppuration), or a cooling effect that will check inflammation and lower fever.

Compresses and packs differ from other forms of water treatment which have been hitherto described principally in the much greater length of their duration, but also in the rest in bed which accompanies them, and the absolutely necessary great care with which they must be applied.

As cold compresses, if laid upon a hot feverish body, will in a very short time cool, and so miss their effect, it is absolutely necessary to change them frequently. On the other hand warm compresses, if they are not perfectly covered up, in a short time lose their heat. For this reason some non-conducting material (gutta-percha tissue) must be placed around the compresses covering the skin, and should be also surrounded with cotton wool.

Anyone who neglects these two principal rules will only do harm and not good with the compress, as the warm compress will act as a cold one and the cold compress as a warm one.

Cold compresses are used:

1. In all local *inflammations;* which are connected with a redundance of blood.

2. In maladies in which we have to combat *fever*, *inflammatory pain*, and *bleeding*.

Warm compresses are used:

1. In all cases where we desire by conservation of heat, and by suppling heat to *hasten an inevitable suppuration.*

2. In all paroxysms of pain not of an inflammatory nature (colics and convulsions) as *a means of soothing the nerves.*

3. To produce local slight perspiration.

Compress of the Chest.

1, the damp linen; 2, gutta percha tissue; 3, wool envelope.

It is well known that the compress is sometimes employed for particular parts of the body, and sometimes as a pack to enclose the whole body. So, according to the place and the manner in which the compress is employed we speak of compress on the neck and compress on the chest, sometimes of packs of the calves of the leg, or the torso, of complete packs, shoulder packs and so forth. I will select at random two forms, and describe them more exactly, from which all other forms will be easily understood.

(1) The compress upon the neck is, applied in the following fashion. A man's pocket handkerchief of a medium size is folded lengthwise so as to give a breadth of about three inches. It is then dipped in cool water of about 60° Fahrenheit (18° Centi-

grade) and quickly wrapped several times around the neck of the patient, after having been well wrung out. If the compress is to

The compress of the chest complete.

produce a slow effect (say is to remain in its position all night) a somewhat wider strip of gutta percha tissue or oil skin is placed

Pack for shoulder and compress on chest.

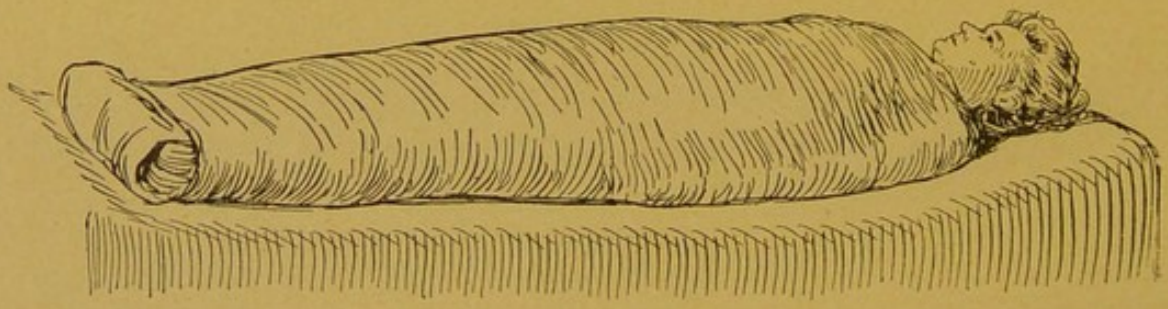
over the wet handkerchief, and the whole is enveloped in a woollen exterior covering, and fastened with a safety pin.

If the compress is to act only as a stimulant, the strips of gutta percha tissue are not necessary, but the compress is to be changed at least every hour.

Cool compresses around the neck are recommended for all forms of catarrhal inflammations in the pharynx and larynx, as well as in scarlet fever and diphtheria.

Warm compresses are beneficial to and accelerate the suppuration of infectious foci (scrofulous lymph glands, abscess of the pharynx, suppuration of the cellular tissue, &c.)

2. *A damp complete pack* is used as a means of diminishing fever in a number of infectious maladies. In diphtheria it may be particularly recommended to assist in the shedding of the diphtherial integument. It is extraordinarily soothing to the nerves (Saint Vitus's dance, hysteria), and mitigates pain (neuralgia, chronic rheumatism) It is applied in the following manner:—A large blanket is first extended upon the bed which is to be used, and on this is placed a linen sheet

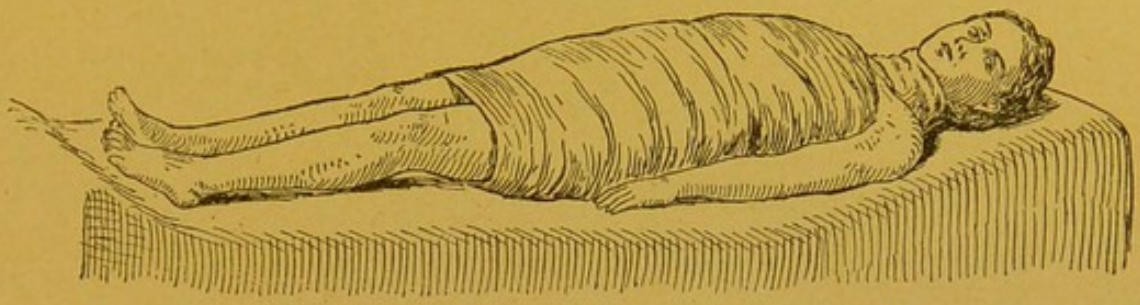


Complete pack.

dipped in cold water and not much wrung out. The patient completely uncovered, now lies on the damp cloth in such a manner that his head alone extends beyond the upper edge. The free sides of the sheet are then quickly folded over the patient's body, the head alone protruding. The blanket is then wound smoothly around the patient, and folded with particular care about the neck, so that the escape of steam at this locality may not be too great. (For security a woolen shawl may be wound around the neck) When the complete pack has been duly arranged, the patient may be well covered with an eider-down quilt. The first sensation of cold will, after a few minutes, be replaced by one of a beneficial agreeable warmth, without any particular perspiration being observed.

If the patient is suffering from a high fever it is advisable after forty or fifty minutes to unroll him quickly, and immediately

(without washing) to place him in another complete pack, which has been prepared in the interim. In this he may lie another forty minutes. If the case requires it even a third complete pack may be added. After the last pack washing with luke-warm water is advisable, gentle rubbing dry, and clean slightly warmed linen. If after



Pack of torso, and compress of neck.

this the warmth of the bed produces copious perspiration, this should on no account be interfered with but carefully wiped off with a soft towel.

It is best in the cases of chronic maladies (cases of disorders of metabolism, corpulence, gout, &c.) to attempt a complete pack only by day. This may last a hundred minutes. After removal the whole body is either to be washed with from luke-warm to cool water, or to be treated with douches. For every kind of pack the feet must be warm. If necessary this can be effected by a preliminary rubbing of the feet, or by a hot water bottle.

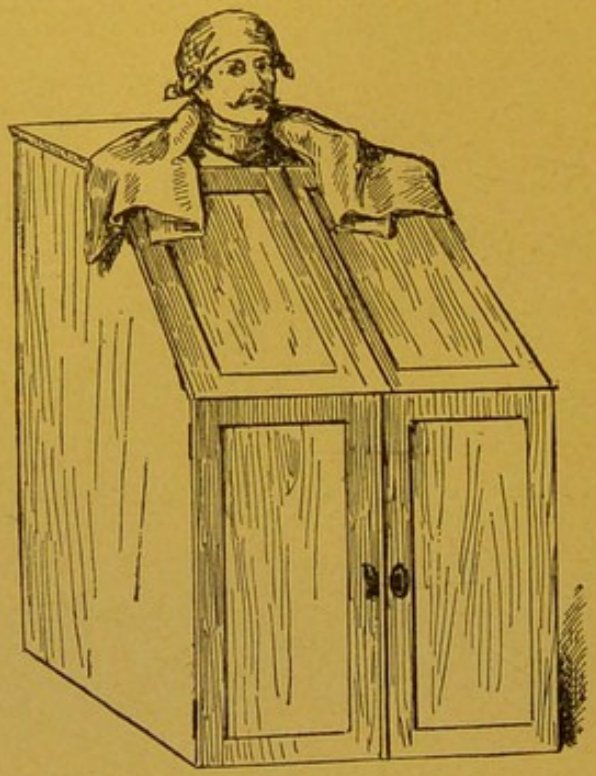
Perspiration packs (dry complete packs) are distinguished from the above damp complete packs only by the absence of the damp linen sheet. Consequently they are simpler, and aim at a distension of the vessels of the skin by accumulation of warmth. They do not always quickly effect perspiration; and it is advisable to stimulate the activity of the sudorific glands by giving the patient drink if the perspiration does not appear within an hour.

This kind of pack also requires immediately after it a cool washing or douches, so that no relaxation may ensue.

Partial packs (half-packs, three-quarter packs, &c.) differ from complete packs only in this that they are applied to portions of the body only. In three-quarter packs the arms remain free. In a half-pack the arms and the upper part of the body down to the navel are outside the pack.

The use of steam is principally for producing perspiration. Both the steam bath in which the patient completely undressed walks about,

and the box steam bath in which he allows the streaming steam to act upon his body whilst he sits still, keeping only his head free, effect important actions upon the vascular system. I must say at once



Box steam bath.

that persons of short stature, and corpulent persons, those who suffer from proclivity to congestion of blood in the head, and those who suffer from weakness of the heart, as well as anæmic girls and pregnant women, must on no account take vapour baths.

But for persons whose organs are sound this method of treatment is a most excellent one, not only in all acute disorders produced by chills, rheumatism of the joints, &c., but also because it obviates all kinds of maladies which are only impending, as it has an extraordinarily stimulating effect upon the evaporation from the skin, increases metabolism, and favours the excretion from the body of injurious substances.

There is no occasion for me to describe the box vapour baths which are used in the great hydropathic establishments: but I may remind the reader that the following points are of importance:

1. The head and neck, which are outside the bath, must be well covered with wet warm cloths until the first perspiration is developed.

2. To support the development of the perspiration a draught of cold water is to be taken from time to time.

Box Vapour Bath for the Arm.

In cases when vapour baths are used for chronic lead poisoning or mercury poisoning, also in cases of corpulence, gout, sciatica, and similar maladies (in which a result can be hoped for only by a tolerably long-continued vapour bath—at least thirty minutes) it is particularly important that the two rules above given should be observed to prevent feeling of distress and faintness, which with many patients soon set in during a vapour bath.

The cooling of the skin after a vapour bath is a matter of importance. I think it best first to wash the body over with water of a temperature of 63° Fahrenheit (20° Centigrade), and that the patient should only after this take a cool douche of about 61° Fahrenheit (16° Centigrade). Others allow the patient to take a douche of quite cold water immediately after the vapour bath, which I opine to be dangerous and hazardous both for the nervous and for the vascular system.

A simple vapour bath may be cheaply and without much trouble managed at home, as the accompanying illustration shows. It is

necessary only to have a cane-bottomed chair, a large bucket of boiling water, and a sufficiently large blanket. In this manner a vapour bath may be taken at no expense at all, and no attendant's assistance is necessary. Particularly when an influenza is threatening this

Partial vapour bath for chest and face.

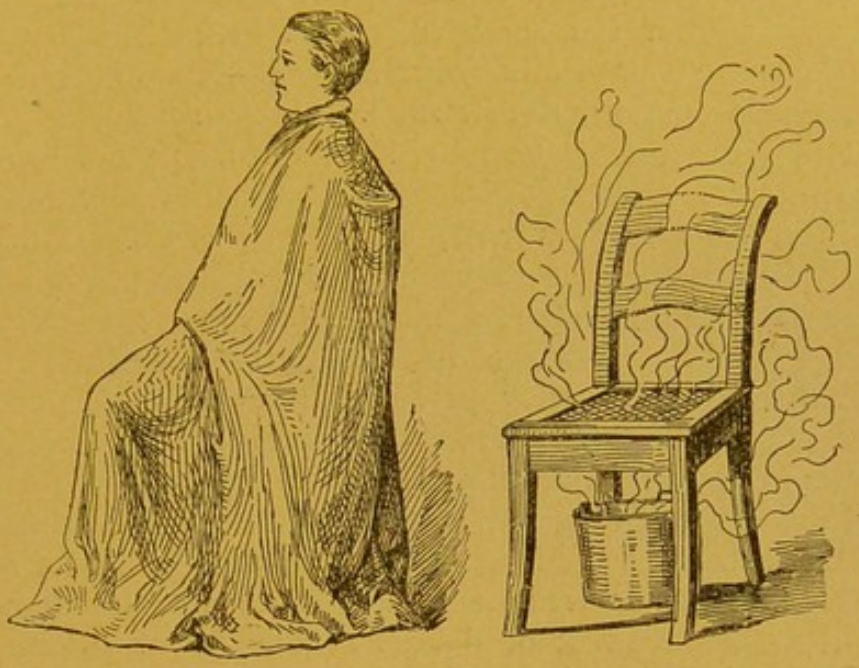
simple method of stimulating a free perspiration of the skin, followed by a damp complete pack, has a splendid effect, and is better than any medicinal remedy, as anyone who makes the experiment will find.

If some particular part of the body is to be treated with vapour (the face for example or the lower limbs) this also can be easily managed by the patient for himself, and I hope that my two illustrations will show the reader at once how he can give himself a partial vapour bath at home without expense.

Before I take leave of water treatment I will not omit to say in conclusion that I hold it to be excellent for a great number of maladies, and to be highly recommended.

That it cannot cure all the disorders of the organism is self evident, and that it cannot produce its effect in two or three days is equally self evident. The man who supposes water treatment to be some-

thing perfectly simple, who has no distinct idea of what effect the different ways of using water produce, who does not reflect that warm water means something quite different from cold water, must not be



Simple kind of vapour bath at home.

surprised if he arrives at no results. Water treatment is an art which requires to be learned, and demands a shrewd understanding, and a practical insight.

Gymnastics and Massage.

Gymnastics and massage are two supreme remedies placed at our disposition by nature, and prove better than a thousand words how true is my frequently repeated assertion that natural methods of cure are by no means any new discovery but of the highest antiquity. Their present popularity is due merely to a strong popular movement towards the simplest and most natural treatment of diseases.

These modern inventions of gymnastics and massage were known to the nations of antiquity. Indians, Chinese, and Phoenicians made use of them thousands of years ago. The vapour bath was used by the Romans two thousand years since, and the physician Asclepiades, a contemporary of Cicero, treated his patients according to dietetic

rules, with water treatment, with exercise, and with rubbing—that is to say massage.

The Greek physician, Hippocrates, who lived about four hundred years before Christ, wrote, "The surgeon must be familiar with many things, and understand how to rub. The same advantage does not always result from the same treatment. Rubbing may make a relaxed joint stiff, or a stiff joint relaxed.—A stiff joint must be gently stroked, especially as soft rubbing is both tolerable and agreeable. The joint must be also moved, without using force, so much as it can be without pain."

Only in the middle ages various processes of the art of healing, previously familiar, appear to have been forgotten; and it was not until the last decade of the nineteenth century that "Swedish hygienic gymnastics"—which included massage—obtained an unanticipated triumph in every part of the world, and assured themselves an important place amongst the natural methods of healing, which it is to be hoped that they may always retain.

Hygienic, or therapeutic (curative) gymnastics—and massage which is so closely connected with them—must be regarded as an important complement of water treatment, and as the foundation of the physico-dietetic treatment of diseases. The future belongs to this treatment, and it is doubtlessly destined to bring the use of drugs into much narrowed limits.

Both gymnastics and massage point to movements of the muscles. In massage, a local influence is exercised over a certain group of muscles by some second person the *masseur*. In gymnastics the whole body is exercised by the exertion of its own strength.

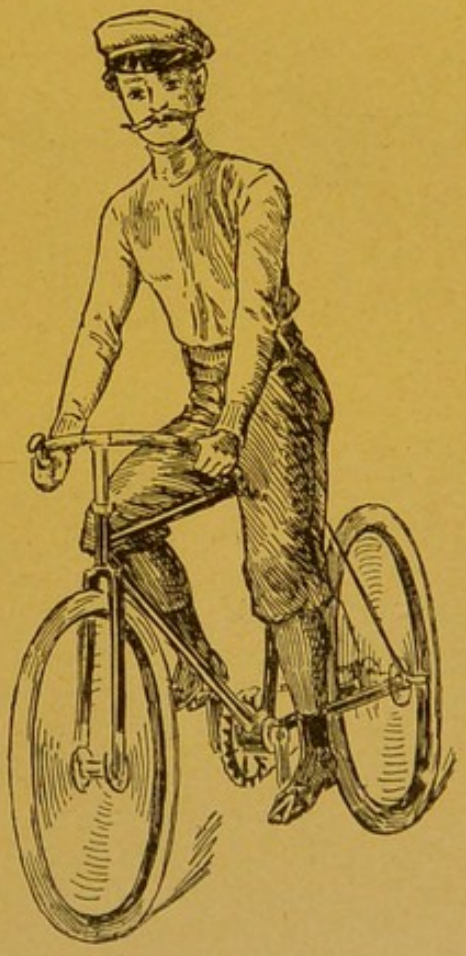
All athletic exercises may be called gymnastics, and I have already in several places alluded to their value; amongst them, we must reckon cycling, riding, and swimming.

Especially in early years, whilst the body is in a state of growth, physical exercise of every kind is to be most highly recommended for the harmonious development of the muscles and for the enlargement of the chest; and it must be a subject of universal satisfaction that regular gymnastics under the guidance of proper teachers now form a part of the curriculum of every public school; proving that it is being gradually realised that book learning is of little value without health.

These general athletic exercises are of use for the training of *healthy* bodies, maintaining and developing their strength. On the other hand hygienic gymnastics aim rather at restoring strength that has been lost to organisms out of health.

Hygienic gymnastics, constantly becoming more widely extended in all countries, are of Swedish invention, originally set on foot at the beginning of the last century in Stockholm by the Swede Henrik Ling, whose "Gymnastic Central Institute" still exists. The original system has been since much modified by Dr. Gustaf Zander, a medical man of Stockholm. Ling's gymnastic exercises were performed with the help of an assistant. Dr. Zander has substituted a machine with which a whole series of gymnastic exercises can be practised. Dr. Zander's various machines, each one of which is intended for the exercise of some particular group of muscles, all

Cyclist in an unhealthy position.



Cyclist in healthy position.

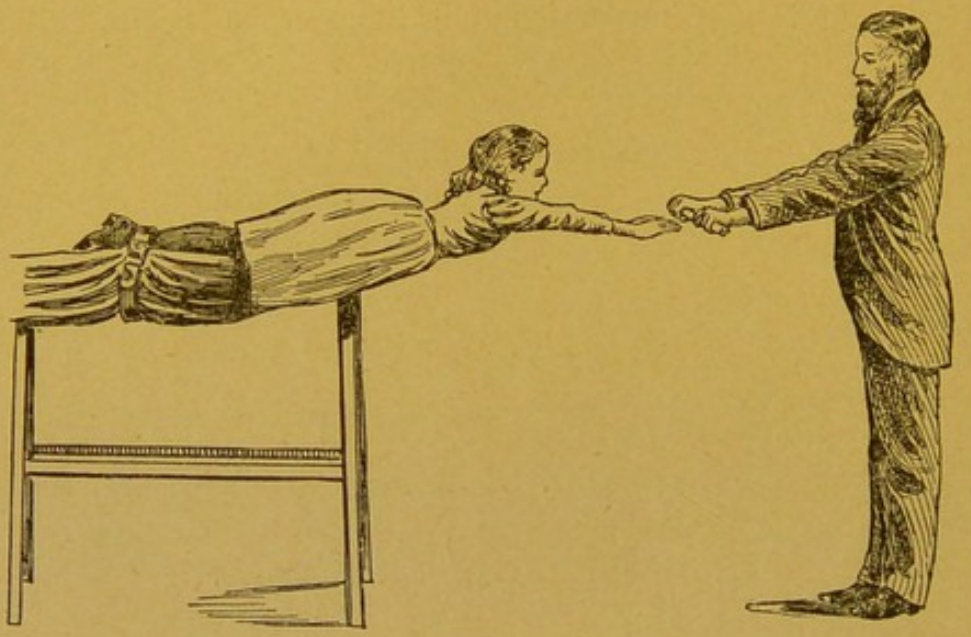
have the same principle. An adjustable lever is furnished with moveable weights, so that the amount of effort required to perform the exercise can be made to suit the strength of the patient. Dr. Zander has invented seventy different apparatus of various kinds, and himself divides his machines into three groups.

1. Those which are set in motion by the strength of the person performing the exercise—apparatus for active movements.

2. Those which are set in motion by some other force (gas or electric motor)—apparatus for passive movements.

3. Machines in which the weight of the patient exercises a beneficial pressure upon the skeleton—orthopedic-position apparatus.

It is extraordinarily interesting to watch the working of these



Hygienic gymnastics.

An exercise that can be highly recommended for strengthening the muscles of the spine in early stages of spinal curvature.

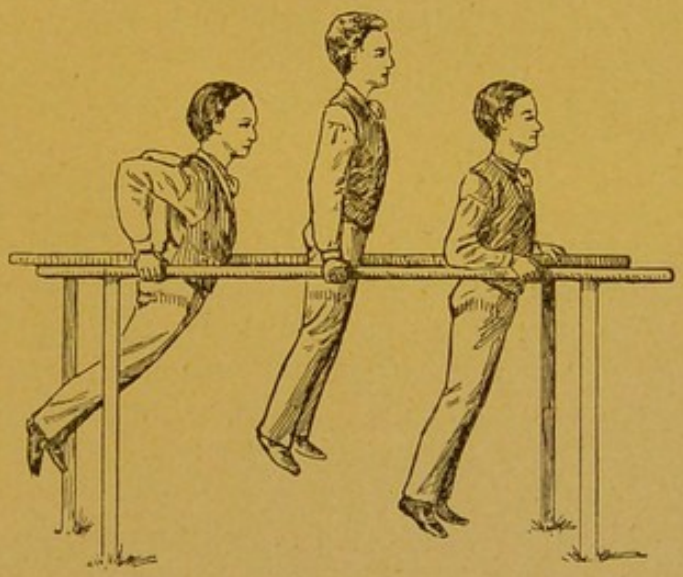
machines. They constitute not only a most valuable means of general strengthening, but are also useful for the subsequent treatment of various accidents (stiffness of the limbs, cicatrized growths, paralyses, &c.) They remove commencing curvatures of the spine better than any plaster or other jacket, enlarge the chest, aud stimulate digestion—in a word are so effective that they can be beneficially applied to the most varied purposes.

It must on no account be supposed that exercise on a Zander apparatus is suited only to powerful robust persons, who wish to diminish their corpulence or to work off something else. On the contrary, the weakest patients (of course with the exception of fever patients) suffering from chronic maladies can use the Swedish apparatus; and, if their own forces are insufficient, can avail themselves of the passive movements which are conducted by the machine

without any exertions of their own.

Before proceeding to the principal disorders which can be favourably influenced by these strictly curative (therapeutic gymnastics), I should like to say a few words about ordinary hygienic gymnastics, which, though they may seem at first sight less imposing than the Swedish, in many cases may supplement them, and in some renders them completely superfluous.

Ordinary hygienic gymnastics make use only of active movements, and require for every movement a muscular exertion on the part of the patient. They consist principally of systematic exercises of free movements which can be practised by any one at home, and are useful both for the general strengthening of the muscles, and more particularly for commencing curvature of the spine, bad carriage, slovenly gait, &c. The strength is supported, and the exactitude of the exercises assured by bars, &c., in the manner shown in the illustrations.

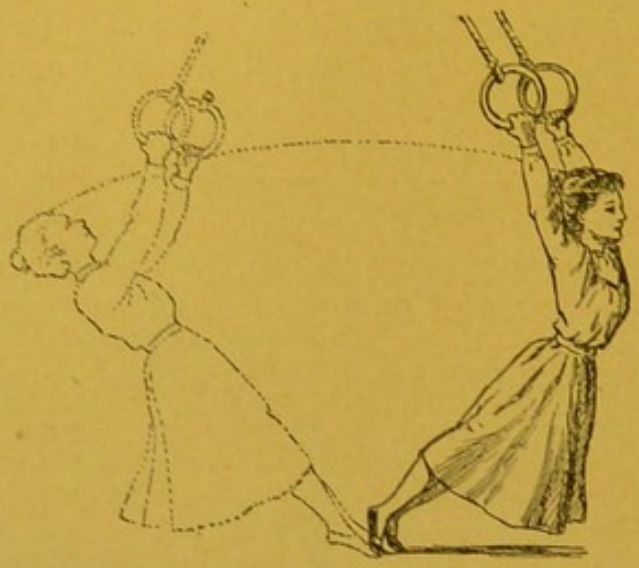


Exercises on parallel bars.

Naturally an endless variety of different movements are possible. But anyone who wishes to practice gymnastics at home should not go through the various movements one after another without any kind of order, but use a system and exercise one portion of the body after the other until the whole task has been gone through. It is also advisable not to continue the exercises until excessive fatigue supervenes. Any fatigue of a muscle is a sufficient indication that it desires to rest.—All the exercises must be conducted regularly and quietly; and it is better to attempt a smaller number of them, and to

perform these with exactitude, than to scramble through the whole task, so as to be as soon as possible rid of it.

When a garden or an open place is available, attached to the house.



Exercise with the rings.

a horizontal bar, parallel bars, or a pair of rings, should be erected, The expense is not very great, and it will be well repaid by the advantage of having these simple apparatus for the gymnastic exercises of the whole household.

Exercises which may be recommended for indoor gymnastics are:

First group. (The feet must not move from their position). Arms bent. Arms extended forwards. Arms bent. Arms extended upwards. Arms bent. Arms extended sideways. (Ten times). Five minutes pause for rest.

Second group. Heels fixed. Torso bent slowly forwards. Torso erect. (Six times). Afterwards: torso turned to the right; torso turned to the left. (Six times). Five minutes pause for rest.

Third group. Right foot raised (slowly); put down. Left foot raised; put down. Knee bent; knee straightened. (Six times). Right foot raised. Foot turned about. Foot put down. Left foot raised. Foot turned about. Foot put down.

In addition to these exercises there are also many other movements of the torso and of the limbs, which may be combined together, and may be left to the choice of the reader.

But I would direct particular attention to some exercises with a staff, and to marches which have an excellent effect upon a bad carriage of the body.

Hygienic Gymnastics.

How great the number of disorders is in which it is possible to derive advantage from hygienic gymnastics either with Zander's apparatus or with the simpler form of gymnastics would surprise many readers, and I will, merely on account of the interest of the subject, collect together a few examples so as to put this highly beneficial method of treatment in the right light.

I. *Disorders of the organs of motion*, in so far as they result from stiffness of the joints, consequences of accidents, rheumatism of the muscles, old sprains, distortions, faulty carriage, or curvature of the spine, are influenced by no other remedy more surely than by various forms of hygienic gymnastics.

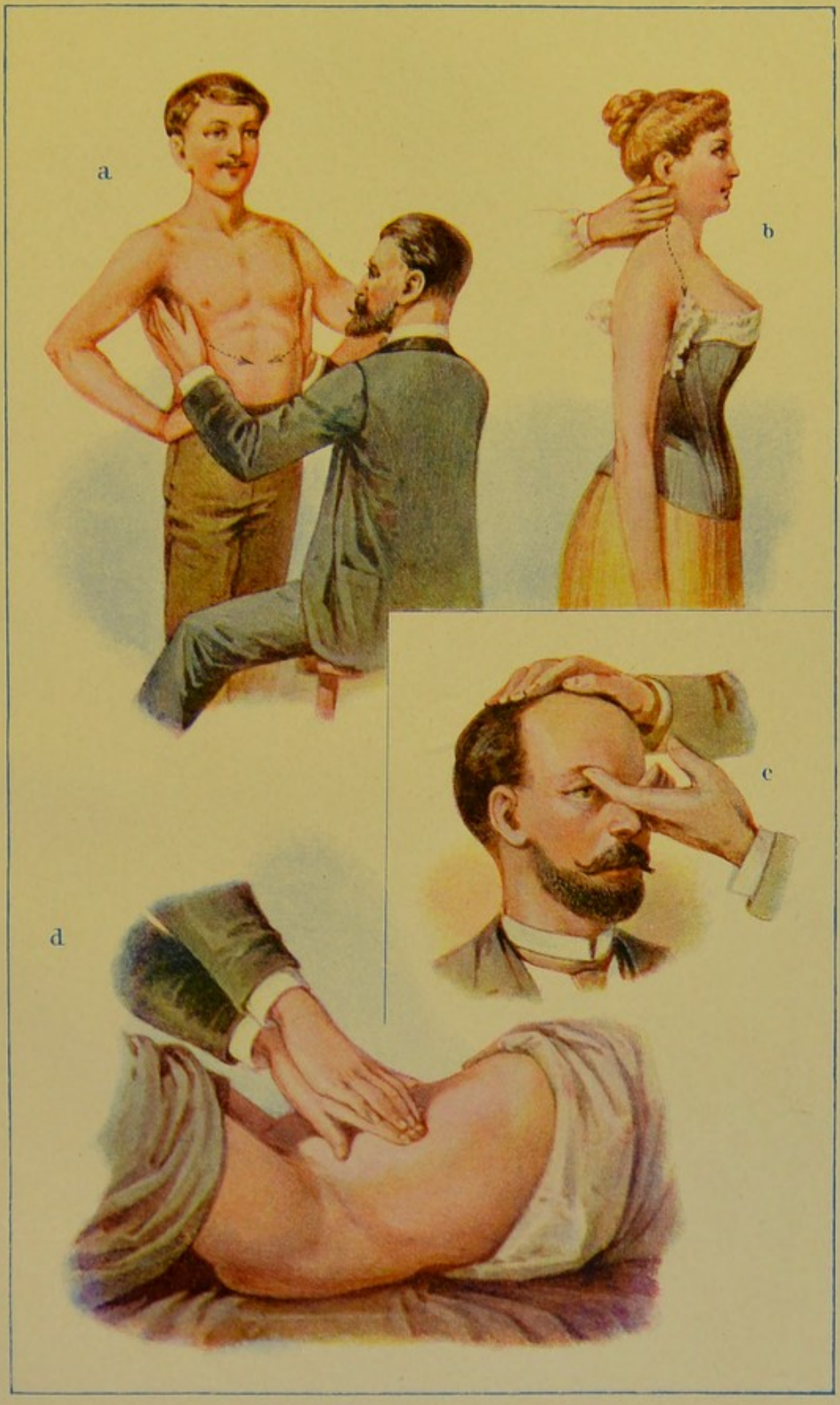
II. *Disorders of the organs of respiration* which can be referred to poor development of the chest, catarrh, resulting from congestion, asthma, pulmonary emphysema, and some adhesions of the pleura, are favourably influenced by hygienic gymnastic exercises.

III. *Disorders of the nervous system.* Hygienic gymnastics exercise a beneficial influence over all paralyses resulting from cerebral hæmorrhages; also over hysterical paralyses, over diseases of the spinal cord (in the first stages), sleeplessness, neurasthenia, Saint Vitus' dance, professional cramp, and chronic poisonings.

IV. *Metabolic disorders*, corpulence, gout, diabetes mellitus, as I have already mentioned when discussing them, can be treated by no remedy better or more naturally, in suitable cases, than by using appropriate hygienic gymnastics, which will increase the metabolism, and so burn up the fat, albumen, and sugar in the body.

V. *Chronic disorders of the organs of the lower abdomen*, in so far as they are occasioned by chronic catarrh, or by overcharging of the great blood vessels, offer special opportunities of the beneficial influence of hygienic gymnastics. In particular, *chronic constipation*, *piles*, and a number of *female complaints* show a great improvement, if they are not completely cured, when the exercises are used in the right way, and contined for a sufficient time.

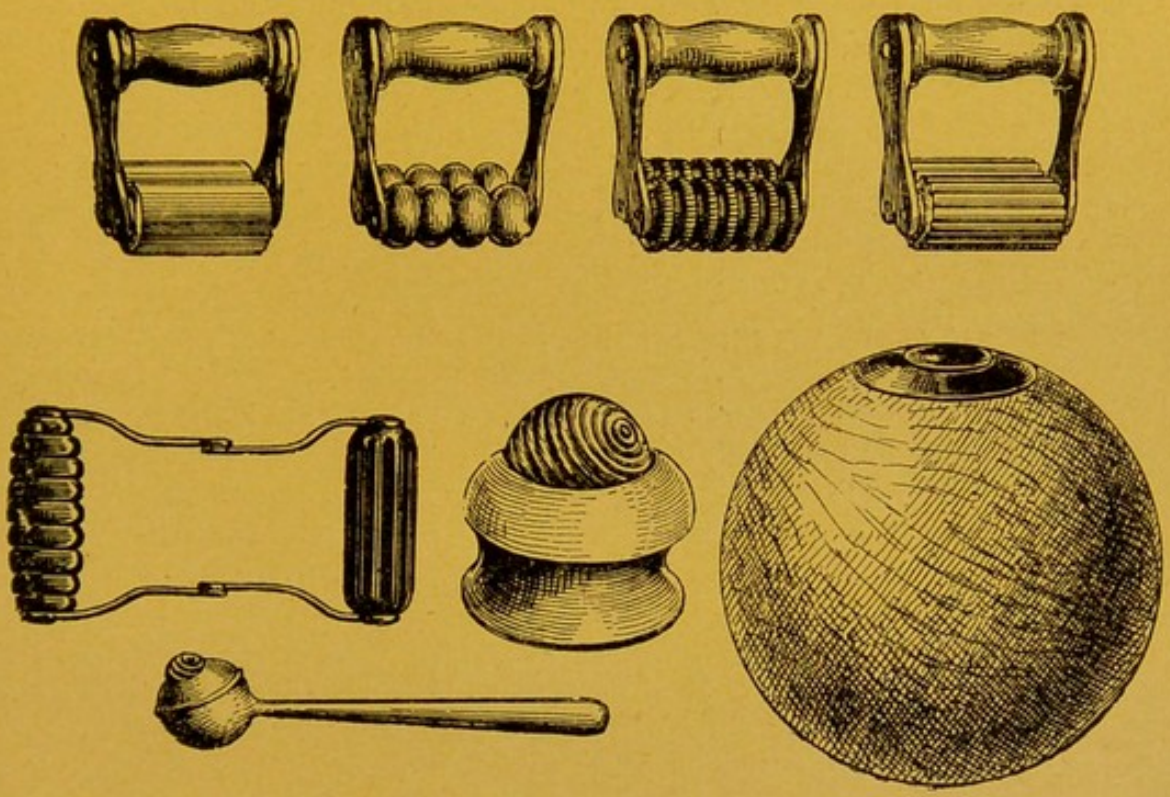
VI. *Disorders of the heart and of the great vessels*, in conclusion, are in many ways mitigated by appropriate exercises. As the distribution of the blood in the different organs is distinctly influenced by the gymnastic exercises, it is self-evident that the heart is spared a great deal of exertion; and it must be admitted that Zander is fully justified in remarking on this subject, "It is astonishing how beneficial an influence regular, gentle, but varied exercise of the muscles exerts particularly upon the heart of the patient. Some maladies of the heart (weakness of the heart and fatty degeneracy) can be, if not too far advanced, completely overcome, others may be



Massage of the breast, neck, face, and abdomen.

prevented from developing, and mitigated in all their symptoms."

Massage, which must be regarded as a branch of hygienic gymnastics, seems in recent years to have developed into a fairly independent method of treatment. It consists essentially in the application to single parts of the body of an external mechanical stimulation.



Instruments for massage.

The original meaning of the word is equivalent to "kneading," but in addition to this particular form, various other manipulations are used, so that massage consists sometimes in striking or stroking, sometimes in kneading and rubbing. In other words, the muscles are handled in various ways, like any other tissue might be handled, to effect a desired result

Howsoever plain and simple massage may at first sight appear to the unprofessional, its effects are very manifold, as the art will be also found to be if any one desires to obtain practical advantage from its use. The *masseur* must, above everything, have an exact knowledge of the courses of the muscles, and of the veins and nerves; otherwise he will be working at random; and it is absolutely necessary that any one who undertakes to massage should first of all receive a thorough

education which will acquaint him with the indispensable methods of proceeding.

The various manipulations which are employed in massage are chiefly *stroking*, *rubbing*, *kneading*, *shaking*, and *striking*.

Stroking is to some extent the mildest and simplest form of massage. It is used principally over the larger portions of the body, and is performed with the palm of the left hand, the right hand holding or supporting the part that is massaged.

Rubbing is best performed with the ends of the fingers or more particularly with the ball of the thumb. It is applied always to small parts of the body. It consists in small circular movements of the fingers, which stimulate and shake with a continuous slight pressure the skin and the parts immediately beneath it. It is used particularly in female disorders.

Kneading is used for those parts of the body which present large soft tracts. This kind of massage is best performed by both hands working simultaneously. It consists either in gently raising between the fingers and thumb, and again releasing, under soft pressure, the soft parts which are massaged, or else in taking in both hands the

Massage by striking the back.

part that is to be massaged (generally an arm or leg) and thoroughly kneading, by a gentle progress of the hand, the muscles which are under the fingers. The thumbs of the two hands employed in massaging generally lie together.

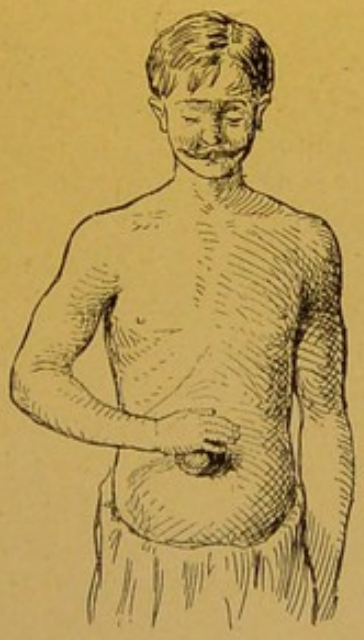
Shaking is best mechanically effected by the Zander vibrating apparatus (see plate xvi.) If the *masseur's* hand is employed, a tremulous quick motion of the distended fingers of the whole hand, is brought to play upon the skin of the patient, so that the continued movements of the fingers produces a continuous soft shaking of the tissues.

Striking (also performed by Zander's apparatus) consists, as the name implies, in the *masseur's* striking in regular time some part of the body either with the outer edge of the hand, or with the tips of the fingers of both hands alternately.

These various commonest methods of manipulation are never used singly or alone, but together and alternately. In addition to them there are many others, every *masseur* in time developing his own system of procedure.

What is the aim, then, of all these various mechanical stimulations; or, in other words, what is the effect of massage? Is it possible, that these movements of the hands and actions of the fingers, which seem almost a sort of play, should vanquish serious disorders against which the most costly medicines are powerless?

There are many maladies which yield to no medicine, but can be certainly cured by able and sufficiently long continued massage.



Massage of abdomen with a ball.

What disorders are particularly fitted for treatment by massage, will be most easily understood if it is observed in what manner the various manipulations affect the body of the patient.

First of all it is perfectly certain that the direct mechanical stimulation of the skin and of the muscles lying immediately beneath it occasions an alteration in the circulation of the blood. This alteration will vary with the description of and the amount of force employed in the different kinds of massage used. The oiled hand of the masseur always works "towards the heart," so that the stream of venous blood towards the heart may be facilitated. In consequence of this the stream of arterial blood is, of course, indirectly assisted, as the more quickly and more abundantly the venous blood passes to the right side of the heart and thence to the lungs, so the more quickly can the arterial blood abounding in oxygen be expedited from the left side of the heart.

What advantage resulting from massage may we deduce from this?

We may first infer that *massage exercises a beneficial influence upon venous congestions*, as it directly expedites the insufficient flow of the blood towards the right side of the heart. It follows further that both the skin and the muscles lying immediately beneath it are better irrigated by the blood. But *the more abundantly the tissues are irrigated by the circulation so much the better are they developed.* This we have already had occasion to point out when discussing the nutrition of the muscles: where we also observed that *every muscle which is not exercised deteriorates or atrophies.* In this sense, then, massage represents a powerful excercise of the muscles.

But that not only the voluntary muscles are strengthened by massage, but that the smooth muscular filaments, which are found principally in the digestive canal, are essentially influenced by a proper massage of the abdomen is most evidently demonstrated by the fact that the most obstinate constipation yields in a short time to massage.

Massage also develops heat; and increased temperature is equivalent to increased metabolism and increased burning within the organism. From this we may draw a certain conclusion that massage effects a general exchange in the interior economy of the organism. In other words, *the vital activity of the body is vigorously increased.*

We see this conclusion most indisputably supported by the effect of massage upon *gout*, *diabetes mellitus*, and corpulence. In all these cases of disturbances of nutrition and metabolism we find after properly-conducted massage (particularly if supported by general gymnastic exercises) a distinct improvement after a short time.

Massage has a particularly beneficial effect upon the nervous system. It not only mitigates severe pain (as everyone will confess who has tried it for *neuralgia of the face*, *lumbago*, and *sciatica*); but gentle massage also relieves cramp, as has been often observed both in *cramp of the*

stomach, *cramp of the calves of the leg*, and other chronic forms of cramp.

I might mention a number of other points of view, and a whole series of different large classes of maladies, in which treatment with massage is most suitable, particularly when employed in connection with other appropriate remedies. Thus, to mention other particulars, it serves to break up old deposits in the tissues, and can generally in a short time effect a great amelioration in stiffness of the joints. But to enter fully into this subject further would take me beyond the limits of my book.

What I particularly wished was to give the reader an explanation of the nature of massage (so much talked about recently), and of the principal effects produced by this method of treatment; which is unhappily too little esteemed by many medical practitioners, and regarded askance, because they have never taken the trouble to inform themselves correctly about the nature and effects of natural methods of cure, amongst which massage has an important place.

It will be self-evident to every thoughtful person that massage cannot benefit all diseases, and that it must be strictly avoided in the case of fever patients, in purulations, in the case of malignant new growths, and during pregnancy.

The use of Suggestion and of Hypnotism in the treatment of Diseases.

It is probable that both "suggestion" and "hypnotism" are known at least by name to my readers. What these rather grand-sounding, and at the same time distinctly indefinite expressions exactly mean I shall presently explain. But if I seem here to be speaking of something absolutely new, and never heard of before the last few decades, I must beg the reader to remember that very few things indeed are really new—and those that are new, are new only in this sense, that they are new to us, not having been previously understood, and still being understood but very imperfectly, or because they are new applications of those forces of nature which have been always exactly what they are now, and what they will always remain. Ever since there have been men on the earth, and since the man of greater mental power and of a stronger will has been able so to move the man of lesser intellectual strength and a weaker volition, as to bring the latter insensibly to accept his views and to submit to his influence,

what is now technically called "suggestion" has existed and has exercised an immense power over the lives of men. We have only to turn to the pages of history to be able to point out countless instances not only of individuals, but even of whole communities submitting to what we should call, if we were using somewhat poetical language, the fascination of some "leader of men." And if we limit our view only to our own experiences of life, we can all of us name cases of people who have been led almost blindly by the influence the "suggestion" of others. Experience will also have shown us that when the individual from whom the "suggestion" has come has been really intelligent, and a person of strong and fine character, the influence instigated by him has proved of untold benefit to the less gifted mind or weaker nature that was guided by it. The reader will, very likely, himself have thought of the kind of influence which older people exercise over the young, who naturally take many of their views of life, and shape their own habits, from the views and examples of their elders. This is a very simple case of "suggestion;" and when we apply the term to the treatment of disorders, we merely speak of a similar phenomenon of the patient's being distinctly affected by an influence exerted over him. Whilst speaking of burns I mentioned (p. 397) an interesting case of a tanner, whose despondence about himself was remedied by his being placed in the hospital between two good humoured and amusing patients. It will be quite natural for any one to remark that this was a very common-place occurrence, and that every one knows the unspeakable value of a good-humoured, bright nurse, and the wonderful effects that hopefulness on the patient's part can produce. But this at once amounts to admitting that in the treatment of disease "suggestion" is a real power; and if its effects are so striking in the most ordinary forms, are we not justified in believing that if carefully and deliberately used it might be of immense value to us.

By "suggestion" we mean, then, this—that one man's influence produces in another certain ideas, from which further ideas, conclusions, and even actions follow. The man who has been influenced at the same time seems to himself to be thinking and acting entirely at his own free will, or at least does not distinctly realize that his notions and actions are by no means the results of his own will and intellectual activity, but have been occasioned really by the influence of another person.

We can distinguish deliberate and accidental "suggestion." In the case of deliberate suggestion the person whom we will call the "suggester" deliberately and purposely introduces certain ideas into

the mind of the other whom we may call the "patient." These ideas soon become the parents of others, and the whole result is a certain course of action on the part of the patient. It is almost always necessary that the suggester should be a person whose intellectual abilities and character give him a certain superiority over the patient.

We speak of an "accidental suggestion" in those cases when a person conceives certain ideas from the unintentional actions or remarks of another person; or in consequence of impressions which he supposes himself to have received from any accidental circumstance or incident. (My tanner who regained his spirits in consequence of having good humoured companions near him came very near a case of the former kind). The accidental suggestion becomes an "auto-suggestion" when the impression which a man supposes himself to have received from some external accidental circumstance is taken up actively by the brain, and worked out further in the sense that appears most befitting to the individual himself. In general, "suggestions" find their way into the brain most easily when they are least realized as suggestions; and it is consequently most easy for a man to submit himself to a deliberate suggestion, when it presents itself to him as a merely accidental one; and patients can be unconsciously won into doing things which they would never have consented to do in obedience to orders. But it is most important that the suggestion should be adapted to the humours, the intellectual capacity, and the mental abilities of the patient.

Here it seems worth while to remark that, under the influence of all kinds of suggestions, we poor frail human beings frequently impose upon ourselves, and deliberately deceive ourselves in every sort of way. Thus, for example, fashion is really nothing else but a "suggestion." A lady wants a new hat. She has only to be shown one with an assurance that it is of the very latest Paris fashion to be enchanted with it, and to find it "absolutely sweet"—no matter how strange or extravagant its form and shape may be. The mere fact that the hat is a fashionable one suffices to make her find it beautiful. Her own æsthetic and artistic senses exercise little, if any influence at all over her judgment. But this identical hat would have been declared tasteless and "positively impossible" if she had discovered that it was the "confection" of some ingenious needlewoman of a little country town, and that it had been offered in vain for sale for the last five years. Do not the costumes to be found in any old journal of fashion, no matter how aristocratic, seem more monstrous than the humble dress of the poorest peasant. Yet, once upon a time, they

were "the rage," and the wealthiest women vied with one another in wearing them. That is to say "suggestion" is in these cases stronger than taste. But we must not deceive ourselves into supposing that we have here any particular example of feminine weakness. Exactly the same remarks apply to male costume—and apply also not only to the artistic taste, or want of taste, of the eye, but equally to all our senses. Everyone of these is daily under the influence of suggestions. Whether we shall find the taste of a certain dish grateful to the palate or not, will often depend upon some previous conception which we have formed of it as a dainty or as a "mess." Probably the reader drinks both tea and coffee. Has it ever happened to him to have placed in his hands a cup of the one when he imagined he was receiving the other, and to have taken a sip of the unexpected beverage before he realized what it was. And does he not remember the shock of the taste of the repellant beverage? In certain countries certain species of frogs and snails are freely eaten, and considered dainties. The mere notion of eating such dishes is disgusting to many Englishmen. But the nerves of taste certainly are not the occasion of the repulsion. We may reflect also upon the very common case of people who acquire a taste for some article of diet that has long been disagreeable to them. These cases are worth mentioning; for it often happens that a man may be recommended, for reasons of health, to eat or drink something that he particularly dislikes. If he has the courage to overcome his initial distaste for it, after a shorter time than he would have believed possible, he finds the previously detested dish or beverage distinctly agreeable to his palate. The new taste has been acquired. But the thing is exactly the same, and tastes the same as it did before.—In a word, our impressions exercise an immense influence even over the elementary organs of sense.

Of course temperament and impressionability of imagination play an important part in "suggestion": and a "nervous" sensitive individual can be much more easily affected by either deliberate or accidental suggestions than some cool, cautious, thoughtful man, who is accustomed to be always looking for the reasons of things. That is only what we should have anticipated. And, in fact, it is principally to the province of hysteria that "suggestion" has been applied in various forms, and during recent years deliberately for purposes of effecting cures.

The possibility of suggestion is particularly extended in the *hypnotic state:* that is to say, in a certain condition, resembling sleep, in which the distinct consciousness is considerably limited, and the power of judgment and the freedom of the will are very much diminished.

This state, however, differs from sleep in this particular, that in the hypnotic state the perceptions of the senses and the mental processes resulting from them continue to be operative. In some cases they are even incredibly intensified; whereas during sound sleep the whole intellectual apparatus appears to be completely at rest.

The hypnotic state (with which we may well compare somnambulism or sleep-walking) in mild cases resembles a sort of sleep-intoxication. Consciousness and power of discrimination seem to be little disturbed. But the state can also advance to something resembling a deep sleep of certain faculties. The patients then become complete automata, and are in the hand of the operator mere passive instruments without either power of judgment or will. After awakening from the hypnotic state they have no recollection of anything that took place whilst it lasted.

Most of my readers will know that it was but recently, towards the end of the last century, that the nature of hypnotism began to be more clearly understood. Previously to this certain experimentalists in this direction had attained a certain celebrity, or notoriety, more particularly on the Continent. Mesmer, the founder of the study of "animal magnetism" (from whose name the familiar word "mesmerism" is derived), died in 1815. It may be said that he rather set people thinking than in any sense lead the way towards "psycho-therapeutics" (healing by means of influence over the mind). His earlier followers, and subsequent "spiritualists" travelled about from town to town giving exhibitions of their "magnetic powers," principally with the aim of making money out of their shows—the performances deserved no more honourable name; but the general public became considerably interested in many of the undeniably very striking phenomena of the hypnotic state. The consequences of these exhibitions were by no means always satisfactory. It appears to be an established fact that in certain parts of Germany they led, in several towns, to actual epidemics of nervous disorders, more particularly amongst school children, who, after visiting the exhibitions, amused themselves with testing their abilities of "magnetising" one another. That a vast amount of nonsense, beginning from the days of Mesmer himself was at first mixed up with the real fact of the existence of an hypnotic state every one is well aware. But it must be understood that in all these various performances of "spiritualism," "animal magnetism," "mesmerism," or by whatever other name similar influences may have been called (and we ought to include Somnambulism among them) the real results, so far as any existed, all belong to the dominion of what is now technically known as hypnotism, that

is to say they were phenomena and results of a disturbed condition of the powers of perception, resulting from voluntary or involuntary suggestion.

We shall, however, not be far wrong in assuming that all this time the "mesmerists" "spiritualists" and other professors of similar powers, were very dimly, if at all aware, of the nature of the forces with which they were dealing. Something of value, however, gradually emerged from their fumblings in the dark—very much as the alchemists of the middle ages, engaged in their useless search after the philosopher's stone and the elixir of life, prepared the way that led to the modern invaluable science of chemistry. With the later decades of the last century the truths of hypnotism emerged from the hands of visionarys and imposters into the charge of scientific men, and whilst in all the above cases "suggestion" was but unconsciously dealt with as a power that could psychologically influence health, recently a complete change has been affected in the whole province of hypnotism, medical science having carefully investigated all its bearings, and all the phenomena connected with it. The immense increase of nervous and mental disorders, and more particularly the great interest which has been, during the last decades, taken by the whole civilised world in the treatment of insanity, naturally led to a close study of hypnosis and hypnotism; and, as soon as it was realised, that a whole series of symptoms of the manifold forms of hysteria could be directly cured by the use of "suggestion" in medical hands, a first and most important step was taken in the direction of psychical therapeutics.

"Suggestion," whether the patient is in a waking condition or in a hypnotic state, can influence the central nervous system alone. From this it is clearly evident that the rest of the organism can be affected only in a secondary manner, that is to say, through the instrumentality of the brain and the nerves. It follows that any sort of cure affected by "suggestion" is applicable especially to all such pathological conditions as in some way or another depend upon disturbances of consciousness, sensation, impression, and will. Thus "suggestion," and particularly hypnotic suggestion, can be used with the greatest advantage in cases of melancholia that do not involve insanity, in querulousness, sickly vacillation, and hypochondria, also in cases of moral perversion, alcoholism, morphinism, and all the pathological symptoms of hysteria and neurasthenia. The treatment can boast also of cures in cases of certain kinds of paralysis, such as those with which we meet in hysteria—which may be described as psychical paralysis. Our voluntary movements are occasioned by certain

processes which take place in the convolutions of the brain; and exactly as a sudden shock for the moment paralyses the actions of the majority of men, so that they totter, or are unable to speak, or drop anything that they may happen to have in their hands, some particular region of the brain may for a longer time become to a certain extent hampered in its action, with the result of a psychical paralysis. We have an example of this sort of thing in a well-known experiment. A lady of a naturally nervous and sensitive temperament is asked to lay a bright sovereign on the palm of her outstretched hand, and to regard it fixedly. After a time she feels unable to raise her hand so long as the sovereign lies upon it. This is in effect a case of psychical paralysis of a very mild kind. We have an opposite phenomenon when the suggester enables a patient to make some movement previously impossible. Of course, the paralysis *must* be of a psychical kind, and the nerve tract *must* be completely uninjured for any such result to be possible. But when a specialist experienced in the treatment of nervous disorders has become convinced that a given paralysis is a purely psychical one he may reckon certainly on sooner or later seeing the paralysis of the affected limb overcome by persevering "suggestion." Cases are on record of patients who have lain for months quite helpless in bed, being by properly applied "suggestion" treatment enabled to rise and to use their limbs.

We have innumerable examples of the wonders that the patient's faith alone can effect in many severe indispositions resting upon a purely nervous basis. And there can be no doubt that the successful cures (which cannot be impugned) effected by innumerable quacks, "cunning men," and other persons of the same kind, are really to be referred to "suggestion" in the form of a kind of ascendency which they acquire over their patients, combined with the firm belief of the latter in the certainty of the cure promised them. In cases of psychological affections cure would be the natural result. Of course the base of the malady must be of a psychical kind. But I would point out here to all patients how important it is for them to be in good spirits about themselves and their recovery. This is to enlist the assistance of their own central nervous system—whose influence upon the whole organism can be, as we have seen, of very great importance.

The danger of "suggestion" and hypnosis lie in this, that great mischief can be done with it by unprofessional persons. It has beyond doubt been used to prompt weak minded and easily influenced people to thefts, arson, and all kinds of crime—the unfortunate criminal believing that he was acting entirely in accordance with the

dictates of his own will. I, for this reason, abstain entirely from giving any description of the processes of "suggestion" and "hypnotising," and would warn all my readers against taking any part in hypnotic, magnetic, or spiritualistic seances.

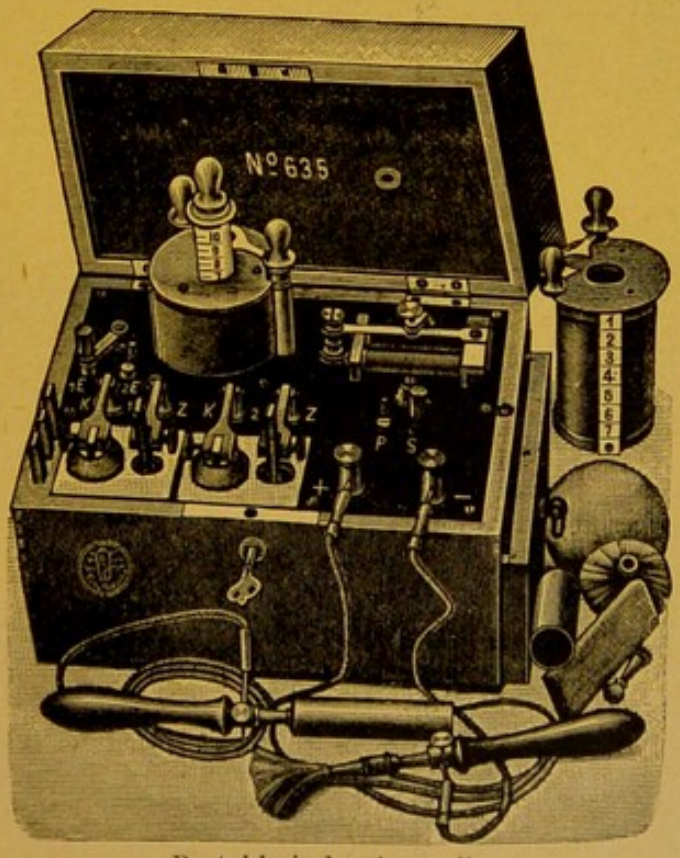
Exactly as the scientifically educated surgeon alone can properly undertake surgical operations—possessing such a knowledge of the human organism, and practical acquaintance with the right way of using the means at our disposal, as will enable him to effect satisfactory results, so the use of hypnosis ought to be restricted entirely to medical specialists, responsible alike to his patients and to the state for his professional procedure. All hypnotic popular exhibitions and dilettante trifling with hypnotism ought to be strictly forbidden by law. The great nerve-specialist Preyer said with reason "It must never be forgotten that the human brain is not a play-thing. It is only the serious scientific man, and the professionally educated medical practitioner that know how on the one hand to avoid all abuses in the use of hypnotism, and on the other hand how so to pursue their investigations as to be able to apply everything useful, which they may have discovered, in a manner advantageous to their patients."

Electricity and its Use in Therapeutics.

One of the most striking characteristics of modern medical treatment is the number of different expedients for dealing with maladies which we now possess that were unknown to our ancestors. Amongst these we must name electricity. In recent years electricity has been found so useful, particularly in dealing with nervous disorders, has been tested in so many different ways to ascertain exactly its effect upon the human body, and has in so many cases been found of invaluable assistance in the hands of capable medical men, that I must say a few words about it.

I hold this to be the more necessary, because in recent years this particular sort of treatment has been regarded with mistrust in certain medical circles. Some medical men have gone even so far as to deny the beneficial effects of electricity, and to say that the results were due merely to "suggestion." But I consider this view an entirely mistaken one. It is true that we at present know so much less than we could wish to know both about the nature of electricity and about its effect upon living organisms, that many different questions remain unsolved. But it is not reasonable to deny the plain, even visible

results, which electricity has effected in the treatment of various maladies, because the manner in which it acts is still a secret hidden from our feeble human understandings. If we were always to proceed upon this rule of action, should we not have to set aside also many other methods of treatment? All medical treatment is indissolubly connected with a certain amount of moral influence exercised over the patient, which supports the physical treatment of whatsoever kind it may be. And this moral influence must always remain inexplicable. I shall not deny that ill-success has in many cases attended the use of electricity; and this may have shaken the faith of many medical men in its utility. But these failures ought to be ascribed not to the method but to the mistakes of those who have misapplied it, or have employed it in cases for which it was of no use. The right application of electricity is a true branch of medical science which has to be properly studied like any other speciality; and a great part of the discredit into which it has fallen is due simply to the fact that



Portable induction coil.

electricity has been employed either by insufficiently instructed medical men or by quack "masseurs," and other persons of the same sort altogether unqualified to handle it.

Electricity should be employed only by such medical men as are thoroughly acquainted with the principles of electrical science and with the manner in which its marvellous powers can be applied. Under such circumstances it is certain that we shall find in electricity not only a great assistance in the investigation of a number of nervous disturbances, but also a valuable method of curing some of them.

The existence of electricity was not absolutely unknown to the ancients. In the middle of the eighteenth century the electrical machine was asserted to be capable of producing cures of many different kinds; but it must be added that wild experiments were made, and the vaguest notions current, as the knowledge of electricity was only in a most elementary stage. We owe the first intelligent use of electricity to the great discovery of the learned Italian Galvani, who based upon his world-renouned experiments with the muscles of frogs, the first principles of the application of the electric current to living organisms. The experiments of Alexander Humboldt with muscle and nerve fibres in 1797, and the discovery of the voltaic pile in 1800 gave Galvani's discoveries their first real value, and laid the foundations of the subsequent use of the electric current for the investigation, recognition, and treatment of various disorders. The development of electrical science was greatly forwarded by Faraday's discovery of induced electricity in 1831. The subsequent discoveries of the magnetic effect of the electrical current by Derstadt, the classical investigations of Rémak, Ziemssen, Dubois Reymond, and Pflüger, as well as the practical results obtained by Erbs and other celebrated physiologists and specialists, made progress still easier; and recently the valuable labours of Röntgen have given electricity an assured and permanent place in the dominion of medicine and natural history.

In therapeutics we distinguish two uses of electricity, frictional electricity, and the electrical current. Whilst the latter is of extended use in the treatment of disease, frictional electricity is rather scientifically than practically interesting.

A complete familiarity with the principles of electricity, and with the extremely complicated electrical apparatus is necessary before electricity can be applied with any prospect of success to the treatment of human disorders. In other words, only a medical man who has received a special scientific and technical education enabling him to deal with these forces and instruments, can use electricity to good effect. For that reason I shall not here attempt to make the public in general acquainted with the various constructions and use of electrical apparatus, but limit myself to the most necessary explanations alone.

Those who are particularly interested in this wonderful science can find further information in other works which contain a full exposition of the science of electricity.

Every body in its natural state contains two kinds of electricity, namely, *positive* and *negative*, which are distributed over the whole surface of the body, and hold each other reciprocally in balance, or are, as we say, in equilibrium.

That there are two kinds of electricity is proved by a very simple experiment which anyone can make. Two pith-balls united by a fine silk thread are hung near each other. If a glass rod is rubbed with a piece of cloth, and the little pith-balls then touched with the glass rod, the pith-balls will be seen to move away from each other, and from the glass rod if it is put near them. If a stick of sealing-wax is now rubbed with a woollen cloth, and the same experiment of placing it near the pith-balls made, it will be found that the pith-balls which, in the case of the former experiment, moved away, now, on the contrary, are drawn to the electrified sealing-wax. The electricity set free by the glass rod we name positive (+), and that set free by the sealing-wax negative (—).

How comes it that in consequence of the rubbing with the piece of cloth (which in this case is the "electromotor," that is to say, producer of electricity) in the one case positive, and in the other negative electricity is produced? That depends upon the electrical relation of all bodies to one another, or, as we say, their place in order of electrical tension, in which every body has its own fixed place, so that by the friction of its surface, either positive or negative electricity is produced.

If a body is so electrified, that by friction of its surface either positive or negative electricity is given off, it can communicate free electricity to another body, or on the contrary take up free electricity from another body until the equilibrium of the opposite kinds of electricity is again restored. So positive electricity seeks to unite itself with negative electricity, and negative with positive, whilst on the contrary similar electricities shun each other, or in the words of the fundamental law of electricity, "Similar electricities repel, dissimilar attract each other."

But positive and negative electricities can be produced not by friction alone, but can be also in other manners so separated from each other that the positive electricity shall be gathered at one "pole" and the negative at the other. Accordingly we distinguish frictional electricity, contact electricity, thermo electricity, and inductive electricity; of which contact electricity and inductive electricity alone are used for medical purposes. The *constant current* of the *galvanic*

battery gives us the former; and the *faradic, interrupted*, or *induction current* the latter.

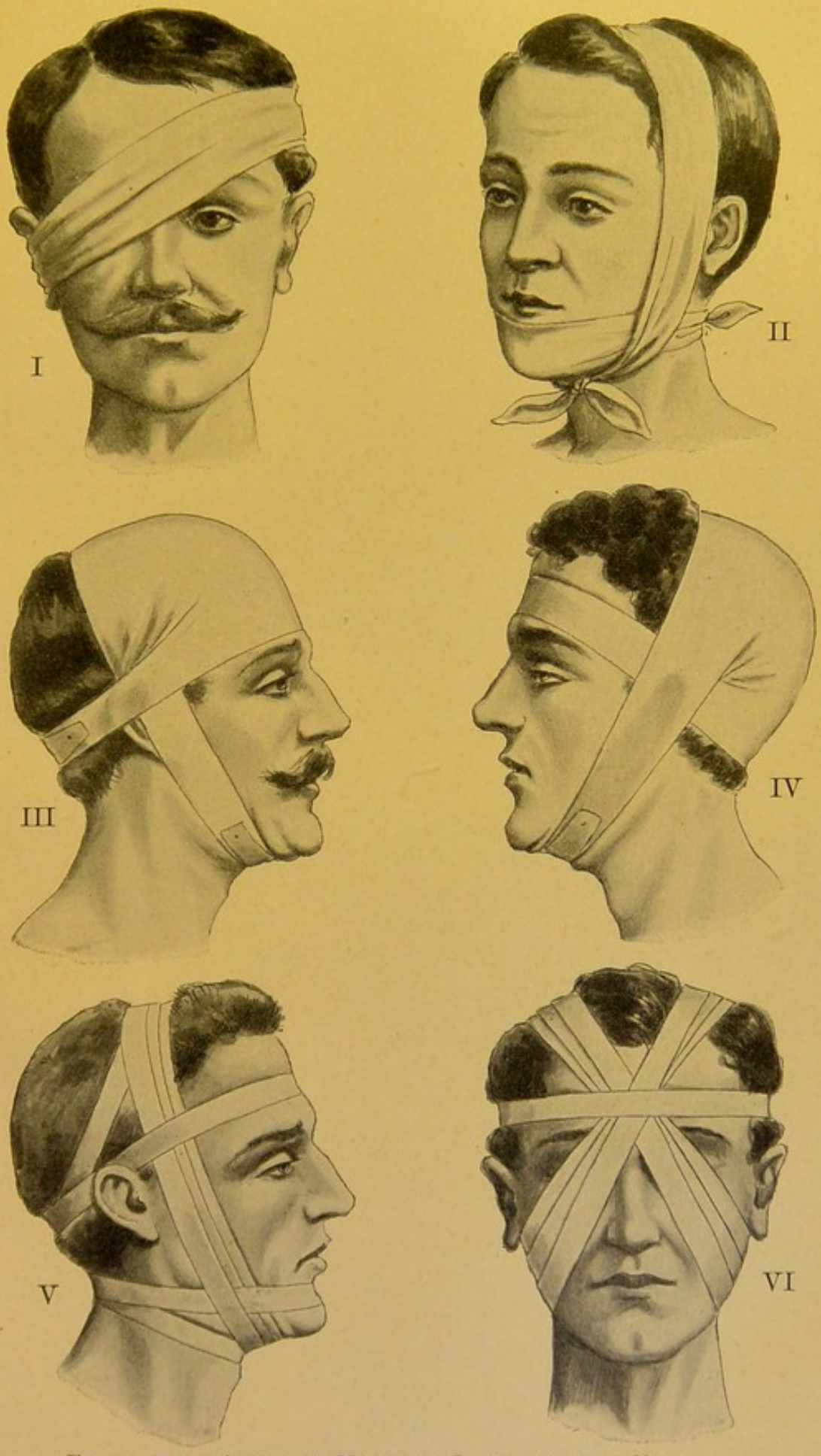
The *galvanic current* results from the immersion of two different metals in a fluid. If, for example, we fill a vessel with diluted sulphuric acid, and immerse in the solution a zinc and a copper plate, so that they do not touch each other, and so that their upper portions rise above the surface of the solution, a separation of the two kinds of electricity existing in both plates immediately takes place, so that the positive electricity is collected at the one end of the plates and the negative at the other. Experiment proves that according to the nature of the metals chosen the positive electricity is always at the top and the negative at the bottom, or *vice versa*. Thus when zinc and copper are immersed in diluted sulphuric acid, negative (—) electricity is accumulated at the upper end of the zinc plate, and positive (+) at the bottom; whereas with the copper the opposite is the case. Now, as unlike electricities have a strong tendency to unite, if the — pole of the zinc is united to the + pole of the copper by a metal wire, or with the thumb and first finger, an equilibrium of the two electricities immediately ensues. But in the vessel filled with the diluted sulphuric acid a continual equilibrium is similarly maintained between the lower ends of the zinc and copper plates, inasmuch as though there is here neither hand nor wire the fluid itself supplies a medium of equilibrium. So whilst zinc and copper, or any other substances which are good conductors, are thus united together a continuous (constant) electric current flows from one metal to the other.

An arrangement of this sort, by which two metal plates immersed in a suitable fluid are connected above by a metal wire, is called a *galvanic cell*. Many such cells connected together are called a *galvanic battery*. The battery is generally so contrived that the metal plates can be all conveniently lifted out of the fluid when the electric current is not required. When this is done we say that the current is open. As soon as the plates are again plunged into the fluid the current is closed. The free ends of the portion of metal are called poles; and the positive pole is the *anode*, the negative the *cathode*.

The faradic or induction current differs from the galvanic or constant current principally in this that it is frequently interrupted, and to a certain extent consists of innumerable infinitesimal quantities of electricity, which, following each other with immense rapidity, form an apparent whole.

There are various ways of producing an induction current of this kind.

When, for example, a copper wire, wound in a coil, is brought



EXAMPLES OF APPROVED MODES OF BANDAGING THE HEAD.
I and II Provisional Bandages. III, IV, V, VI, Surgical Bandages.

near a closed galvanic element at the instant of approach, as well as at the instant of removal, a momentary electrical current is induced in the copper coil—a current which has been aroused, or in scientific language "induced" in the wire by the galvanic current. In this case the galvanic current is called the *primary current*, and the momentarily arising and vanishing current in the coil the *secondary current*.

Similarly an induction current is occasioned in the closed copper wire if the primary galvanic circuit is rapidly opened and closed.

Finally if a magnet is put in the place of the closed copper wire, and a closed copper wire in the place of the primary current, an induction will ensue in the latter as often as the magnet is put near it or removed.

The electrical mechanician makes use of the three facts above stated to form what is called an induction apparatus. Of these there are a whole series constructed on different systems. I may mention briefly that the wire of the primary and secondary coils do not consist of single wires, but both are formed of manifold coils around a wooden cylinder. These are distinguished as the primary and secondary coils, and are so arranged that the secondary coil can be removed from the fixed primary one.

To describe fully the construction of these extremely ingenious apparatus would, of course, take up more space than I here have at my disposal. I shall say only that with the assistance of very delicate subsidiary instruments it is possible constantly to measure the strength of the current produced, and to increase or to diminish it at will: and that the current can be selected or altered at pleasure, accordingly as anode or cathode is changed, or it is desired to employ either a galvanic or an induction current. Modern electrical mechanics places all these forces at our disposal united in convenient apparatus supplied by special firms of instrument-makers.

In order to bring the electrical current to bear upon the human organism the positive and negative poles are united to conducting wires, that is to say, thin copper wires which are covered with silk or india-rubber to isolate them. At the ends of the conducting wires are placed what are called the electrodes, which have the shape either of balls or of flat plates, accordingly as it is desired to act upon single parts of the body or upon large surfaces. They are supplied with handles of leather or linen so as to afford a convenient hold for the hand of the medical man in the application of the electricity.

All substances do not conduct electricity equally well, but offer a greater or a less resistance to it. Thus all metals are very good

conductors; but glass, silk, and india rubber, bad ones—for which reason they are used as isolators. It will therefore be interesting to enquire how the human body stands in relation to electrical conduction; and we may say first that the human body is a whole compound of various very different conductors, and that the power of the various portions to conduct electricity depends very much upon the quantity of fluid contained in the tissues. The dryer the tissue is the less is its capacity of conducting electricity. This at once explains why a dry surface of the skin conducts the electricity badly, and why, in the case of the application of the electric current, the skin should be well damped with luke-warm salt and water and cleaned from any impurities. The various parts of the skin have also very different conducting capacity. The resistance of the soles of the feet and of the palms of the hands is very much greater than that of the skin of the face. A hand moist with perspiration conducts much better than a dry one. The constantly covered skin of the arms of a young lady conducts much better than the constantly exposed skin of a laundress. The horny palm of a labourer can support without a quiver of the muscles a current that a lady's hand could scarcely endure.

After the electric current has once vanquished the resistance offered by the skin, the more or less saline fluids (blood, lymph) of the subcutaneous tissues conduct the current very well.

We may now turn to the physiological effects of the electric current. The most familiar of these are the electromotor effects, that is to say the stimulating effects upon the nerves and muscles. If, in order to show these, a current is passed through a certain nerve, twitching ensues in the muscle which the nerve controls. The strongest effect is produced by a successive opening and closing of the current, so that we may rightly lay down the principle. "The irritation is due not to the fixed magnitude of the current, but to its variability." The stimulation of the nerves follows fixed laws, the best known of which is Pfluger's law of convulsive motion. According to Pfluger the stimulating effects of the galvanic current take place only at the poles, that is to say the places where the electric current enters or quits the body, or in technical lauguage only at the anode and cathode, and in this way—that the effect is produced at the cathode when the current is closed, and at the anode when it is opened. The stimulating effect of the cathode considerably surpasses that of the anode.

From this follows the practical rule that in order to produce a stimulation of the nervous system we make use of the cathode, and

to heighten the effect of stimulation frequently change the current. If the galvanic current has been for a period closed, and is then broken, the next closing of the current in the same direction occasions a sharp twitch, and the stimulation will be the more marked if there is a rapid change of the direction of the current, and a rapid alteruation of the opposite poles.

Like the galvanic current the induced current (that is to say the perpetually interrupted secondary current, which I have above described) is also capable of producing stronger stimulation when it is composed of shocks rapidly succeeding each other with sudden variations of force.

Now if the muscles and nerves which are to be examined and treated are pathologically altered (that is to say are in some way out of health) the manner in which they respond to the stimulation of the electric current is also altered. In certain maladies the twitching produced by the electric current does not follow with the normal lightening rapidity, but is slow. Also the law above mentioned, that the twitching produced by the cathode is more marked than that produced by the anode is also reversed, and the anode stimulation surpasses the cathode stimulation. It will not be necessary to say any more on this subject to show that investigations of this description can throw light upon the most important disorders of the nerves, and can enable us to form correct opinions respecting the possibility of their cure; particularly after we have discovered from experience that the same maladies invariably produce the result of the same departures from the ordinary laws of the effects of the electric current upon the nerves.

In applying electricity to the human organism one of the most important principles to be observed is that the affected organ must be treated with an electric current of a definite strength. Also whensoever this is possible, it is most important exactly to fix the focus of the malady. An exact knowledge of the malady with which we have to deal assists us more than anything else to do this, and after this knowledge of the nature of the malady, an investigation of this particular case of the disorder, based upon a thorough knowledge of the structure of the human organism itself and upon the manner in which various maladies affect it. But if the case happens to be one of a general condition of weakness, or of disturbances of nutrition or of mental condition, an exact local application of the electric current will not be of so much assistance as some such general electric treatment as I shall describe below, the aim of which will be a general strengthening of the whole nervous system.

Another most important particular to which the greatest attention must be paid in the use of the electric current for therapeutical purposes is that it should be possible to regulate exactly the strength of the current used. It cannot be a matter of indifference to the patient whether a current of less or greater strength, or of longer or shorter duration is applied to the tissues. It must be remembered that the electric current can vary in intensity through all the grades between something that can be scarcely felt and a series of shocks that are scarcely tolerable. Formerly the current was roughly distinguished as "mild," "moderately strong," and "strong." But this was by far too inexact a distinction for scientific purposes, and for the exact measurement of the electric current we now use an instrument known as the galvanometer. The construction of the galvanometer is briefly as follows:—In the interior of the instrument is a magnet which, when no current is passing through the galvanometer, stands in the position which it naturally assumes in consequence of the earth's magnetism. Outside this magnet is placed a coil of copper wire, isolated with silk or some other non-conducting substance, in such a manner that the lines of the wire lie in the same direction as the normal position of the magnet. This coil is not circular but has the shape of two "U"s placed endwise facing each other (⊂⊃). The magnet placed in the centre is free to swing on its middle point, as in an ordinary compass. (In fact a galvanometer would be immediately made if any one were to wrap round an ordinary compass an electric wire, so placing it that it passed round in the direction of north and south). So long as no current passes through the wire the magnet retains its ordinary position. But as soon as an electric current is passed through the copper wire the magnet is by the influence of the electricity turned out of its normal position, and the deflection is less or greater according to the strength of the current. It will be immediately seen that we have here a very simple and exact instrument for measuring the strength of a current. Externally the galvanometer has a face like that of a watch, divided by points for measurement, on which a little "hand" shows us how far the magnet has been deflected. This instrument is used for measuring the galvanic current only. In the case of the induction current the intensity is most simply measured by the distance between the primary and secondary coils.

The duration of the period during which the patient is subjected to the influence of the electric current naturally cannot be determined by any general rules. It depends not alone upon the particular object with which the electricity is applied, but also upon the extent of the

portion of the organism upon which we desire to work electrically. In general, however, a warning may be given against a very long duration of the use of the current, particularly at first, and it is also at first best to use only mild currents. "The current should be allowed at the beginning to steal only gently upon the organism." Afterwards its strength may be gradually increased, always with due regard to the sensibility and excitability of the individual, which in different persons varies enormously. The choice of the electrodes, the character of the current, and its direction, are all of very great importance; so that it will be at once realised, even from this very short description that no one who is not a specialist should ever attempt to treat any malady with electricity.

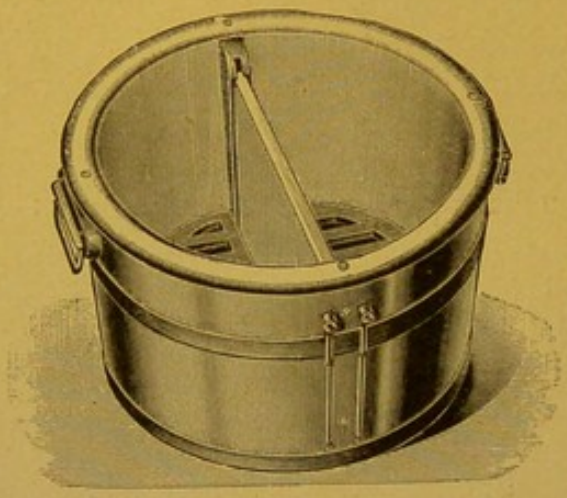
The method of local treatment is as follows:—A well damped electrode is either held by the patient in the hollow of his hand, or is applied to some other portion of the body, for example, to the nape of the neck, whilst the medical man applies the other electrode locally to the affected portion of the body, either stroking the skin gently, or sending the electric current into the tissues by pressing the electrode firmly upon some particular locality. But other methods of using the current exist which aim rather at a general influence to be exerted over the whole organism.

These methods are mostly used in cases of general weakness of the nervous system—that is to say in various forms of hysteria, neurasthenia, hypochondria, and such maladies as are based upon poorness of the blood, disturbances of digestion, and general muscular weakness. There can be no doubt that anæmia, chlorosis, and the majority of maladies which we call disorders of metabolism can be favourably influenced by the use of general electric cures; though it must be, at the same time, freely confessed that we do not at present know in what manner the electric current acts upon the disordered organism.

The principal general treatments are as follows:—

(1) *General electrization.* This aims at a general stimulation, as complete as possible, of the whole organism (usually with an induced current), with particular attention to the central nervous system, the muscular system, and the skin. The patient is generally undressed, and best placed upon a table or chair. He either puts his feet upon a large flat-shaped electrode, which corresponds with the cathode of the current, or in a vessel filled with luke-warm water. The medical man takes in his hand the other electrode, which represents the anode of the current (and is well protected in such a manner that the hand of the operator is completely isolated), and gently brings this electrode

into contact with different parts of the patient's body. The process, which takes from fifteen to twenty minutes, and is performed with a current carefully adjusted to the age, sex, and state, and also to the malady of the patient, has an extraordinarily refreshing and stimulating effect. Pains and feeling of fatigue and weakness, with which



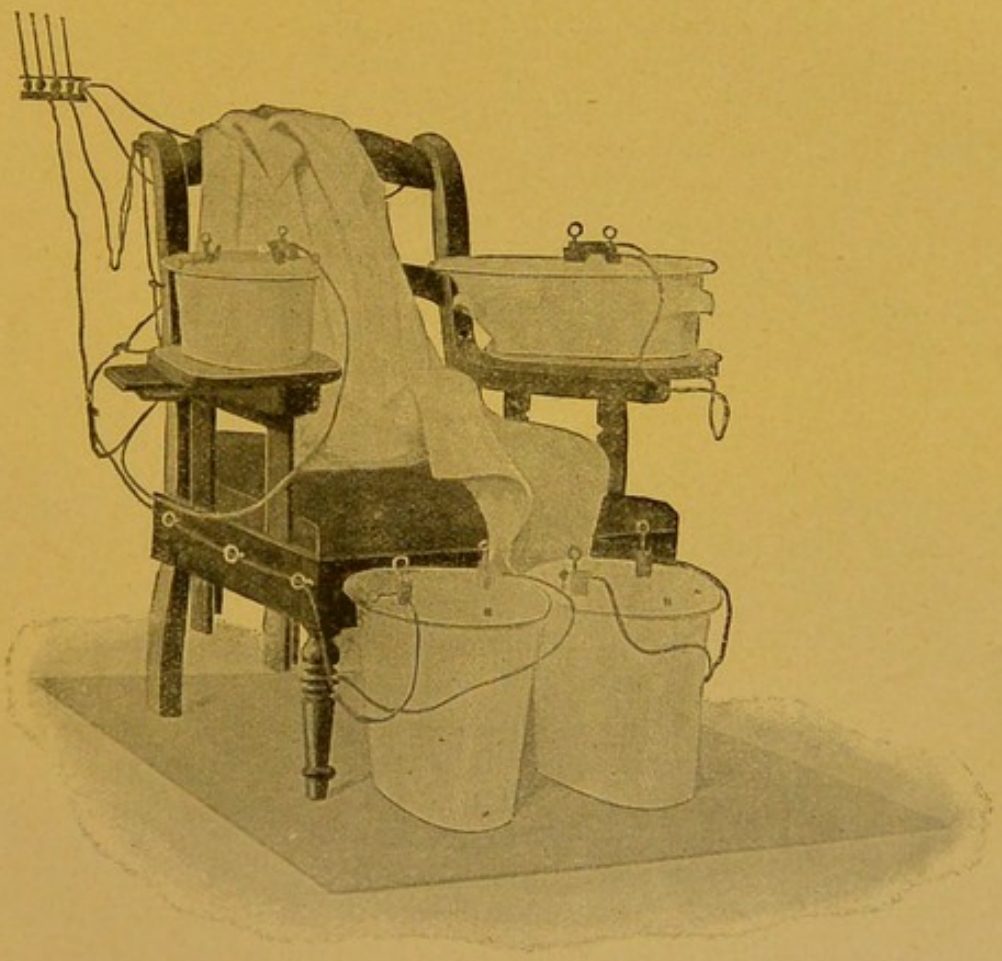
Electric foot-bath

the patient was previously afflicted, generally yield to a single application of the current. Sleep is more easily obtained, and is more refreshing. The appetite is increased. The digestion improves. Motions become more regular. The sense of oppression about the head is diminished, and the physical and mental capacities, as well as the general pleasure taken in activity, are distinctly augmented. In short, in almost every case a sensible improvement in the general condition is felt in every direction.

(2) *Central electrization.* The aim of this is to influence principally the central nervous system. The method of proceeding consists in placing a large flat-shaped electrode upon the pubic arch, whilst the other electrode is slowly passed along the whole length of the spinal column. In this treatment the galvanic current is generally used. From this central electrization good results may be anticipated in cases of general nervous weakness, in which the nourishment of the body and the strength of the muscles are in a fairly good condition. Also in cases of nervous disturbances of the stomach, of Saint Vitus' dance, and nervous pains connected with itching, and in various painful

disorders of the skin, this kind of electric treatment may be well applied with good hopes of satisfactory results.

(3) *The electric bath.* The kinds of electric baths formerly used had this disadvantage, that it was not always possible to regulate the exact strength of the current and to assure its effect upon the organism, so that baths of this sort were justly regarded by the medical profession as an unprofitable way of using electricity. But lately Dr. Schnée, a medical man of Carlsbad, has succeeded in constructing a new sort of electric bath, which, to judge from the success that has attended its use, seems likely to restore to serious use this particular form of

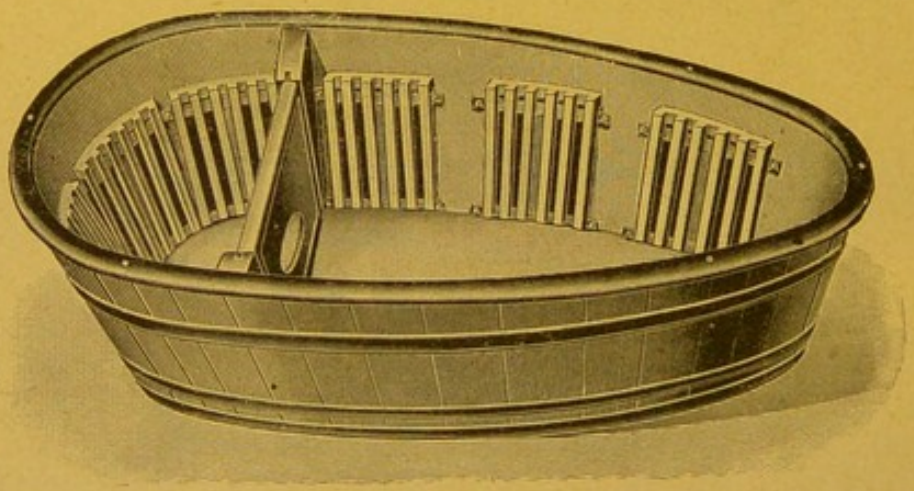


Four-cell electric bath.

electric treatment, which has of late been considered as mere trifling. The construction of this "four-cell bath" may be described as follows: The patient sits upon a comfortable wooden chair, whose height can be raised or lowered to suit the patient's stature and convenience. On the sides of the chair, in the places where the arms of an arm-chair

would be, are situated porcelain vessels filled with water. In these the patient immerses his arms up to about one-third of the height of the upper arm, as if he were taking an arm-bath. In front of the chair are placed two other deep porcelain vessels in which the legs can be immersed up to the top of the calves. The electric current passes into the water from carbon plates, two of which are placed right and left in each of the vessels, and from the water into the limbs immersed in it. By means of the ordinary mechanism either a galvanic or induced current can be switched on at pleasure, or both currents can be brought into action at the same time. The direction and strength of the current can also at any moment be regulated at pleasure, and the current be accordingly made to enter the organism from one vessel or another.

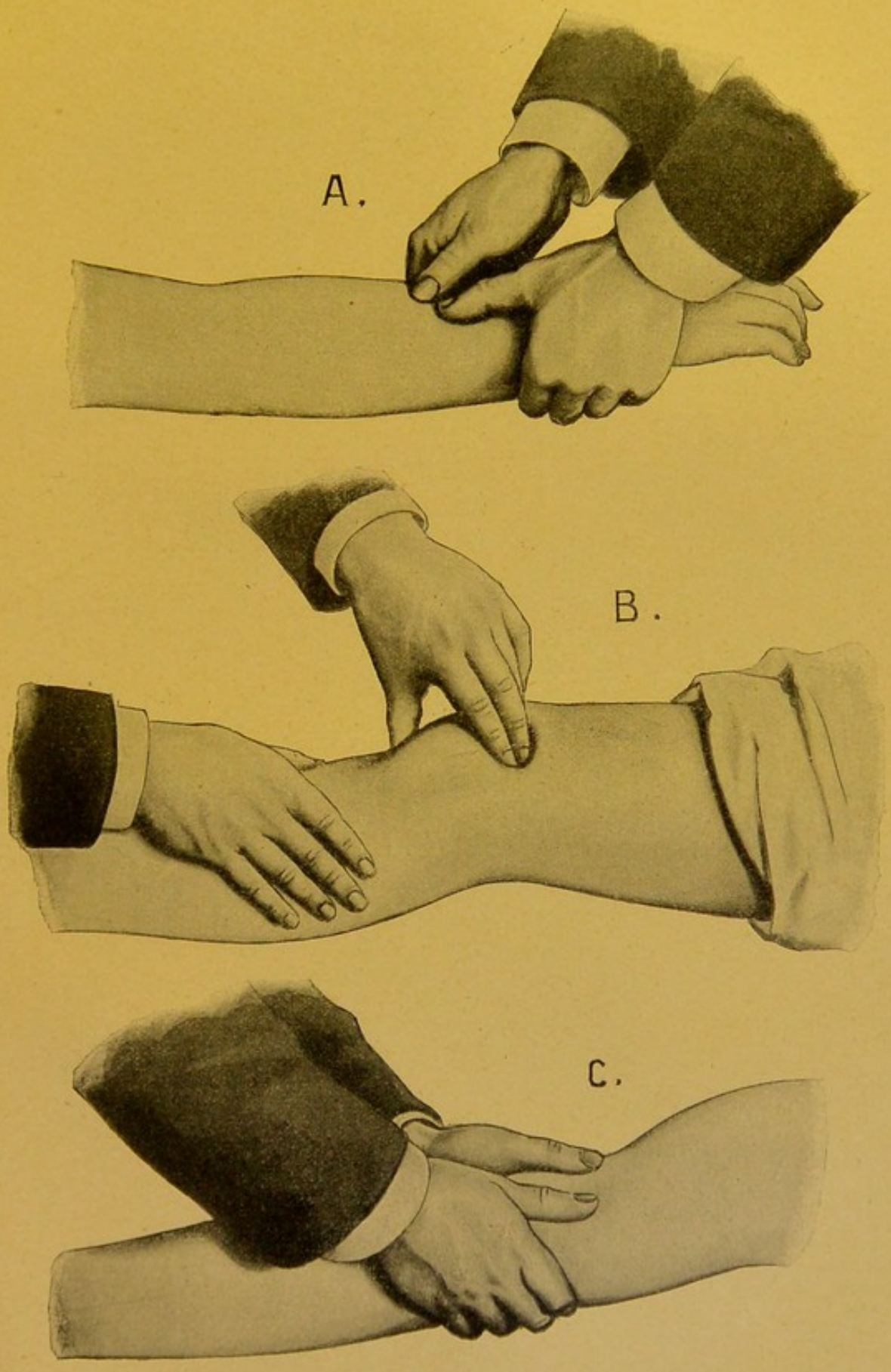
By using this arrangement of a four-cell bath it is possible to assure the passage of the current through the immersed limbs of the patient.



Electric bath provided with double cells.

This kind of bath also deserves particular attention, because its effects are of a very gentle character, and can be easily borne by highly sensitive individuals. In the case of other methods of applying electricity we not infrequently find that the distress which it causes the patients is such that it is necessary to renounce the treatment after a single experiment.

After the bath, which lasts from fifteen to twenty minutes, a slight sensation of pricking often remains in the skin. During the time necessarily devoted to repose after the bath many patients also experience a gentle and beneficial perspiration, which is a consequence of the increased activity of the skin.



Massage of Lower Arm, Elbow, and Upper Arm.

The advantages to be derived from electric baths of this form has been demonstrated in the case of many different maladies. Thus we have met with cases of these baths having been used with good results in the case of diabetes mellitus. Also patients suffering from weakness of the muscles, cramp in the legs, pains of the muscles, rheumatism, gout, sciatica, and from obstinate sleeplessness, resulting from itching diseases of the skin, have derived great advantages from the use of these baths, and are loud in their praises of them.—I think that one of the particular merits of these baths consists in the fact that they can be used to introduce soluble medicines into the body. They can thus be used, for example, for introducing sublimate, and the observations of experienced medical men seem to show that in cases when such treatment is necessary this method of using it is particularly beneficial to the general condition of the patient.

Electric head-bath.

In a similar manner electric iron baths such as have been recently brought into use in various sanatoriums and similar institutions, are much to be recommended in many chronic forms of disorders of the blood and disturbances of metabolism. Nor can there be any doubt that in the future our wider knowledge of the human organism, of

the maladies by which it is attacked, and of the means by which they can be combated will open out to us new possibilities of the physical treatment of disease by electricity which may enable us to restore health in cases where all our present resources of the pharmacopœa, and of the other treatments with which we are acquainted, fail to affect our object.

Light Cures and the Röntgen Rays.

I purposely place here at the conclusion of what I have had to say about electricity, my short description of the treatment of diseases by light, and a few words concerning the epoch-making discovery of the Röntgen rays, because both our modern light-treatment, and the production of the Röntgen rays stand in the closest connection with electricity and are entirely dependent upon the electric current.

It is true that the medical men of antiquity were acquainted with a very simple sort of treatment of diseases by light, though electricity had, of course, no connection with it. Thus the Greek Historian Herodotus who wrote 450 years before the Christian Era mentions sun baths. "The patients," he tells us, "were on bright sunny days placed in a cavity either on the banks of a river or by the shore of the sea, where they could be well shone upon by the sun. Afterwards their bodies were covered with sand as hot as they could bear it, and finally they either took a bath, or had water poured over them."

Antyllus, also, one of the most celebrated physicians of the times of the Roman empire was also acquainted with sun baths. We are not acquainted either with the date of his birth, nor even with the century in which he lived, though we know that he must have written between A.D. 200 and A.D. 400, but he deserves to be remembered as the first man who practised trachæotomy (that valuable operation which has saved so many lives), and all evidence shows him to have been a man of immense learning and ability. Of sun-baths he says, "The light of the sun, if moderately applied, increases the transpiration and provokes perspiration. It arrests the development of corpulence, strengthens the muscles, and diminishes fat. It makes the respiration more sturdy and rapid, and so assists to the development of persons who have narrow chests, and is beneficial to those who suffer from heaviness in the head by strengthening them

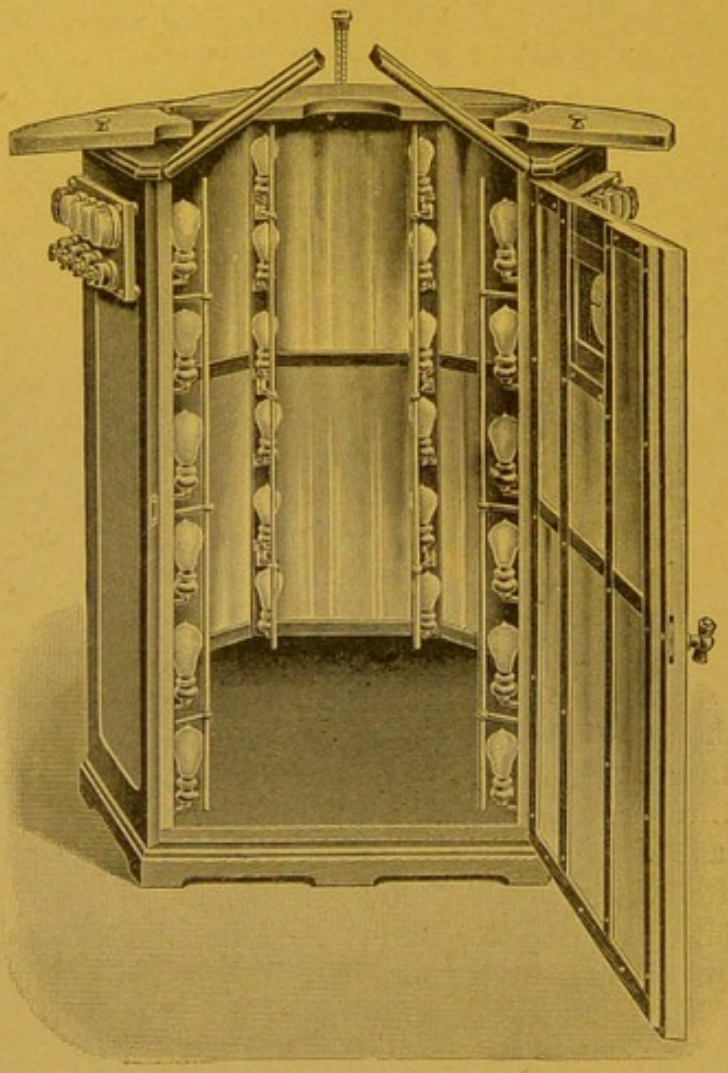
and hardening them against the attacks of various maladies." Similarly Hippocrates, the most famous of all the physicians of antiquity, whom I have previously mentioned when speaking of massage, left various precepts concerning the beneficial effects of light upon the human organism; whilst we learn from the writings of Cicero, Pliny, and Galen, that the Romans were in the habit of sunning themselves on the roofs of their houses, and built themselves terraces or balconies of special design, where they could sit lightly clad in the light of the sun for the sake of the beneficial effects of its rays.

Such sun-baths are not entirely unknown in our own days, and have been made a speciality of certain sanatoriums. In these cases the patients, properly sheltered from the wind, lie in the sun-light in rooms opening on the south. That these sun-baths are not mere foolery nor infatuations of persons bent upon curing every disorder by "natural methods" (as some people who cannot persuade themselves to believe in anything but bottles of physic, pills, and powders, are pleased to assert) is demonstrated by the fact that a special chamber with a southern aspect has been constructed in the hospital at Munich, for the purpose of enabling patients to take sun-baths. This is a roomy chamber of thirty feet by twelve but of no great height. The floor is laid with linóleum, and the long southern front and arched roof connected with it are constructed of iron and glass. The glass front has three high double windows which can be so opened as to admit the full brilliance of the sunshine, whilst careful arrangements of the ventilation at the same time ensure a proper temperature in the room. In the cooler seasons of the year the temperature is kept up by steam heating apparatus. In the summer an excessive heating of the glass roof by the sun's heat is prevented by cooling the glass with continuous streams of water. In an adjoining chamber are provided all the necessaries for various kinds of baths douches, &c., for the use of those patients for whom water treatment has been prescribed after the light-bath has been taken.

The patient generally takes the sun-bath lying down. The bath lasts from half-an-hour to fifty minutes, during which time the patient frequently changes his position, lying sometimes on his back, sometimes on his breast, sometimes on one side, and sometimes on the other, so as to expose in turn all portions of the body to the light. One of the duties of the attendant physician (the presence of a physician to watch the effects of the sun-bath is always desirable) is to see that the head of the patient is so protected that it may not be injuriously affected by too great exposure to the sunshine. Under

ordinary circumstances, after from fifteen to twenty minutes the sun-bath produces a general profuse perspiration. After this has appeared the bath is continued for another ten minutes. It is then usually followed by a ten minutes bath in water of the temperature of 828 Fahrenheit (28° Centigrade). After this bath the patient, according to the nature of his malady, receives either massage, rubbing down, &c., or is enveloped in a pack, as the medical man may direct.

Sun-baths, however, present one insurmountable difficulty that will be obvious to everyone. The sun does not always shine when we



Opened sitting light-bath.

wish for his cheering brilliance. And the brightest sunshine is necessarily, in our northern climates, of a modified strength during a great many months of the year. Recently the difficulty of light

treatment presented by the variation of the seasons have, however, been overcome by the use of electric light. This light approaches sunlight both in its composition and in its effects, and has the advantages that we can make use of it whenever we please, and also that the whole body can be simultaneously exposed to the influence of the light, and to the same intensity of light.

Electric light is used for light-baths and for irradiation in two different forms, either in the form of incandescent lights or of arc-lights. For the general light-bath of the whole body incandescent light is used in preference to arc-light. The arc-light, whose effects are by no means so intense, is preferred for the treatment of conditions of nervous irritation, for the alleviation of pain, and for the general stimulation of metabolism, as I shall explain more fully below.

We may next turn our attention to what is known as the incandescent light-bath, and see what forms of this apparatus are supplied by the leading firms who devote themselves to the construction of electrical appliances, and which are used in hospitals and sanatoriums, as well as occasionally in private houses.

The incandescent light-bath is a wooden chamber some seven feet high, with a floor measuring about a square yard, not square, however, but of a polygonal form, so as to make the distance of the various incandescent lamps from the body as nearly equal as possible. Inside the chamber are arranged 40, 60, or 100 incandescent lamps, every one of which has a strength of from 15 to 30 candles. Behind these lamps the inner walls of the chamber are lined with looking-glass. The lamps are so furnished with shades that the bath can be taken either as a white light-bath, or, the light being passed through coloured glass, can be modified into a bath of blue, red, green, or violet light.—The patient takes his seat on a chair in the interior of the bath. The doors which form the front of the chamber are then closed, and the upper part, or what we might call the ceiling of the chamber, which is moveable, and furnished with an aperture for the neck, is so closed around the patient's neck that his head is outside the chamber. The moment that the electricity is switched on the whole body of the patient is inundated on all sides with the light. If the thermometer which indicates the temperature of the interior of the light-bath is watched it is seen to rise slowly, and the patient is in a very short time conscious of an agreeable warmth penetrating the whole of his body. It is as well, at anyrate at first, not to allow the temperature to rise above 122° Fahrenheit (50° Centigrade). But I can say from personal experience that I have taken in perfect comfort, light-baths of 140° and 158° Fahrenheit (60° and 70° Centigrade),

without any sense of physical pain, or any shortness of breath, or palpitation of the heart, such as are common in the case of vapour-baths.

Personally I do not allow an electric bath, at anyrate at first, to last more than fifteen or twenty minutes. I also take care, particularly in the case of corpulent or short-necked persons, that both the neck and the head should be enveloped in damp cloths, which are found extremely comfortable. Towards the end of the bath it is well slowly to diminish the strength of the electric current, so that the patient may at the conclusion find himself in a lower temperature. The apparatus is, of course, so constructed that the electric current is completely under control, and can be immediately increased or diminished at will.

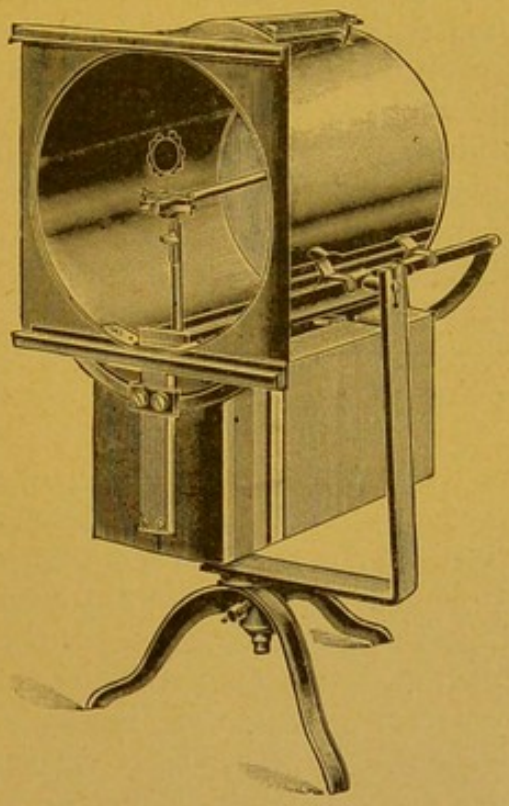
After the light-bath the patient takes for the cooling of the body, and stimulation of the cutaneous nerves and the vascular system, a water-bath of from 78° to 82° Fahrenheit (26° to 28° Centigrade). This bath lasts about six minutes; and, as in the case of the sun-bath above described, is followed by either cold douches, massage, a pack, &c., according to medical prescription.

In sanitoriums and hospitals, where provisions for sun-baths exist, either sun-baths or incandescent light-baths can of course be taken: and I am acquainted with an institution where they are (whenever that is possible) systematically alternated; this plan being considered by the presiding physician particularly beneficial to health.

But electric light is not found useful alone in providing us thus with light-baths. In certain pathological conditions local irradiation with electric light can be of great advantage. In these cases the arc light is generally used. The arc light is produced when a powerful electric current is passed through two carbon rods, whose pointed ends are but a very slight distance apart. Between their extremities the electricity flashing from one to the other, and in so doing cleaving the non-conducting air, produces light. The flash of light which connects the extremities of the two carbon rods both has an extremely high temperature, and produces an excessively brilliant light. This light can be focussed upon any desired portion of the body by various apparatus, mostly of a transportable kind. The arc-lamp is placed in the focus of a concave reflector, which can be moved forward or backward, so that the rays can be regulated by the position of the reflector. In this manner it is possible so to direct the rays that they may be all concentrated upon some small portion of the body. The patient sits at a distance of from six to eight feet from the apparatus. The portion of the body which is to be affected by the light must, of

course, be uncovered.

In order to guard against any injurious affects resulting from the excessive heat developed, glass screens of different colours are placed between the patients and the light; and a blue glass is chosen as the best, the glass of this colour permitting the chemical rays of the light to pass through without hindrance, whilst the heat-rays are, on the contrary, absorbed. In many cases irradiation of an hour's duration is necessary. Afterwards the portion of the body which has been



Electric arc-light reflector for localising rays.

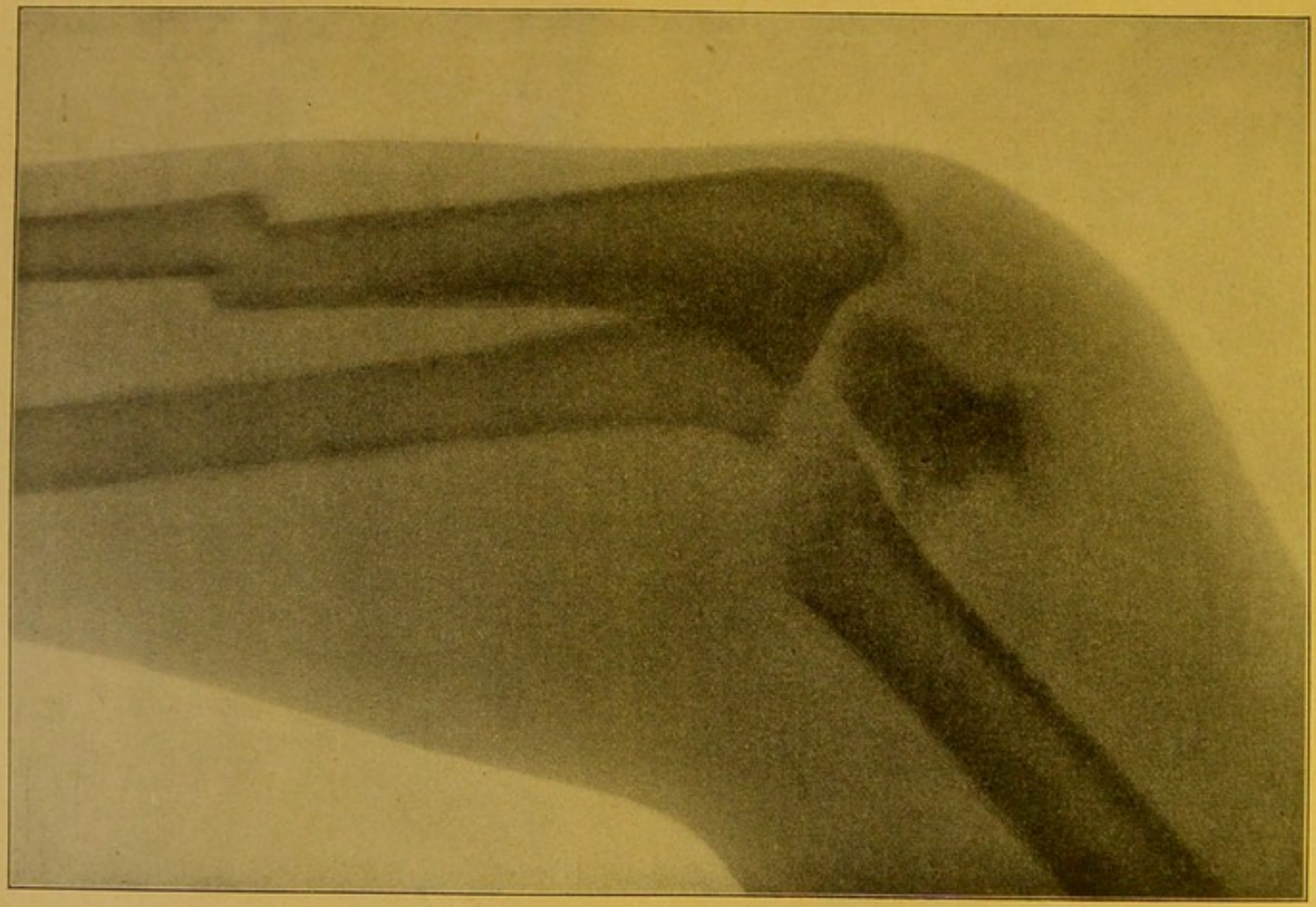
exposed to the rays is first rubbed with luke-warm and then with cold water; and afterwards treated, according to medical prescription, with massage, douches, &c.

Most of the newest and best apparatus for giving electric light-baths are so constructed that they can be used also as combined light-curing apparatus. They are provided with both incandescent and arc-lights, and contain all the adjuncts necessary for modifying the colour of the light, as well as for focussing the rays upon any particular portion of the patient's body.

The principal results of the effect of the light upon the human organism are *an increase of metabolism* and *a greater ease in the evacuation of injurious products of metabolism;* also *an increase in the quantity of oxygen assimilated*, with which must be immediately connected *the destruction of all bacteria* in so far as they are *present in the shape of septic germs near the surface of the skin.*

Light has an immense effect upon the development of the human body, exactly as it has upon the welfare and growth of plants. It is a demonstrated fact that children grow more slowly in the dull winter months than they do in the bright months of summer; and everyone is acquainted with the etiolated (blanched) appearance of a plant which has been either purposely raised by the gardener, or has accidentally grown in a situation from which the sun-light is excluded. Precisely similar in kind, if not exactly the same in result, is the case of the human organism which grows where there is too little light. "When the sun does not come, the medical man comes," is a popular Italian saying, containing no small amount of truth. For healthy life light is necessary. I have already in the course of this book more than once had occasion to insist upon that elementary truth of hygienics. And in these days we have happily learned to cultivate much wider views about health than were known in the days of our ancestors. We have realized that the aim of all medical science and practice is not merely to cure sick people but to keep those who are well strong and hearty. We are careful not only of the health of the individual but also of that of the community—realizing that it is upon the latter that the welfare and progress of the nation rest. And then how important a national need is that of providing bright and sunny homes for the poorer part of the population; and how serious the problem of how thousands of human lives can be rescued from dwellings into which no bright daylight and no sunshine at all even penetrates! It is from these dens that scrofula, tuberculosis, and all infectious diseases start to ravage the whole population. It is in these dens that they find weakly organisms ready to become their prey, because they are living, if it can be called living, without fresh air and light.

But to return to the modern uses of electric light. It must be confessed that we are hardly yet in a position to pass a final opinion upon the exact limits of the utility of the use of electric light baths, and of irradiation in various forms of disease. We have but recently become acquainted with these methods as possibilities, and to form definite conclusions about their value we need the record of close scientific investigation. But already a considerable mass of valuable



Badly Set Fracture of the Lower Arm, with an Angular Deformity of the Elbow, as shown by Röntgen Rays.

observations lie before us; and we may at least say this much about them with certainity, that they justify us in entertaining hopes that these new methods of treatment may turn out to be of great value. I have myself in the course of the last twelve months carefully observed the effects of the "light cure" upon some fifty patients belonging to different classes, and have made notes in each case of the alterations in their health affected by the treatment. Taking the results of all these observations, and balancing the condition of the patients at the date of their coming under my care, with their condition when they quitted me, and making all due allowances for the considerable part in the improvement of the health of patients which must be assigned to the rest, care, diet, fresh air, &c. (which constitute a large part of the restorative influences of any properly directed, and favourably situated sanatorium), I can say with absolute conviction that the "light treatment" was beneficial to all patients without a single exception.

The great advantage that electric light baths have over what are called Turkish, Russian, and other kinds of vapour baths consists certainly in this, that we have no occasion to entertain any fear of injury to the heart, faintness, accumulation of blood in the head, or similar accidents. All of these are by no means rare when vapour baths are used. And the extreme cleanness of the electric light bath, when compared with the frequently primitive arrangements of many vapour baths, may be also justly considered a point in its favour.

One thing I must not omit to mention here. I must warn people against supposing that a light-sanatorium is nothing more than a refined kind of hydropathic establishment, and that any one is capable of being a satisfactory director of an institution of this kind without any particular special training. Any reader of ordinary intelligence must at once have perceived from what I have said that it is by no means a matter of indifference whether in a given institution, the whole system of light baths is in use, or such baths only used in particular forms; nor a matter of small moment whether incandescent light or arc light is applied as a treatment for this or that malady. Even the question whether white or coloured light should be used, whether the light bath is to be combined with local application of light or not, and the determination of the height of the temperature, the time that the several baths should last, and the condition of the patient after each bath are all matters demanding careful attention, respecting which only a properly trained and experienced medical man is capable of forming an opinion. In any other hands the patient will run a considerable risk of leaving the institution worse

rather than better, with the result that light baths may come to be regarded as a sort of foolery, combined with speculation—which would be very much to be regretted.

In conclusion, in proceeding to mention briefly the maladies for which treatment with light is more particularly to be recommended, I will say first of all that the treatment does not appear to suit feverish disorders. Beneficial results from its use are to be anticipated rather mostly in cases of chronic disorders, and more particularly in cases of what are called constitutional disorders.

Amongst acute maladies, *rheumatism of the muscles* should be certainly mentioned first. I have myself seen *lumbago*, and *pains of the muscles* in various parts of the body vanish with remarkable rapidity after a single light bath.

Various forms of *nerve pains* (neuralgia), sciatica, *neuralgia of the face*, and *neuralgia of the intercostal nerves*, and of the *nerves of the arms*, and all kinds of *inflammations of the nerves* form a class of maladies to which treatment with rays of light may be applied with hopes of good results. That light baths, particularly in the form of arc-ray baths can boast of real triumphs in the cases of *neuresthenia* and *hysterics* I have more than once seen with my own eyes—but a simultaneous general treatment was used conjointly with the baths.

Also all *complaints of a gouty nature*, attacks of *gout* itself, *perspiration of the joints*, and *perspirations connected with disorders following child-bed*, or *inflammations of coecum*, *pleura*, *and peritoneum* can be favourably influenced by treatment with light, combined with other forms of natural treatment.

But it seems likely that in the future light treatment may be of the greatest importance in dealing with disorders of the skin. Recently, since the Danish Professor Niels Finsen in Copenhagen has succeeded in constructing a most ingenious apparatus, in which the electric light is first conducted through rock crystal lenses and robbed of its heat, so that only the chemically effective rays play upon the skin of the patients, we have approached much nearer the possibility of the cure of tuberculosis of the skin, the frightfully disfiguring lupus. I have had personal opportunities of convincing myself of the extraordinarily beneficial influence of local irradiation in a whole series of severe cutaneous maladies, and was always delightfully surprised to see with what certainty the diseased portion of skin, after having been irradiated for a considerable period, gently detached itself, and made way for a new skin of a perfectly healthy appearance.

Respecting the treatment of corpulence, asthma, emphysema,

chlorosis, constipation, and a number of other chronic maladies, I am by no means disposed to assert that an exclusive light treatment should be applied to them. But as an assistance to other proper remedies it certainly is of service in all these disorders; that is to say when a well regulated diet, exercise, accustoming the lungs to breathe freely in pure forest air, and other treatment necessary for the patient's health is being simultaneously carried on. It is a notorious fact that at home patients can hardly ever be persuaded to conform to all these accessories of any well regulated treatment of their maladies; and this is one reason why a longer or shorter stay in some favourably situated, and scientifically conducted sanatorium, seems to be always to be recommended when the patient can comply with the medical man's directions.

Röntgen Rays and their Use in Therapeutics.

At the end of the year 1895 the world was startled by the epoch-making announcement of Professor Röntgen, then a Professor at the University of Würzburg, proclaiming the discovery of "a new kind of rays." Professor Röntgen had been experimenting for a long time with cathode rays, and used for this purpose what are known as Hittorf vacuum tubes. The air in these tubes is almost completely exhausted by an air-pump, and the discharge from an induction apparatus is passed through them. Although the tubes were wrapped in a close-fitting mantle of black cardboard, a morsel of paper covered with barium-platino-cyanide that happened to be lying near them, at each discharge lighted up in the completely darkened room; and Professor Röntgen became convinced that the cause of the lighting up of this paper lay in the vacuum tube, and arose from nothing else. That meant that the rays passed both through the dark mantle of cardboard and also through the paper to barium-platino-crystals. Professor Röntgen next discovered that all bodies, even metal plates (if not of too great thickness) were penetrable in various degrees by these rays. But the further discovery which he made next was of the very greatest importance, for he found out how to proceed from the penetration by the rays of the various bodies to making a photographic dry-plate sensitive to them. Thus it was Professor Röntgen who first saw on a screen the dark shadow of the bones of the hand in the very slightly shaded shadow of the hand itself, and first fixed

this shadow on a photographic plate.

After this brief preliminary mention of how the Röntgen rays were discovered, we may turn our attention to the complete apparatus necessary for making use of this wonderful discovery. The apparatus consists of two parts.

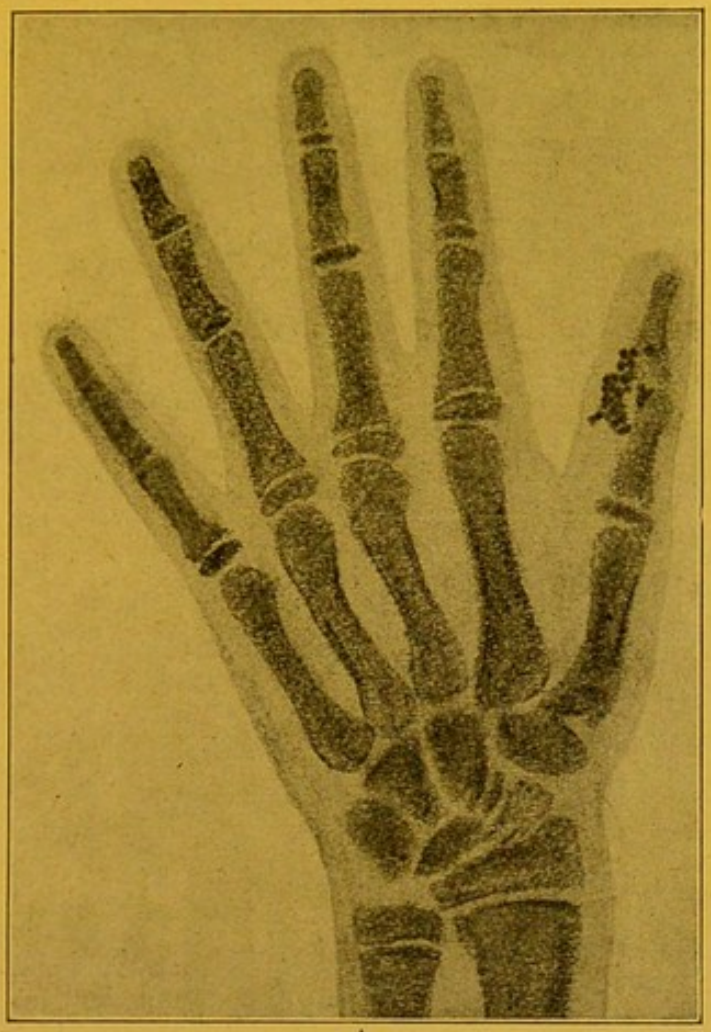
(1) An apparatus that can give an electric current of a very high tension.

(2) The discharging apparatus, that is to say the tube, through which the current is sent.

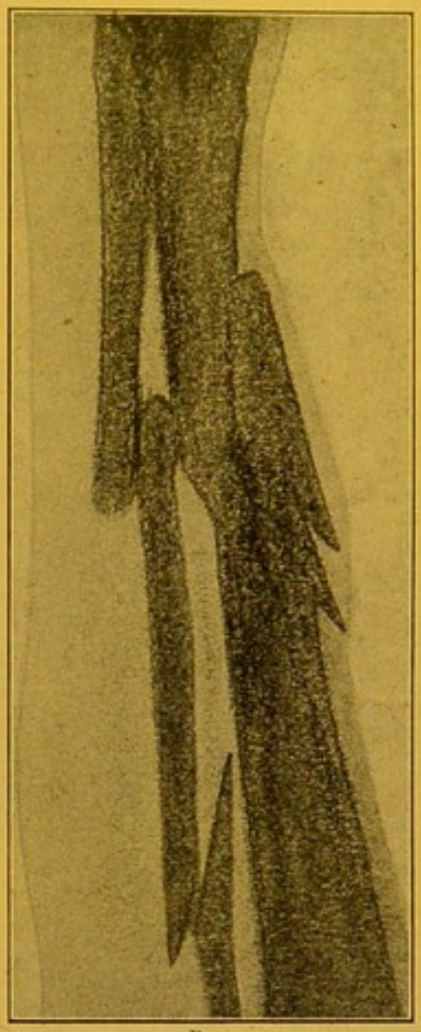
In order to obtain an electric current of very high tension it is best to use what is called a Ruhmkoff induction apparatus. As has been already explained in the section devoted to electric therapeutics, an induction apparatus is one by means of which we can obtain by induction from a primary current of small tension but proportionately great strength, a secondary current of high tension but less strength.

Apparatus of this kind brought to a high degree of perfection were first made by Ruhmkoff in Paris, and are still known by his name. Now, the greater the tension of the inductor the larger and longer are the electric flashes which it can give; and we describe the induction apparatus by the extreme length of the electric flashes obtained from it, speaking of an inductor of 20, 30, 40, or even 50 or more centimeters, that is one capable of giving us an electric flash of that length.

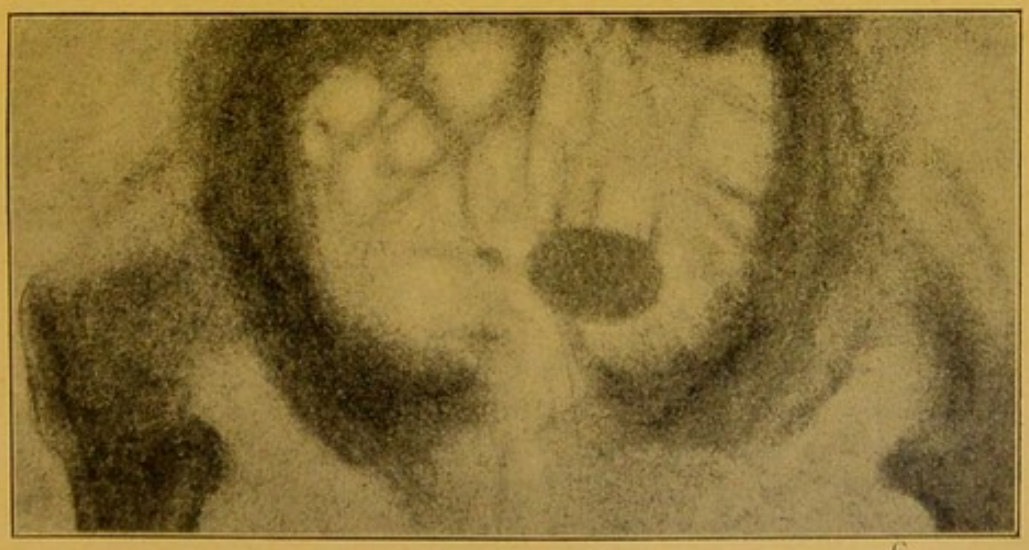
We usually procure the primary current from "accumulator batteries," as these batteries give us the most constant and most trustworthy currents. Of these accumulator batteries I shall attempt here only such an explanation as may acquaint the reader with what is most necessary to be understood. We know that the conducting fluid which we place in a vessel (technically called a "cell") in which we plunge two electrodes, that is to say two plates of the same metal, and then pass an electric current through them, is separated into its elements. These conducting fluids are in general solutions of acids, or salts, and water; and the phenomenon of decomposition of the fluid which takes place is called electrolysis. In all these cases of electrolysis certain changes take place simultaneously in the electrodes, and the two pieces of metal which we have used are affected in very different manners, so that we find in the fluid two metalic bodies differing in a certain degree from each other, which are now capable of reciprocally producing an electromotor effect. In other words the cell has become a galvanic element which is capable of producing an electric current. This process is called the polarization of the electrodes, and the current which is obtained from these polarized electrodes a polarization current. A polarization element is called a



A.



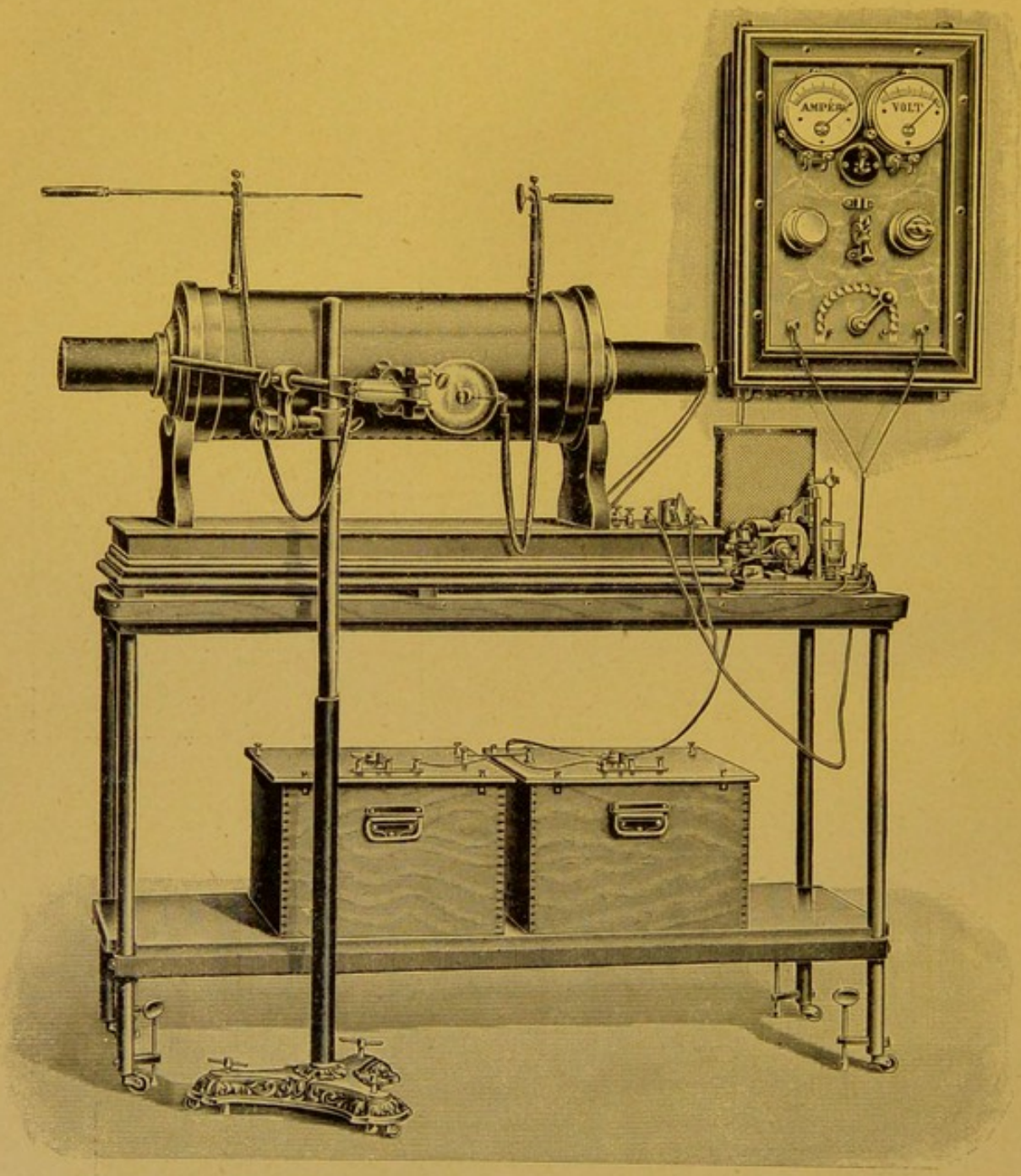
B.



C.

KÖNTGEN RAYS.

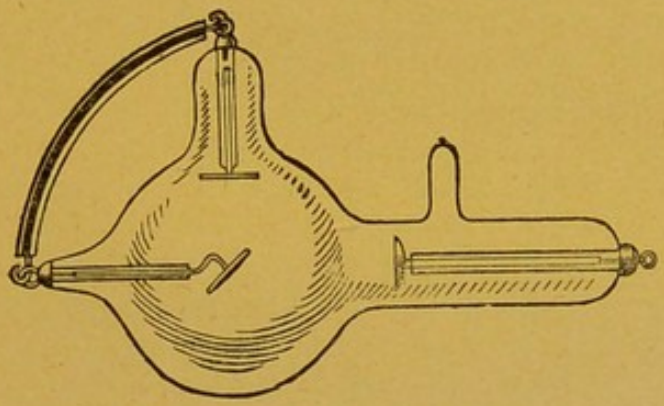
A. Hand with gun shot in thumb, as shewn by Röntgen Rays. B. Badly set compound fracture of both bones of the lower leg, as shewn by Röntgen Rays. C. Bladder with large bladder stone, as shewn by Röntgen Rays.



Complete apparatus for the production of Röntgen Rays, and of Röntgen Skiograms.

secondary element, or secondary cell, or, as we can to a certain extent either collect or store up electrictity in one of these cells, an accumulator cell. If a number of these cells are collected together they constitute an accumulator-battery.

Next to proceed to a brief description of the Röntgen tube, I may ask the reader to imagine a glass tube about six inches long and two and a half inches in diameter, in whose closed ends two metal wires are inserted in such a manner that they are externally bent into little loops, but inside the tube terminate in pointed ends opposite to each other. In the tube we have the same pressure as in the external air surrounding us, that is a pressure of fifteen pounds on the square inch. Both the wires represent electrodes, and, after the entrance of the electric current we distinguish them, according to the end at which the electricity enters, as a positive electrode or anode, and a negative electrode or cathode.



Vacuum tube.

Now if in the tube that I have just described the pointed ends of the electrodes are 20 centimeters apart, and we connect the two external loops of the electrodes with the poles of the secondary coil of an induction apparatus strong enough to give a flash 15 centimeters long, naturally no discharge takes place from the point of one electrode to the other; first of all because the distance is too great, and secondly because the atmospheric pressure within the tube is too high. But if we, with the assistance of a quicksilver air-pump, diminish the interior pressure in the tube so that it is reduced to 1-130th of the atmospheric pressure, and now send an electric current through it we see the electricity in the form of a narrow violet line of light between the two parts of the wire inside the tube. The smaller the pressure of the air within the tube becomes the wider this band of

light grows. When the pressure within the tube is reduced to 1-760th of the atmospheric pressure the light fills the whole tube. At the same time the light appears to be distributed in a peculiar manner, and we can clearly distinguish a blue shimmer of light at cathode, from which the violet light of the anode appears to be separated by a small interval. But if we proceed still further with the exhaustion of the tube we find that the darker cathode space grows continually larger whilst the anode light vanishes in the same degree. Röntgen found in conjunction with Hittorf that when the vacuum in the tube was almost complete, rays streamed from the cathode which brought the opposite side of the tube into view although they were themselves invisible. These are the *cathode rays* of which I spoke above. As I have already mentioned, Professor Röntgen proved in 1895 that his "new rays" originated from the point where the cathode rays met the side of the tube.

Further experiments have shown that we need not rely alone upon photography to give us a true image from the Röntgen rays when we wish to arrive at a more or less exact conclusion respecting the conditions of the interior of a human body. In the iridescent screen we have a by far more convenient and simple means of obtaining an immediate view of the interior organs without loss of time. This screen consists essentially of a good piece of white cardboard of uniform thickness covered with dust of barium-platinocyanide. For greater convenience of use it is set in a wooden frame and furnished with a handle. The arrangement of the objects in order to obtain a view with the rays is—vacuum tube: body: screen: eye of the observer. It is hardly necessary to say that the side of the screen covered with the dust must be turned towards the observer's eye.

By means of this discovery of Professor Röntgen's we are now in a position to obtain either upon the screen or upon a photographic plate a representation of the interior of any portion of the body from any point of view. Thus, for example, we can obtain an image of a man's chest whether we pass the cathode rays from the back towards the breast, from the breast towards the back, or from right to left or left to right. But in general it best repays our trouble to view the interior of the body from back to front, or from front to back, and to take care that we have to send the rays through as short a distance as possible. When the distance which the rays have to traverse through the tissues is very considerable the images which we obtain are comparatively vague, and a much longer time of exposure is necessary to procure them. And so we much more readily obtain a view of the interior of the organism of a thin man than of a stout one, and see the

bones of the hand or arm much more easily than those of the thigh. In therapeutics the Röntgen rays are used chiefly to obtain an exact knowledge of the case of the malady lying before us; but they are also applied in a limited number of disorders (principally chronic disorders and diseases of the skin which have hitherto been regarded as incurable) as directly curative. But here I must immediately add that the results of this last use of the Röntgen rays have hitherto disappointed the expectations that had been cherished.

The Röntgen rays have been hitherto of much greater assistance to medical men, and especially to surgeons, by the help they have afforded us to determine at once the presence of foreign bodies within the organism, and immediately to recognise their form and dimensions. Whether it was bullet, or needle, or a fragment of a needle, or a splinter of iron in the flesh, or nails or money or fragments of glass that had been swallowed; and no matter in what way the foreign body had entered, whether in consequence of accident, or carelessness, or attempted murder, or lunatic freak—inspection with Röntgen rays immediately showed distinctly the shape and position of the foreign body, and gave the medical man that first most valuable piece of information what and where the foreign body was. In the treatment of accidents during the short time since the discovery of the Röntgen rays, the amount of assistance that has been received from them is indescribable; and we have innumerable records of cases of accidents in which, thanks to the immediate elucidation of the situation by the Röntgen rays it was possible to proceed at once to operations that saved life. This has been particularly true of shooting misadventures leading to injuries of the head, the chest, and the abdomen, after which it has been possible at once to discover the locality of the bullet or shot, and to remove the foreign body.

In an opposite way—that is to say in a negative manner—the Röntgen rays can also sometimes assist us to form valuable conclusions. If some person comes to a medical man asserting that he has trodden upon a piece of glass or upon a nail that has become embedded in his foot, that he has swallowed a coin or some similar object, that he has run a needle into his hand, and that the point of the needle is still embedded in the flesh, and makes him fear that he may suffer from blood-poisoning—the Röntgen rays inform the medical man immediately whether the foreign body is really present or not: for any hard object can be immediately recognised, as may be clearly seen in the case of the shot in the thumb in the illustration given above. But if after proper investigation with the rays no foreign object is discoverable, the medical man can with a good conscience assure his patient

that his fears are mistaken.

The recognition of such foreign bodies also as have not entered the organism from without, but are results of pathological disturbances, is much facilitated by the use of the Röntgen rays. I may mention, for example, the cases of maladies occasioned by gall-stones, kidney-stones, and stones in the bladder. Another of the illustrations given above, showing a case of the last, will afford the reader an idea of the assistance we receive from the rays.

Another large and important field in which the rays are of great service is the wide area of diseases of the bones and joints. Not only are the external forms of the bones placed before the eye of the observer with the most perfect clearness by the Röntgen rays, but a glimpse is also afforded of their interior structure, so that we are placed, without the help of the microscope, in a position to be able to recognise clearly in the living patient a whole series of disordered alterations in the structure of the bones, and to apply the right treatment for them—I need name only chronic inflammation of the bone-tissue, tuberculosis, rhachitic alterations of the bones, and tumours of the bones.—The rays are also of particular value in many tuberculous affections, as they enable us to arrive at a precise knowledge of the situation, and of the exact extent of the focus of the disease, and so afford us valuable hints respecting the treatment which should be prescribed. Bones tuberculously affected appear thickened and spongy, they are more than ordinarily translucent; the normal boundaries have disappeared, the joints seem swollen, and a cloud-like turbid appearance, and tufted processes are to be seen spreading from the joints.

The rays give us also immense assistance in all cases of fractures, dislocations, and sprains. They do this partly by assisting, confirming, and supplementing our previous methods of investigation, in many cases correcting first opinions of the surgeon concerning the case, but also more particularly in this way—that many necessary investigations of the nature of injuries which were previously impossible without the assistance of narcosis, are now immediately possible without any use of anæsthetics, and without giving the patient any pain. These remarkable rays show us at once upon the screen an exact and unerring representation of the broken bones or dislocated joints, or even of any serious effusion of blood.

But I may give yet one more instance of a possible use of the rays. Let us imagine that an acquaintance has met with a severe fracture of the upper arm. The medical man was quickly summoned, proceeded to treat the patient, and, in accordance with all the rules of surgical

art at the proper time applied a fixed bandage. Is it not worth while some eight days afterwards to have the healing fracture examined with the Röntgen rays to assure ourselves that the broken bone is setting in the right direction? For we shall be able to judge immediately from the image which the rays will give us whether the original bandaging should remain, or should rather be replaced by some other. It is interesting also, and also worth while in order that we may be able to form a correct estimate of how long the cure will take, eight days later to again see how the callus is forming itself, and how the young bone tissue is developing—all of which will be shown us in the clearest contours by the Röntgen rays. In this way the Röntgen rays may serve as an evidence of the ability of the surgeon; and in another direction they might certainly be used by workman's clubs as a check upon members. It is no uncommon thing for the committee to be called upon to agree that some further medical allowance ought to be made in the case of an injury that has not healed so well as it should have done. In some cases an examination with the Röntgen rays of the fracture, or injury of whatsoever nature it may be—not one, of course, visible to the naked eye—might assist to diminish the number of idlers, who under a plea of simulated ill health, make themselves a charge to their fellow-workmen.

General Notes.

In conclusion I desire to add here under this title of "General Notes" some things which I wish to say to all patients, and to all who have the charge of patients, whether they are nurses or friends. These are remarks that might have been made above in Chapter V., when I was making a few observations about the child's sick room, and giving some general instructions respecting nursing. But I have preferred to place them here, at the end of the work, for a reason which will, I hope, be understood by everyone. That reason is this—that what I have to say here will seem to a great many people to be superfluous, because it is so very obvious, and to a certain extent so merely common-place. Many of my readers on perusing these last pages will very probably remark, "But all this was hardly worth saying. These things are quite obvious, and everyone knows them." To which I would beg to reply, "Yes, all these things are very obvious; the remarks I am making are of a trite and common-place nature:

and these are things which happily most people do know. But they are things which *everyone* does not know, or at least does not properly realise." And for that reason these remarks are placed here, like a kind of supplement to all the rest that I have said, at the conclusion of the book. Those of my readers to whom these final observations and words of advice appear superfluous, because they deal only with things already quite familiar to them, after passing their eyes over these last paragraphs need not trouble themselves to bestow any further attention upon them. Only if they are already familiar with all I shall have to urge they will consider me justified in insisting upon the importance of these things with anyone to whom they are not familiar. And I do implore those to whom they are not familiar, all those who have not yet fully realised the importance of the counsels which I am here about to urge, to take them as seriously to heart as anything else that I have said. The advice I am here about to give, and the facts to which I here call the reader's attention, if very simple, are of the gravest importance in all cases of sickness; and even if these words of general advice seem to be outside the scope of my book (which in reality they are not) I desire to assure everyone that attention to them or neglect of them may mean the difference of sickness or health, of cure or failure to effect any amelioration, even the difference of life and death.

And now to put into a single sentence the pith of all the warnings and advice that I wish to give in these last pages: *When the days of sickness come that is the time for patient and nurse and friends to show that they have patience and courage and brave hearts.* Courage and patience and brave hearts, those will make the painful hours of sickness more tolerable than anything else; courage, patience, and brave hearts, those will make recovery possible in cases where, without them, all help might be in vain.

And here patient, nurse, and friends have a noble opportunity of setting one another brave examples, and of making up for what is lacking on the part of one by the ready help of another.

The days of sickness are bitter days—often terribly bitter. With the suffering physical organism the whole man suffers, the intellectual faculties, the spirits, and all else that constitutes the complex being of man. A man needs to be but a very little "out of sorts" to find that not his body only, but his brains also, and all his powers are incapable of things that in good health are easy to him. In a word the sick man *is not himself.* Such is human frailty that none of us, even at our best, are the men and women we might be, the men and women that we should all wish to be. But when sickness comes upon

us, when we are only "a little below par," we are inferior to our ordinary selves. We have less self-control than usual, less courage than usual, less patience than usual, less than usual of all the qualities that make life good and admirable, and more of the weaknesses that make life poor and pitiable. When sickness is accompanied by pain the patient has to bear that pain with less of all those qualities at his command that make up courage and powers of endurance. If the patient is so circumstanced that his illness implies many real anxieties (anxieties about his work, and anxieties about those dependent upon him, which will be very often the case with those who are not too well-to-do), these anxieties have to be supported by a mind less well armed than usual for facing the battle of life. In consequence the patient, with diminished powers of endurance at the very moment when he has rather more than usual to try him, quite *naturally*, and we might even say necessarily, frequently exhibits a character altogether different from that with which his friends are familiar when he is in good health. Men, in particular, accustomed to take their way boldly and brightly through life, frequently become extraordinarily intractable—and often even unreasonable. And it is a good rule for a sick *man* to submit himself to a kind of servitude to his nurses; to say to himself, "I am ill. That is the long and short of the situation. And a sick man ordinarily has a little less sense than an idiot; so that the wisest thing I can do is to give up having a will of my own for the present, and to comply with the directions given me without attempting to understand them." On the whole women are in sickness more tractable than men; but by no means always more really patient. But every invalid does wisely to realise that just for the present he or she is not exactly the same person as in ordinary days of good health, but a distinctly mentally and morally, as well as physically, weaker person. And it is hardly necessary to add that nurse and friends should keep the same fact always before them. Half the difficulty of assisting the patient to recover is vanquished when those who give the assistance fully realise the altered personality of the patient. That more than ordinary gentleness and forbearance and patience are needful is so self-evident as to make insistance upon this point unnecessary now that I have indicated the nature of the circumstances that call for them.

It may seem a contradiction of what I have just written to say that the patient should try to be not only obedient, but also in as good spirits about himself as possible. But I say as good *as possible*. That the patient should be able to keep up the ordinary elasticity of his mind is not possible. There is, however, a good deal of difference

between being in a normal state of good spirits and hopefulness, and giving way to that despondency which looks only on the dark side of everything. And the patient should do everything in his power to avoid the latter. Incapable of the same kind of courage that bears him up under ordinary circumstances he no doubt is. But he should do all that he can to "make the best of a bad business." And of one thing he may rest perfectly assured, *every bit of hopefulness, every bit of cheerfulness, and every bit of courage that he can command* has a direct and immediate good effect upon himself, and *powerfully* assists the treatment which is being applied to restore his health. He is not only assisting those about him by making their task more easy, and so *indirectly* helping matters along towards a satisfactory conclusion; but, inasmuch as the mind immediately reacts upon the body, he is *directly* seconding the treatment by the hopeful mood that puts the organism into a condition favourable to the influences of the remedies which are being applied. Stories are current of men who have recovered from serious and critical disorders *because they were resolved to recover*. It is extremely likely that some of them are true, because the thing is by no means impossible. But this is quite certain that many patients have succumbed when they might have recovered if they had not allowed themselves to be vanquished by a fatal despondency.

Here a few words must be said about the case of children. With very young children and infants all these considerations of the reflex action of the spirits upon the organism are evidently out of place. But they are not altogether out of place in the case of older children; and here we have to observe two things. The child naturally has not the same degree of command over his own sentiments as the adult. On the other hand he is much more sensitive to the impressions made upon him by his elders, and where the patient's moral command of himself here assists less than we could wish, his impressionability happily comes in to balance it.

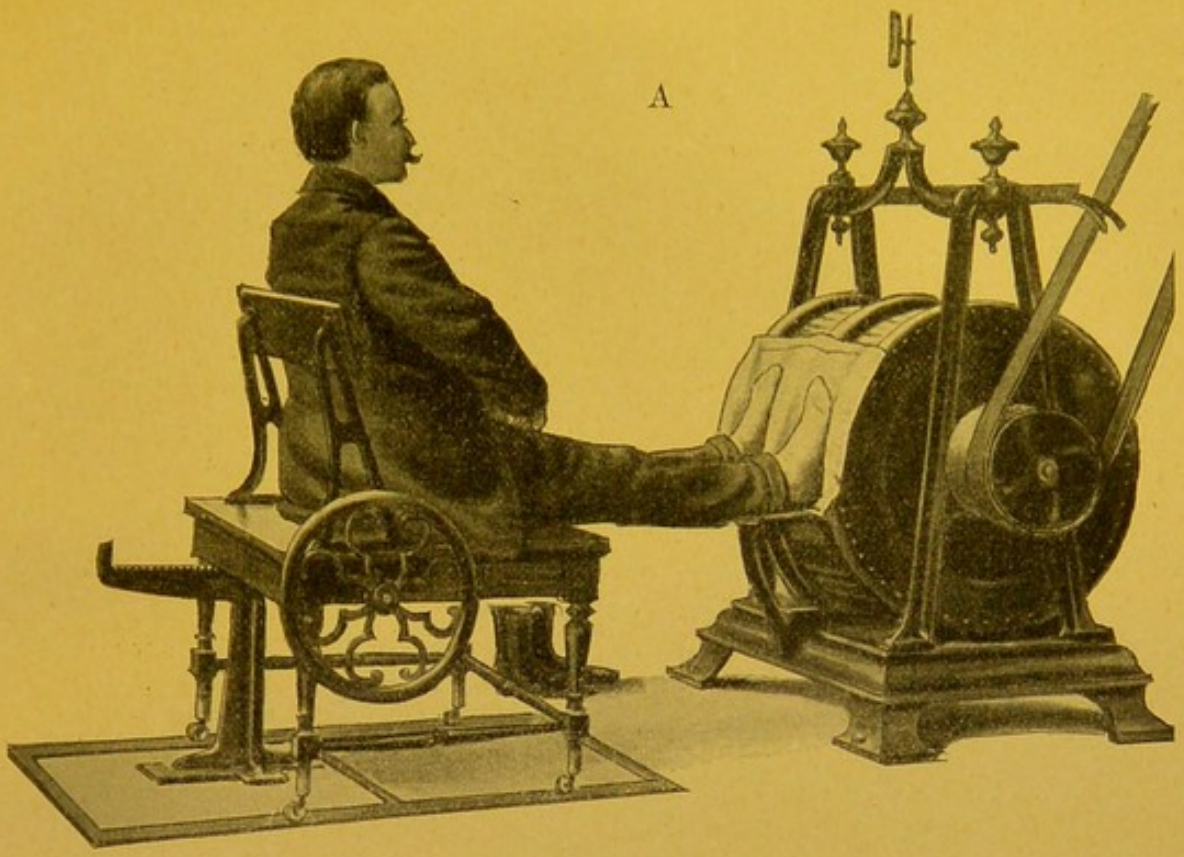
With the very aged we encounter again a different condition. An old man's pride in the length of his days, and his past experience of many a difficulty conquered in the course of a long life, are powerful factors to raise his spirits, and to help him to believe that this time also he will prove stouter than his adversary, in spite of his years; an encouraging reflection which those about him should on no account fail to foster.

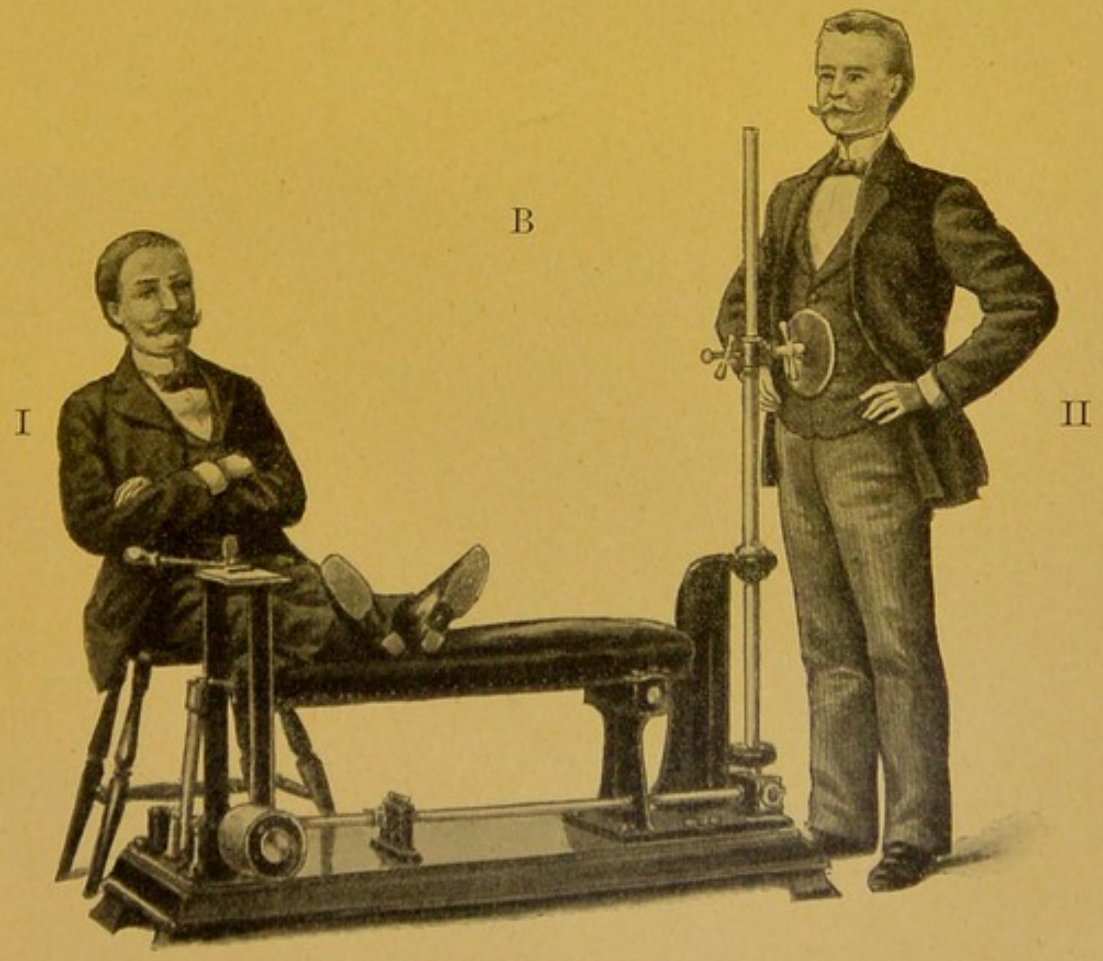
Passing now from the patient to the nurse I shall turn for a moment to an entirely different subject. This subject is *the difference between knowing what to do and being able to do it*. That is a very essential difference, We find it present with us at every turn of life. And we

find also, by personal experience as well as in other ways, that very few people thoroughly realize how wide the distinction is between knowing, and knowing exactly what has to be done, and being capable of doing it properly. Almost every thing seems quite easy of accomplishment—until we try our hands at it. When we try to do the apparently easy thing, the thing that looks so simple, even when we have watched other people doing it, we discover that it is by no means so easy as it appeared, and that it is only in consequence of long practice that the hand and mind work together to accomplish even very simple enterprises. When that discovery is made two different results generally follow, corresponding to the character of the individual who has made the attempt. Impatient, desponding characters, as soon as they are confronted with the hidden difficulties that come to light only when the business is taken in hand, are generally disgusted and put out of heart, and so give up trying to do what they had purposed, convinced that it is beyond their abilities. On the contrary people with strong wills and a plentiful supply of patience, finding the same difficulties, resolve determinately that they will not be beaten, and stick resolutely to their purpose until the difficulties are overcome, and they at last succeed in doing whatever it was that they had resolved to do. And, as there is nothing that cannot be done with a sufficient amount of care and perseverance, these people in the end invariably succeed. "What most people want is not the ability to do what they wish but the perseverance," was long ago said, and with great truth, by the French philosopher de la Rochefoucauld. But everyone who has to undertake nursing will do well to recollect that wise saying. For as soon as anyone—who is not a professional nurse—undertakes attending upon an invalid, even though the malady is of no serious nature, and even though the patient is some little child who is tractable and has been taught to obey, it will be found that carrying out the very simplest directions is by no means so simple a matter as might be supposed. Many of the directions which I have given above are of a very simple nature (care has been taken to make them as simple as possible), and other directions which may be given by the attendant medical man be even of a still simpler kind. To give a stated dose of medicine at a certain hour, and to keep up a fire that may maintain the patient's room at a stated temperature, and to see that a screen stands in the way of a draught, even to take the patient's temperature with a clinical thermometer, and to prepare a particular sort of bath, or to soak and apply the linen for a cold compress, all appear the simplest things in the world. Only when we come to doing them all,

and to doing all regularly and quietly, and so as not to worry the patient, whose temper may not at the moment be one of the best, it is very soon discovered how very much more attention and patience is necessary than might have been supposed. The mere mental attention to the details is not an easy matter at all. The nurse who is not a professional nurse will more frequently forget the exact hour when the medicine ought to be given, and leave the door open when it ought to be shut, and find that the temperature of the bath has gone clean out of her memory, than she would have believed possible. And everything that has to be done is not so simple as giving a dose of medicine or shutting a door. In many cases too it will, of course, happen that the nurse will be a mother who has already many household cares and other duties, such perhaps as under any circumstances keep her busily occupied all day long; and then the additional labour of attending upon the patient will mean a strain placed upon her strength, as well as a naturally greatly increased liability to forget or overlook some of the numerous little things which attendance upon the patient implies. When it comes to this the result is very likely a sense of bewilderment. The poor nurse does not know "whether she is standing on her head or her heels," nor what she did last nor what she is going to do next, and all the time the patient is as "cross as two sticks," and she is herself seriously and distressingly anxious lest her poor bewildered services should be making matters rather worse than better and endangering the life of some one whom she loves.

Now what I want to say is, that under these circumstances the nurse is not to lose heart. The difficulties with which she finds herself surrounded are nothing at all out of the common. They are the difficulties that beset all of us, yes the cleverest and wisest of us, as soon as we try to do something which we have never done before. After a day or two the difficulties will be much less apparent. She will get into the way of doing everything that has to be done, and that sooner than she expects, if she will only go on taking *care* and *persevering* in her efforts to do everything regularly and in the right way. What was at first so difficult will presently be quite easy; and she will not find herself forgetting things as she did at first. A little practice will make things easy, and the sense of bewilderment will completely vanish with the confidence that is gained by experience. *Therefore the nurse is not to be distressing herself and increasing the uneasiness of her own mind by worrying about this or that thing which she has forgotten, but only to be careful that she does not make the same mistake again.* But I must add that she should never neglect to tell the medical man of any error that has been committed. That would





ZANDER APPARATUS.

A. Vibrating Massage for the Soles of the Feet. B. Vibrating Massage for Feet and Stomach.

be a worse mistake than all the rest. By omitting to say, "I forgot this or that," the nurse is preventing the medical man from taking such steps as may easily remedy the mistake that has been made. By frankly stating the mistake, the nurse will ensure its being remedied if possible, and will *immediately win the confidence of the medical man*, who will see on the spot that he has to do with a person on whom he can rely.

Then I wish also to say this, and will beg every one who is performing the office of a nurse to lay it seriously to heart. There are a certain number of people, very gentle natures, to whom the onerous task of waiting upon the sick is a congenial occupation. But we are not all so constituted, and the duties to be performed in the sick chamber are, to many people, of a very disagreeable kind. In families where there is any choice, it will of course be right that the office of nurse should be undertaken by the one of the family to whom it is least distasteful. But in many cases no such choice may be possible, and then the nursing must be done by any one who can do it; and this person, if she has no taste for nursing, will do well to look the hard facts straight in the face. She will understand that she has before her an onerous duty of a disagreeable kind, but one that, though she does not like it, she is going to perform courageously to the best of her ability. *After all the good nurse is not the nurse that likes what she is doing, but the nurse who does what ought to be done.*

And this brings me back to what I said before about patience and courage and a brave heart. These are the things that will pull the nurse, who has an uncongenial task, through her difficult duties. The task will not be without its reward. Nursing a patient through a malady is a great schooling, one of those great lessons of life out of which the individual comes with a character refined and improved. But the nurse will not think about that. She will, if she has a brave heart, think only of the patient, and how to help him as gently and as quickly as possible out of his sufferings. That is the one and only thing that she should keep before her. Anything that she does that helps the patient towards recovery, is well done—is a step towards the accomplishment of her aim. And she will have her eyes fixed on her aim, and on nothing else. When the patient is fretful and tiresome she will not be distressing herself about his unreasonableness and ingratitude. She is not working for his gratitude, she is working for his health. She will find patience, because her patience is directly conducive to the patient's health. She will be bright and cheerful with him, and labour whenever she has the opportunity, to communicate to him something of her own brightness and cheerful-

ness, because that is conducive to his health. She will keep up a brave heart in the midst of her uncongenial labour, not because it does herself credit, but because that is conducive to the recovery of her patient's health. And, if people say, "You go through your task like a piece of machinery," her answer is, "I go through my task in the way that will make my patient well again." Sentiment in the sick room sounds very romantic, but the good nurse is the nurse that does what ought to be done.

But the nurse's task is after all a very difficult, onerous, and wearying one, and when she is doing it bravely the very least that every one else in the house can do is to second her to the best of their abilities; being careful to bring into the sick room only those three qualities of patience, courage, and brave hearts, which will assist both the nurse and her patient.

I need not say that in all cases where the nurse is acting under the directions of a medical man she will simply and implicitly obey orders, and follow the treatment prescribed by him, whatsoever it may be.

In the treatment of diseases, the master reveals himself by his impartiality. The best helper is not the man who wishes to cure all maladies by a single rule and by a single remedy. For this reason, I wish to give one more warning against attachment to some one particular method of treatment, and neglect of the rest.

All methods are justified if they afford assistance; and as a great number of remedies exist, as I have proved to the reader, it only remains to know them all, and to employ the best.

INDEX.

A

Abdominal Viscera 130
Abscess 404
Acceleration of the Heart's Action 257
Accidents 467
„ help in 467
Accomodation 338
Acne 398
Adam's Apple 187
After Birth Period 512, 513
After Pains 513
Alcohol 145
Alcoholic Poisoning 474
Alder Rind 522
Alkaline Waters 164
Aloes 522
Alum 485
Ammonia, Preparations of - 532
Amnion 510
Amniotic Fluid 510
Anæmia 358, 361
Angina Pectoris 256
Anise 532
Ankle 438
„ Sprained 460
Antipyrin 529
Antiseptic Remedies 522
Aorta 242
Aperients 177, 520
Apex Pulmonis Catarrh 218
Apoplexy 313
Arnica 539
Arsenic Poisoning 474
Arteries 241
Arytenoid Cartilages 187
Ascaris Lumbricoides 183
Asthma 213
Atropine Poisoning 474
Auditory Canal- 349
„ Nerves 285, 351

B

Bandage, temporary 455
Banting's Cure 379
Basedow's Disease 331
Basilicum Ointment 544
Baths 551
„ Changing 556
„ Children's 553
„ Cleansing 388
„ Diving 555
„ Full 551
„ Half 487, 554
„ Hand 556
„ High 551
„ Malt 553
„ Partial 555
„ Refreshing 388
„ Sitz 556
„ Suckling's 37

Baths, Vegetable 554
Beauty Water 548
Bed, of Sick Child 64
,, of Suckling 37
,, Wetting 275
Beer 146
Belladonna Poisoning 474
Bilberry 543
Binding Medicine 541
Bladder 264
,, Bleeding of 264
,, Catarrh of 272
,, Spasm of 275
,, Stone in the 273
,, Worm 181
Blaud's Pills 526
Bleeding, Abdominal 528
,, External 527
,, Staunching of 425
Blister Eruption (pemphigus) 17
Blood 238
,, Corpuscules 239
,, Clot 239
,, Forming Remedies 525
,, Plasma 239
,, Poisoning 405, 428
,, Spitting 219
,, Vomiting 165
Blows as a form of Massage 579
Boils 403
Bone 430
,, Earth 429
,, Gelatine 429
Bones, Diseases of 439
,, Inflammation of Medulla of 440
,, Lupus in 225, 441
,, Medulla of 430
,, of Head 431
,, of Arms 434
,, of Legs 435
,, of Trunk 431
,, Softening of 442
,, Tuberculosis of 441
,, Typhoid of 440
Boracic Acid 523
,, ,, Ointment 544
Borax 46
Bothriocephalus 182
Brain 280
,, Bleeding of 311
,, Congestion and Anæmia of 311
,, Diseases of 311
,, Inflammation of Skin of 230
,, Skin of 280
Breast-bone 433
Breast, Female 484
Breasts, care of 515
Bright's Disease 269
Bringing up by Hand 26
Bromide, Effervescing Salt of 537
,, Preparation of 537
Bronchial Asthma 213
,, Catarrh 201, 204, 206
Brunner's Glands 131
Burns 394
Butter 144

C

Calendar 498
Calculi 273
Callous Degeneration of the Heart 256
Callus, Formation of 458
Calomel 542
Cancer 480
Cancerous Ulcer 480
Canine Teeth 124
Capillaries 241, 247
Carbolic Acid 523
,, ,, Poisoning 474
,, ,, Water 89
Carbon Monoxide Poisoning 474
Carbuncle 403
Carcinoma 480
Carlsbad Salt 521
Carotid Artery 242
Castor Oil 521
Cataract 347
Catarrhal Jaundice 179
Caverns, Formation of 218

Cellular Tissue, Inflammation of 404
Cepalhaematoma 7
Cerebellum 280
Cerebral Apoplexy 313
Cerebrum 279
Champagne 538
Camomile 540
Change of Life 494
Chaps 392
Cheese 144
Chicken-pox 97
Chilblains 397
Child-bed 513
„ Disorders of 515
Child-birth, first 512
Chill 201, 203
Chiragra 374
Chloral Hydrate 537
„ Poisoning 474
Chloroform 536
Chlorosis 358
Cholera, Asiatic 97
„ Nostras 53
Chorion 510
Chyle 239
Chyme 147
Circulation 248
„ Organs of 238
„ „ „ Disorders of 249
Clavicle 434
Cleanings 514
Clergyman's Throat 198
Climatic Cure 223
Clyster 59
Coal-gas Poisoning 477
Cocaine 537
Coccygeal Gland 510
Coccyx 433
Cod Liver Oil 227, 526
Coecum 131
„ Inflammation of 179
Coffee 145
Cognac 538
Colds, Nasal Catarrh 192
Colic 170
Collar-bone 434
Colon 132
Coma 365
Comedones 391
Compensation 252
Compress, cold 561
„ damp 561
„ warm 561
Congestion 311
Congestive Œdema of the Lungs 215
Conjunctivis, Granular 343
Constipation 58, 163, 175
„ Chronic 175
Constitutional Diseases 358
Consumption 215
Convulsions 290
„ in Childhood 317
Cooking Salt 140
Cornea, Inflammation of 345
Corns 392
Corpulence 141, 377
Cough Tea 533
Cow's Milk 24, 26
„ Pox 93
Cramps 290
„ in Leg 299
„ of Jaw 19, 296
„ of Masseter 296
Cranial Nerves 282
Creasote 222
Crisis 211
Curvature of the Spine 444

D

Dandriff Water 548
Deadly Nightshade Poisoning 474
Death, apparent 468
Decidua 510
Decomposition, Products of 77, 87
Delirium 211, 212
Delirium Tremens 211
Delivery, Obstacles to 511
Development, Faults in 1
Diabetes 367
„ Mellitus 363

Diarrhœa 168
Diet, Average 141
,, Proportions of 143
,, for Measles 71
,, for Rheumatism of Joints 118
,, for Tuberculosis 223
,, for Typhoid 111
Digestion, Organs of 122
,, in Stomach 146
Diphtheria 82
Diphtheria, False 197
Disinfection 522
Dislocation 451
Displacement 489
Diuretics 530
Douches 558
,, of varying temperature 561
Drowning 470
Dyspepsia of Suckling 47

E

Ear, Inner 350
,, Inflammation of 354
,, Structure of 348
,, Syringe 352
,, Wax, Hard 352
Eczema 400
Eggs 144
Egyptian Ophthalmia 344
Elder Tea 541
Electric Baths 598
Electric Light Treatment 605
Electricity, use of in Therapeutics 588
Electrization 597
Embrocations 545
Emetics 528
Emphysema 214
Enema 48, 56, 169
Enteric Fever 105
Epidermis 381
Epiglottis 187
Epilepsy 319
Erysipilas 102
,, Butterfly 103
Erysipelas, Wandering 103
Ether Poisoning 475
Excess in Eating 378
Excoriation 391
Expectoration 210
Eye, Inflammation in Newborn Children 18
,, Diseases of 341
,, Structure of 334

F

Face, Spots on 548
Facial Spasms 296
,, Erysipelas 102
,, Nerve 285
,, Pains in 300
,, Paralysis 294
Fainting 312
Fallopian Tube 483
,, ,, in Pregnancy 494
Fan Douche 559
Fattening Cure 141
Favus 412
Female Disorders 482
Femur 438
Fennel 524
Fermentation in Intestines 48
Fever 66
,, Curve 67, 108
,, Remedies 529
,, Spots 210, 408
Finger Bones 435
First Help in Accidents 466
Fish 143
Flat Foot 465
Flatulency 171, 524
,, of Lungs, Emphysema 214
Flexions of the Womb 490
Fœces, Child's 58
Fœtal Membranes 510, 511
Fœtid Nose 194
Fœtus, Development 509
,, Position 510
Fontanelles 42
,, in Rickets 370
Food Stuffs 137, etc.

Foot Bath 556
„ Sores 391
Foreign Bodies 159, 191
Fowler's Solution 362
Foxglove 254, 531
„ Poisoning 474
Fractures 451
Freckles 393
Frost-bite 397
Fungi 143
„ Poisoning 475
Furuncle in Ear 353
„ of Skin 403

G

Gall 147
„ Bladder 135
„ Colic 173
„ Stones 173
Galloping Consumption 217
Game 143
Gangrene Ointment 397
„ of Wounds 396
Gargling Water 546
Gas Poisoning 477
Gentian 535
Ginger Bread 520
Glands, Swelling of 228
Glaucoma 346
Glosso-pharnygeal Nerve 285
Glottis, Spasm of 200
Glycerine 46
„ Plug 520
Goat's Milk 24
Gonagra 374
Goose Skin 387
Gout 373
„ Poor Man's 463
Graaf's Follicles 491
Grain, kinds of 142
Grave's Disease 331
Gum-boil 153
Gutta-percha Tissue 561
Gymnastics 569
„ Hygienic 571

H

Hæmorrhage 219
Hæmorroids, or Piles 259
„ Bleeding of 528
„ Douche 560
Hair, care of 384
„ fall of 414
„ growth of 384
„ structure of 382
Hanging 472
Hare-lip 3
Hart's Horn Oil 532
Headache, Nervous 303
Head Bones, 431
Head Scurf 413
Hearing, Organs 348
Heart, Enlargement of 255
„ Inflammation of 251, 258
„ Nervous Disturbances of 256
„ Pain in 256
„ Paralyses of 87, 88
„ Spasm of 256
„ Structure of 240
„ Valves of 241
„ Valvular Disease of 251
„ Weakness of 117, 251, 252
Hebra's Ointment 544
Hectic Fever 220
Hemlock Poisoning 475
Henbane Poisoning 475
Heredity 219
Hernia 420
„ Abdominal 420
„ Congenital 10
„ of Inguinal Canal 420
„ of Navel 16
Hernial Sack 421
Herpes 408
Hip Dislocation 10
Hoarseness 196, 220
Home Remedies 520
Honey-comb, Favus 412
Horse Radish 213, 545
Hump-back, Kyphosis 449
Hydro-carbon 139
Hydrocele 9
Hydrocephalus 5

Hydrothorax 237
Hypercœmia of Lungs 215
Hypnotism 581
,, Therapeutic use of 586
Hypodermic Connective Tissues 382
Hypoglossal Nerve 286
Hysteria 326

I

Ichthyol Salve 544
Ileum 130
Iliac Artery 245
Incisor Teeth 124
Incompensation 254
Incubation 69, 75, 98, 99, 103, 107, 114, 116
India-rubber Nipples 45
Infant's Food 31
Infection 69
Influenza 113
Inhalation 89
,, Machine 90, 200
Insects, Stings of 477
Insufficience 252
Intermittent Fever 419
Intestines, Acute Catarrh of 168
,, Catarrh of Suckling 48
,, Chronic Catarrh of 174
,, Colic of 170
,, Fluid of 130, 146
,, Glands, Tubes of 41
,, Rupture of 419
,, Sluggish 176
,, Villus of 131
Invagination 177
Invalid's Chamber 63, 80, 88, 110
Iodide of Potassium 215
Iodoform 192, 524
,, Eczema 524
Ipecachuana Wine 528
Irrigator 486
Iris, Inflammation of 346
Iron, Albuminate of 526
,, Preparations of 360, 526
Iceland Moss 533
Itch 410
Itching 408

J

Jacket 449
Jaundice 172
,, of recently born 13
Joints, Inflammation of 461, 465
,, Rheumatism of 115, 462
Juniper 531

K

Kidney, Sand 271
,, Stone 21
Kidneys, Atrophy of 268
,, Colic of 270
,, Inflammation of, Acute 266
,, Inflammation of, Chronic 267
,, in Gout 375
,, in Scarlet Fever 79
Kneading Massage 578
Kneipp 550
,, Cure 550
Knock-knee 464
Kousso Flowers 183
Kyphosis 445, 449

L

Large Intestine 131
Laryngitis, or Membranous Croup 82
,, Phthsis 232
Laryngotomy 90
Larynx 188
,, Catarrh 195, 198
,, False Diphtheria of 197
,, Ointment 544
Lead Paralyses 295
,, Poisoning 171, 475
Leguminous Fruits 142
Leucæmia 361

Leucorrhœa 485
Lice 411
Light Baths 603
,, Cures 602
,, Treatment 610
Lime Blossom Tea 541
Liquor Sanguinis 239
Lithium Water 376
Liver 132
,, Spots 393
Lockjaw, Tetanus of Infants 19
Long Sight 339
Lordosis 445
Lumbar Nerves 290
Lungs, Bleeding of 219
,, Consumption of 216
,, Expectoration from 207
,, Veins of 246
Lupus 224
Lymph 239
,, Vessels 249
Lymphatics 249

M

Mad Dog Bite 475
Magnesia 46
Mammary Gland, Swelling of 20
Marsh Mallow Tea 533
Massage 569
,, of Abdomen 580
,, Vibrating 579
Mead-worm 184
Meadow Saffron (poisoning) 475
Measles 68
,, Precursors of 70
Meat 143
Medicines, handling 159
Medulla Oblongata 281
Meibomian Glands 335
Membrana Tympani 350
,, Inflammation of 356
,, Moisture of 356
Menses 491
,, Disturbances of 493
Mercury, Ointment 7, 544
,, Plaster 545
,, Poisoning 476
Metabolism 137
,, Disorders of 358
Microscope 358
Middle Ear 349
,, ,, Inflammation of 78, 87, 354
,, Foot 438
,, Hand 438
Migraine 315
,, Pencil 540
Miliary Tuberculosis 217
Milk 144
,, Bottle 28
,, Comparative Table of 27
,, Human 24
,, of Infant 26
,, Sugar 27, 520
,, Teeth 34, 123
Mineral Acids, poisoning 476
Miscarriage 511
Molar Teeth 124
Moles 393
Monsters 5
Morphine 537
,, poisoning 476
Mothers' Marks 393
,, Milk 24
Mouth, Cavity of 149
,, Disorders of Mucous Membrane 150
,, Inflammation of 149
,, Water 546
Mumps 120
Muriate of Copper, poisoning 476
Muriatic Acid 534
,, ,, poisoning 476
Muscles 415
,, care of 416
,, Diseases of 418
,, Pains of 420
,, Rheumatism of 418
,, Structure of 415
Mustard 56
Myelitis 306

N

Nails 385
„ growth of 385
Narcosis 536
Nasal Catarrh 192, 193
„ Cavity, posterior 127
„ Polypus 194
Navel, Fleshy 15
„ Hernia of 16
„ Inflammation of 13
Neck Compress 562
„ Stiff 419
„ Wry 422
Nerve Cells 279
„ Tea 539
Nerves, Facial, Paralysis of 294
„ Fibres of 279
„ Inflammation of 292
Nerves, Motor, Disorders of 289
„ Radial, Affections of 295
„ Remedies 535
„ Sensory, Diseases of 298
„ Weakness of 323
Nervous Palpitation of the Heart 257
„ System 277
Nettle Rash 405
Neuralgia 300
„ of Coccygeal Nerve 302
Neurasthenia 323
New Growths 478
Nitric Acid, poisoning 476
Nose Bleeding 195
„ Catarrh of, Acute 192
„ „ Chronic 193
„ Douches 81, 193
„ Structure of 186
Notification of Diseases 80, 87, 92
Nutmeg 524

O

Oak Bark 18
Odol 547
Oertel's Cure 256, 379
Œsophagus 128
Œsophagus, Disorders of 158
Ointments, Curative 543
„ Use of 544
Olfactory Nerve 283
Omagra 374
Opening Period 512
Opium 56, 536
„ poisoning 476
Opodeldoc 546
Optic Muscles 334
Ossification of the Vessels 256
Ovary 483
Ovum, Ripening 510
Oxymuriatic Acid, poisoning 476
Oxyuris Vermicularis 184

P

Packs 487, 561
„ Complete 564
„ of Torso 565
Pancreas 135
Papillæ of Tongue 126
Paralysis 290
„ in Childhood 309
„ „ Diphtheria 87
„ „ Hysteria 329
„ Radial 295
Parasites 181
Parotid Glands 126
Parturition, Period of 512
Pectoral Tea 531
Pediculus Pubis 412
Pelvis, Structure of 435
Pemphigus Neonatorum 16
Peppermint 534
Pepsine 534
Pericardium 240
„ Inflammation of 258
Period 491
„ Disturbances of 491
Periosteum 430
Permanganate of iron 526
„ peptonate 526
„ potash 524
Perspiration 562
„ Excessive 391

Perspiration, Nightly 220
,, Packs 564
Peruvian Bark 530
,, Wine 530
Pessary 486, 491
Peyer's Glands 131
Pharynx 149
,, Catarrh of, Acute 154
,, ,, Chronic 154
,, Inflammation of 149
,, ,, in Diphtheria 84
,, Inflammation in Scarlet Fever 77
,, Purulation of 158
Phenacetin 530
Phlegmon 404
Phosphorated Cod Liver Oil 373
Phosphoric Acid 530
Phosphorus, poisoning 476
Phthisis 41, 209, 621
Pigeon Breast 370
Piles, or Hæmorrhoids 259
Placenta 14
Plaster, Muslin 545
Pleurisy 233
Pneumo-gastric Nerve 285
Pneumonia 209
Podagra 374
Poisoning 473
Pomegranate Rind 183
,, Skin 534
Portal Vein System 246
Position, Coccygeal 510
,, Cranial 510
,, Transverse 510
Potatoes 143
Powder, Children's 46, 59
Pox Marks 96
Pregnancy 494
,, Symptoms of 495
,, Duration of 497
,, Rules 496
,, Spots 495
Preissnitz 549
Princesses' Water 548
Professional Cramp 297
Prolapsis of Vagina 490
Prolapsis of Womb 490
Proud Flesh 428
Prurigo 406
Psoriasis 409
Puerperal Fever 515
Pulmonic Artery 241
,, Circulation 248
Pulse 68
,, Acceleration 332
Pylorus 128

Q

Quinine 530
Quinsy (see Diphtheria).

R

Rectum 132
,, Prolapse of 180
Red Wine 539
Resin Ointment 544
Respiration 190, 191
,, Artificial 468
,, Organs of 186
Rest Harrow 531
Retina 336
,, Bleeding of 347
,, Loosening of 348
Re-vaccination 93, 97
Rheumatism 462
,, of the Joints, Acute 115, 462
Rhubarb 47, 520
Ribs 433
Rickets 6, 201, 369
Ringworm 413
Rinsing 485
Röntgen Rays 611
Rosacea 398
Rose Honey 46
Roseola 108
Rubbing in Massage 578
,, down, in Water Treatment 557

S

Sacral Nerves 289
Sacrum 433
Saint Vitus Dance 117, 329
Sal Ammoniac Pastilles 532
Salicylic Acid 118
„ Plaster 545
„ Powder 391
Saliva 126, 146
Salivary Glands 127
Salt Baths 553
Salammoniac 532
Saliva 546
Sandow's Salt 376, 379, 537
Sarcoma 479
Scalds 394
Scarlet Fever 74
„ „ Diptheria 77
„ „ Kidneys 79
Sciatica 301
Scoliosis 445
Scottish Douche 561
Schweninger Cure 379
Scrofula 227, 554
Sea Bathing 389
Sebaceous Glands 386
Seborrhœa 413
Senile Cataract 347
„ Emphysema 214
Senna Leaves 522
Sensation, Disturbances of 298
Serum Treatment 89
Shingles 408
Shivering Fits 210
Short Sight 339
Shoulder Blade 434
Skeleton 429
Skin, Care of 366, 547
„ Disorders of 390
„ Functions 81
„ Inflammation of cellular tissue of 404
„ Injuries of 405
„ Itching of 408
„ Stimulating Ointment 544
„ Structure of 381
„ Transplantation 225
Small Intestine 130
Small-pox 91
Snake-bite Poisoning 477
Soap Plaster 545
„ Plug 520
Sorrel Salt Poisoning 477
Soxleth Apparatus 30
Spanish Fly Ointment 544
Spinal Cord 281
„ Inflammation of 305
„ Nerves 286
„ Paralysis of Children 309
Spirits 145
Spirits, Russian 546
Spleen 136
„ Swelling of 402, 10·
Squills 531
Squinting 342
Standing, First Attempts 38
Starch Clyster 543
Sticking Plaster 16, 545
Stiff Neck 419
Stomach, Bitters 534
„ Bleeding of 166, 528
„ Catarrh of, Acute 160
„ „ Chronic 161
„ „ Suckling 46, 57
„ Spasm in 167
„ Juices in 147
„ Pains in 165
„ Remedies 533
„ Structure of 129
„ Ulcers in 164
Street Gas Poisoning 477
Stroking in Massage 578
Stye 345
Subclavian Artery 242
Sublimate 523
„ Poisoning 476
Suckling 22
„ Care of 34
„ Clothes of 37
„ Diet of 24
„ Diseases of 40
„ Growth of 35
Sudamina 405, 406
Sudorific Remedies 540

Suffocation 471
Sugar 139
"Suggestion" 581, 582
Sulphate of Magnesia 521
,, of Soda 521
Sun-baths 603
Sunlight 602, 608
Sunstroke 471
Sulphuric, Ether 536
Sulphuric Acid Poisoning 477
Swallowing, Difficulty in 75
Sweat Glands 385
Sweating Feet 391
Swiss Milk 31
Sycosis 413
Sympathetic Nerve System 289

T

Tænia Medio-cannellata 182
,, Solium 182
Tamarind 521
Tape Worms 181
,, ,, Cure of 182
Tartar Emetic 528
Tea 145
Teeth 123
,, cares of 153
,, Cutting of 60
,, Diseases of 151
,, Formation of, in Rickets 370
Teething, First 33
,, Painful 60
Temperature, of Body 66
,, of Child's Bath 37
,, Measurement of 65
Testicles, Inflammation of 121
,, Position of 8
Tetanus 296
Thermometer 66
Thirst, Intense 368
Thorn Apple Poisoning 474
Thrush 44
Thyme Oil 546
Thyroid Cartilage 188
,, Gland, Swelling 332
Tincture of Myrrh 547
Tongue 125
,, Ulceration of 150
Tonsils 126
,, Inflammation of 155, 157, 158
Toothache 151
Tooth Drawing 153
Trachea 188
Trachoma 344
Transport of Wounded 456
Traumatic Tetanus 20
Trichina 184
,, in Muscles 185
Trifacial Nerve, Neuralgia of 300
Truss 421
Tuberculin 222
Tuberculosis 43, 215
,, Bacilli 216
,, Nodes 216
,, of Bones 225
,, of Digestive Organs 229
Tuberculosis of Glands, Scrofula 227
,, of Intestines 228
,, of Joints 465
,, of Larynx 231
,, of Lungs 215, 218
,, of Meninges 230
,, of Peritoneum 229
,, of Pharynx 228
,, of Skin, Lupus 224
,, of Urinary Organs 229
Tumour on Gums 153
Tumours 478
Turpentine Ointment 544
,, Steam 200
Twins 495
Typhoid 105, 551
Typhus Bacilli 105

U

Ulcer, Gastric 164

Ulcer, Purulent 44
Umbilical Cord 510
Unconsciousness 468
Underclothing 390
Uræmia 268
Urea 264
„ Excretion of 364
„ Poisoning 268
Ureters 264
Urethra 264
Uric Acid 265
„ „ Excretion of 374
Urine 642
„ Composition of 364
„ Incontinence of 275
„ Stoppage of 276
Urinary Organs 262
Uva Ursi Tea 273
Uvula 126

V

Vaccination, compulsory 94
Vaccination, Injuries from 92
„ Laws concerning 94
Vagina, Prolapse of 490
„ Sinking of 490
„ Washing 485
Vaginal Catarrh 485
Valerian 539
„ Tincture of 525
Valvular Disease 251
Vapour Bath 565
Varicocele 423
Veins 246
Velum Palatinum 126
Vertebral Column 431
Vessels, Ossification of 256
Vibration Massage 579
Vocal Cords 188
Volatile Liniment 546

W

Walking, First Attempts 38
Warts 393
Water 139
„ Effects of 550
„ Treatment in Bronchial Catarrh 203, 209
„ Treatment of Stomach 163
„ Treatment in Constipation 177
„ Treatment in Corpulence 380
„ Treatment in Hysteria 329
„ Treatment in Inflammation of the Lungs 206
„ Treatment in Influenza 115
„ Treatment in Laryngeal Catarrh 196
„ Treatment in Migraine 317
„ Treatment in Neurasthenia 326
„ Treatment in Rickets 373
„ Treatment in Scarlet Fever 81
„ Treatment in St. Vitus' Dance 331
„ Treatment in Typhoid 112
„ Treatment in Weakness of the Heart 254
Weaning 32
Weight of New-born Child 35
Wet Nurse 24, 25
Whitlow 443
Whooping Cough 98
„ „ Precursory Symptoms of 99
Wilkinson's Ointment 408
Wind, Colic 524
„ Water 540
Wine 145
Wolf's Jaw 5
Womb 482
„ Catarrh of 486
„ Colic of 491
Womb, Displacement of 489
„ Inflammation of 487

Womb, Prolapse of 490
„ Sinking of 490
Wormwood 534
Wounds, and their Healing 423, 428
„ Cleansing of 425
„ Pollution of 427
„ Treatment of 428
Wrist 434
Writer's Cramp 297
Wry Neck 422

Z

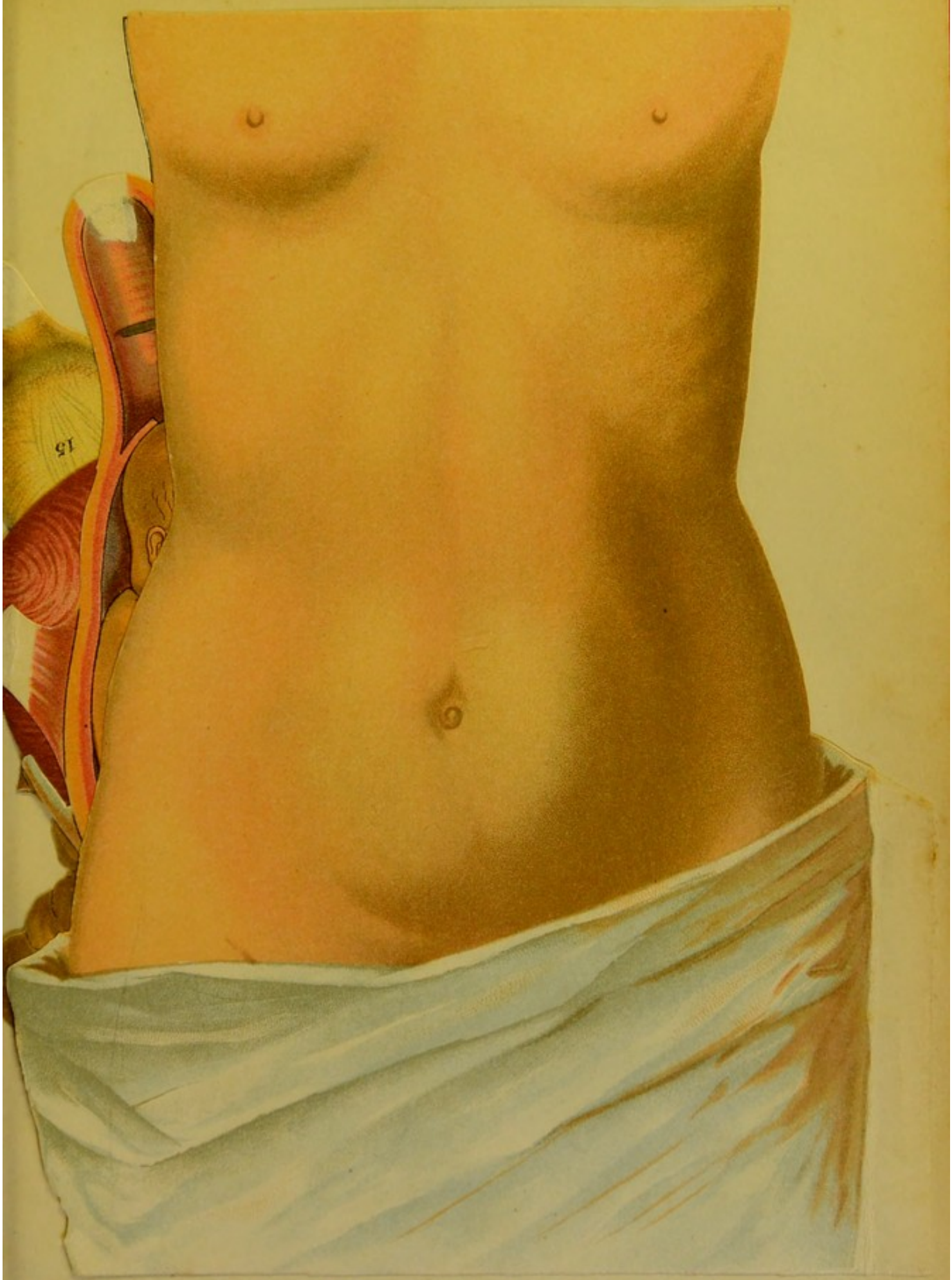
Zander's Apparatus 571
Zinc Ointment 544
„ Poisoning 477

Coll. SAW.
19/12/68

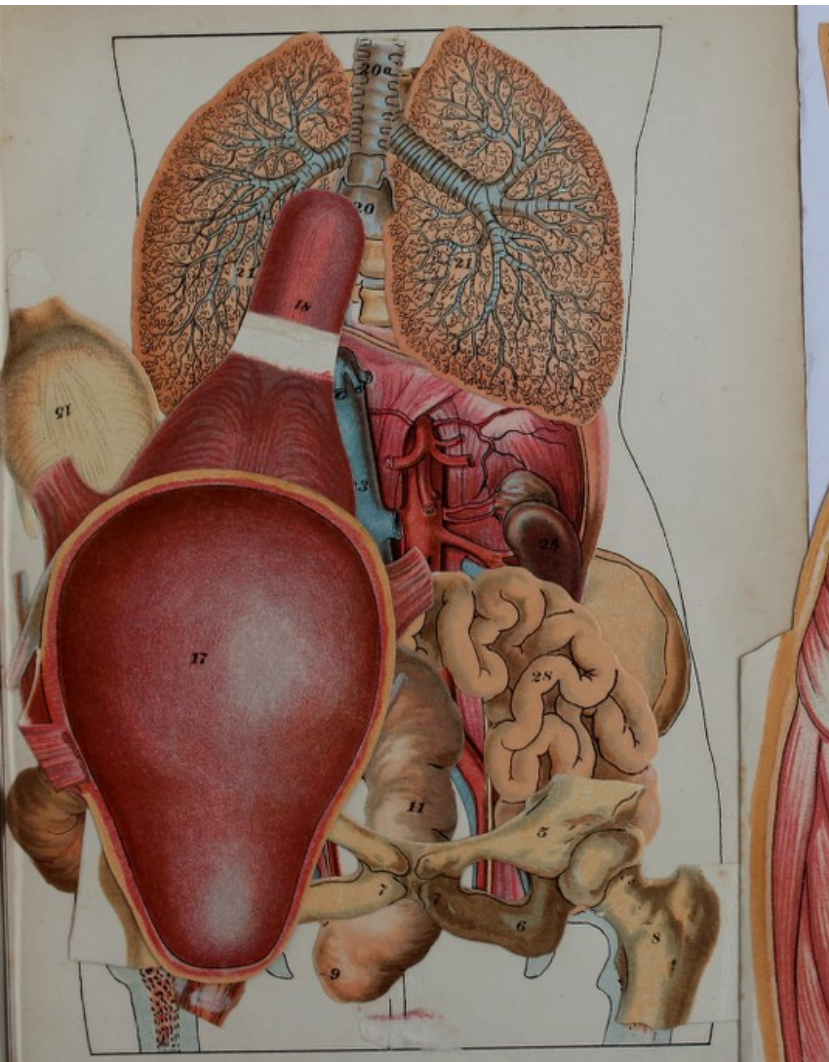
Explanation of the Anatomical Models.

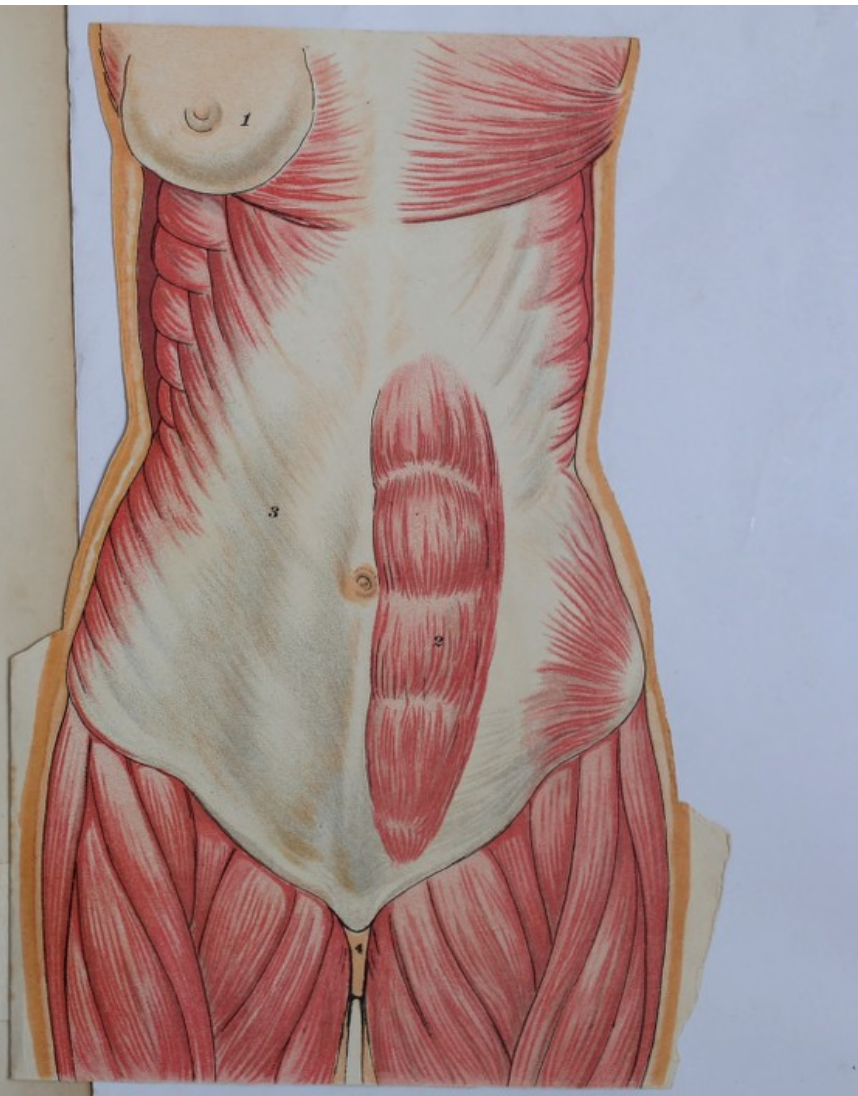
The Female Body.

1. The Female Breast.
2. The Rectus Abdominal Muscle.
3. Sheath of the Abdominal Muscles
4. The Public Symphysis.
5. The Ilium of the Pelvis.
6. The Ischium of the Pelvis.
7. The Os Pubis of the Pelvis.
8. The Femur.
9. The Cœcum.
10. The Vermiform Process.
11. The ascending Colon.
12. The transverse Colon.
13. The descending Colon.
14. The Rectum.
15. The Bladder.
16. The Ureter.
17. The Womb.
18. The Vagina.
19. The Fœtus.
20. The Larynx.
21. The Lungs.
22. The Diaphragm.
23. The ascending Vena Cava.
24. The descending Aorta.
25. The Kidneys.
26. The Sacrum.
27. The Coccyx.
28. The Small Intestine.



Anatomical Model of the Female Body.





Anatomical Model of the Female Body.

Explanation of the Anatomical Models.

Pharynx and Larynx.

1. The Upper Lip.
2. The Teeth.
3. The Hard Palate.
4. The Palatine Arch.
5. The Uvula.
6. The Tonsils.
7. The Pharynx.
8. The Tongue.
9. The Muscles of the Larynx.
10. The Thyroid Cartilage.
11. The Cricoid Cartilage.
12. The Trachea.

The Heart.

1. The right Ventricle.
2. The right Auricle.
3. The Appendix of the Auricle.
4. The Aorta.
5. The Innominate Artery.
6. The left common Carotid.
7. The left subclavian Artery.
8. The pulmonary Artery.
9. The superior Vena Cava.
10. The inferior Vena Cava.
11. The semi-lunar Valves.
12. Interior of the right side of the Heart.

The Ear.

1. The exterior Ear.
2. The exterior auditory Canal.
3. The semi-circular Canal.
4. The Cochlea.
5. The Labyrinth.

The Lungs.

1. The Larynx.
2. The Trachea.
3. The Bronchi.
4. 4a. The left Lung.
5. 5b. The right Lung.

The Eye.

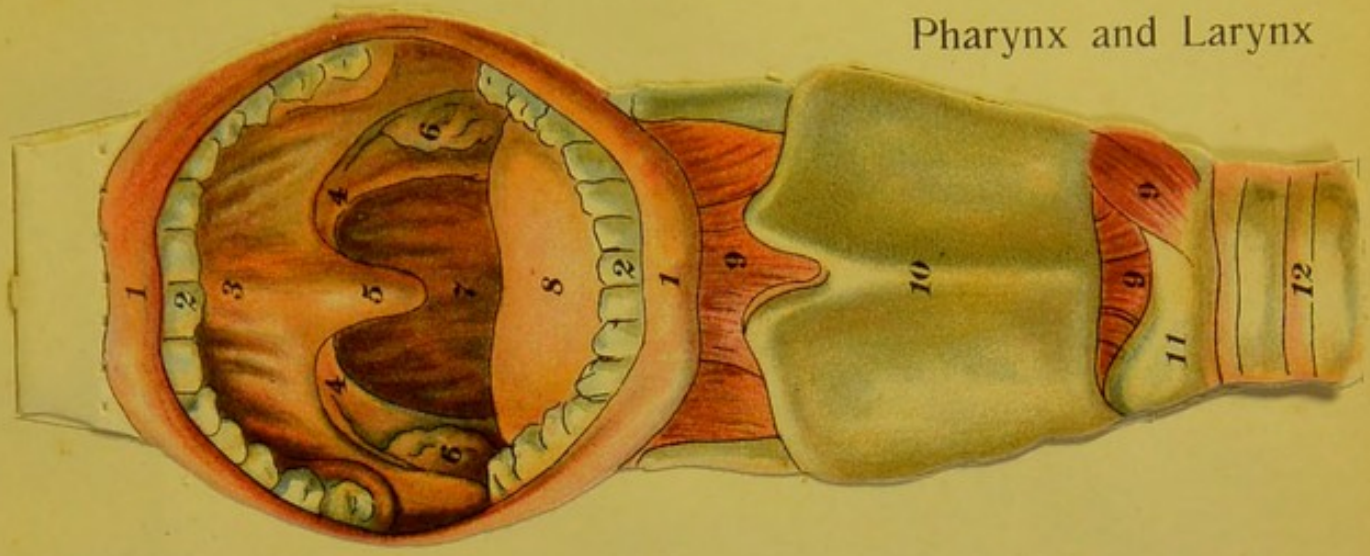
1. The orbicularis palpebraum Muscle.
2. The tarsal Cartilage.
3. The Eye-lashes.
4. The lachrymal Gland.
5. The meibomian Glands.
6. The punctum Lachrymale.
7. The lachrymal Sac.
8. The nasal Duct.
9. The rectus superior Muscle.
10. The rectus externus Muscle.
11. The rectus internus Muscle.
12. The rectus inferior Muscle.
13. The Sclerotic.
14. The Iris.
15. The Pupil.
16. The Choroid.
17. The vessels of the Retina.
18. The yellow Spot.
19. The bony orbital Cavity.

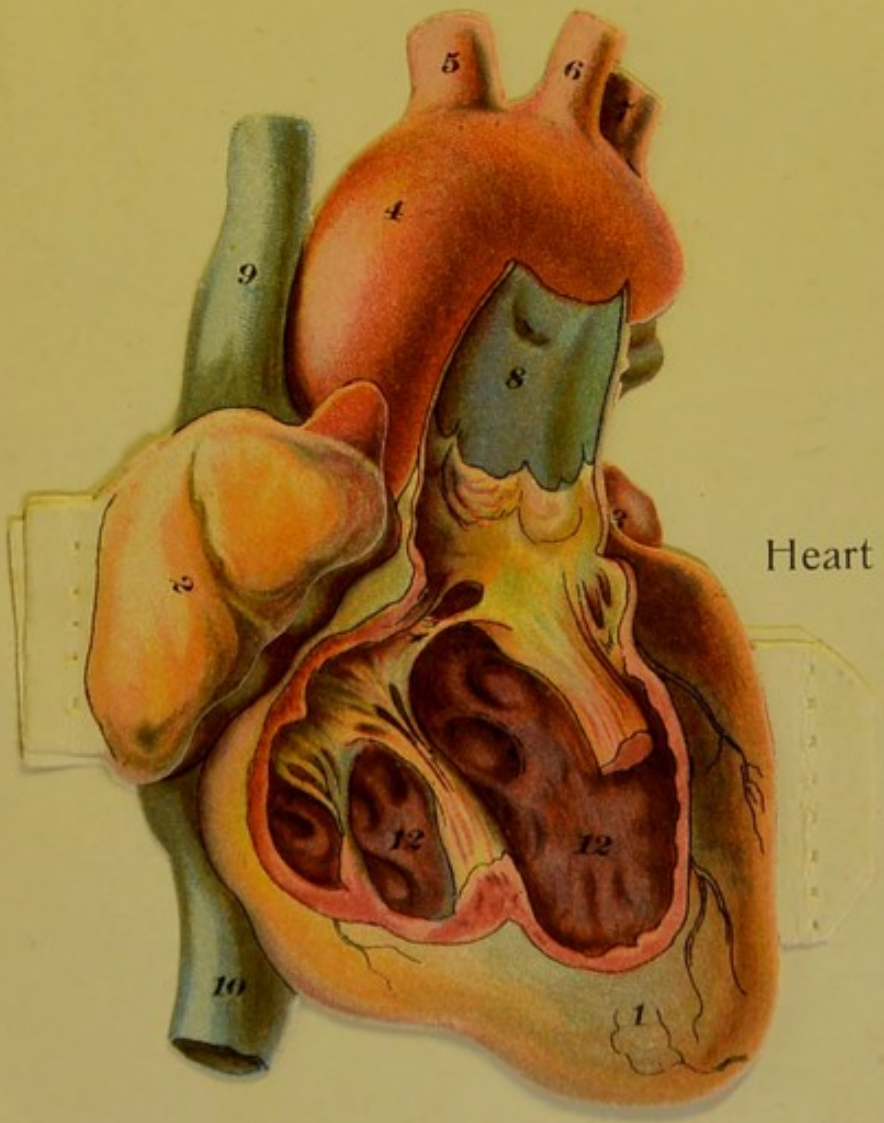
The Nose.

1. The foramina of the Ethmoid Bone.
2. The branches of the Olfactory Nerve.
3. The mucous membrane of the Nose.
4. The nasal Cartilage.
5. The Blood Vessels of the Mucous Membrane.
7. The hard Palate.
8. Section through the inferior section of the Nose.
9. The Cribriform Plate.
10. The superior Turbinated Bone.
11. The middle Turbinated Bone.
12. The inferior Turbinated Bone.
13. The superior Nasal Meatus.
14. The middle Nasal Meatus.
15. The inferior Nasal Meatus.

Anatomical Models

Pharynx and Larynx

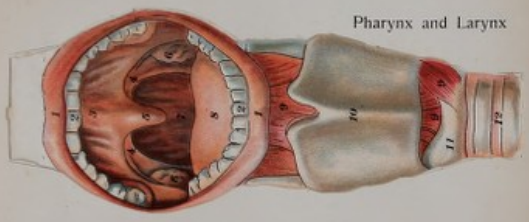


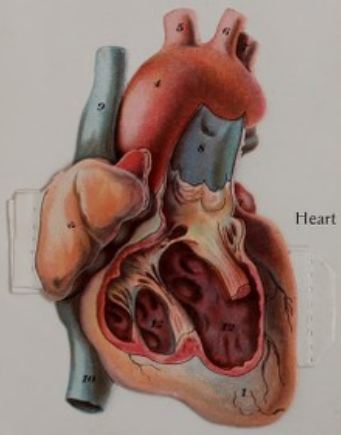


Heart

Anatomical Models

Pharynx and Larynx

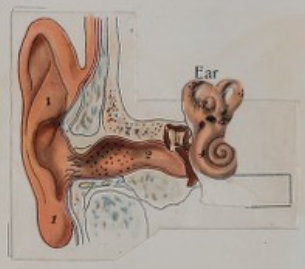


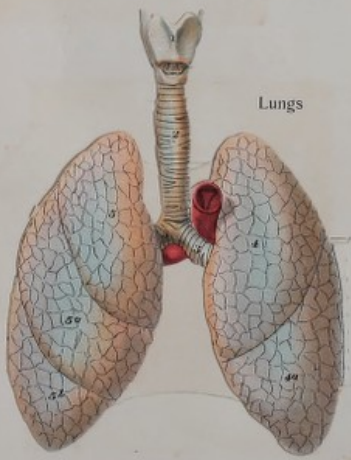


Heart

Anatomical Models

Ear





Lungs

Anatomical Models

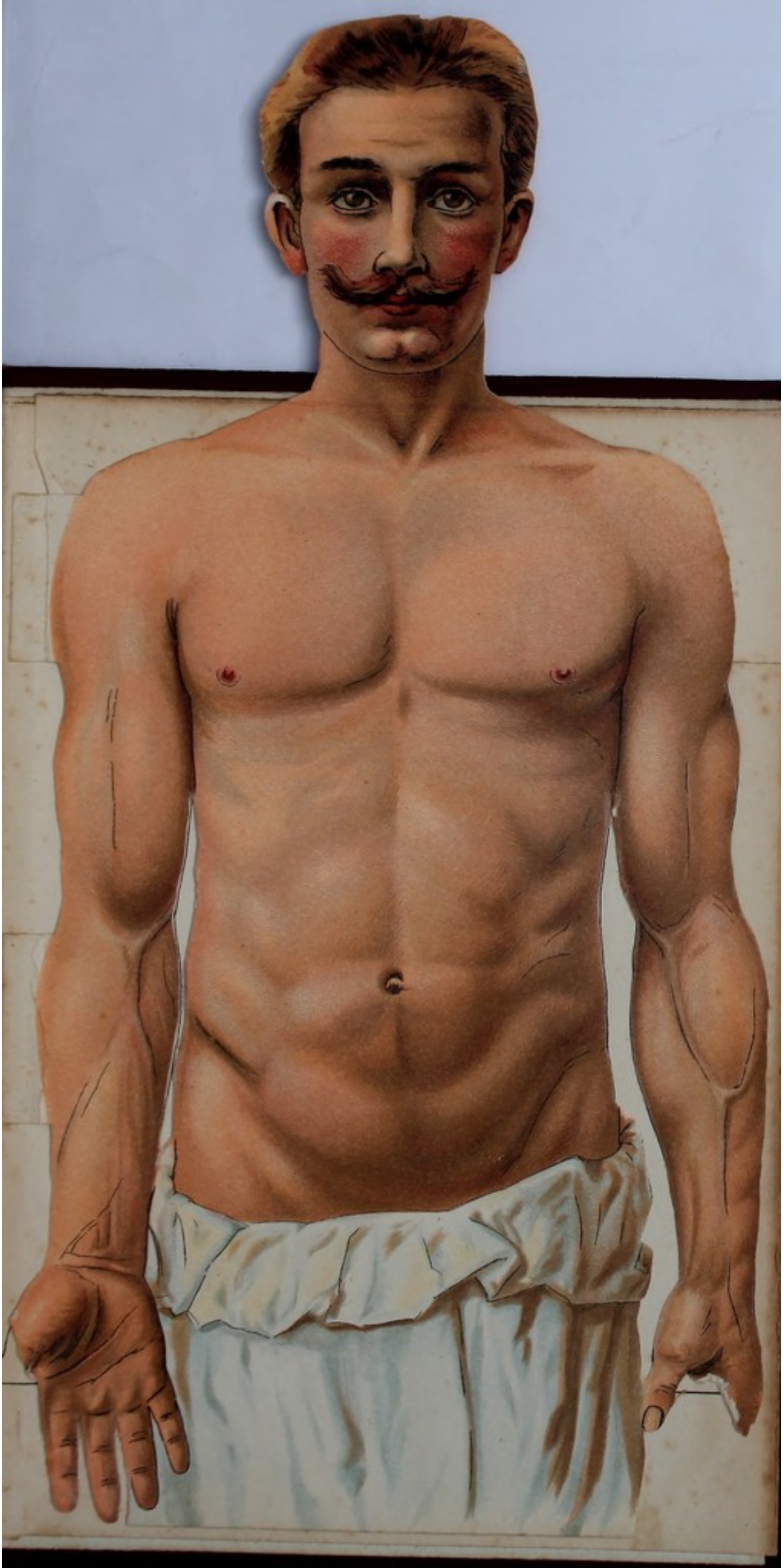
Eye

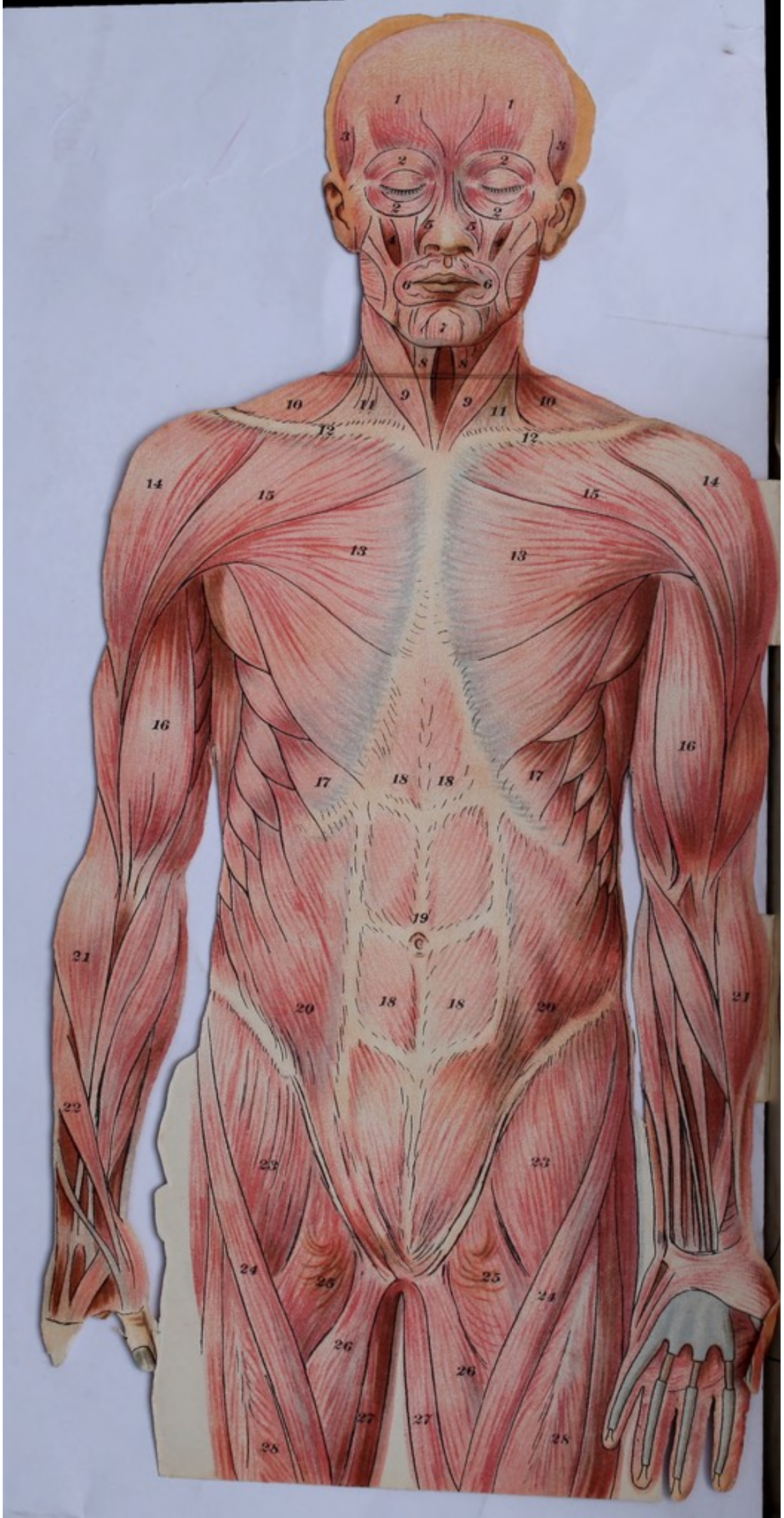
Nose

Explanation of the Anatomical Models.

The Male Body.

1. The Frontalis Muscle.
2. The Orbicularis Palpebrarum Muscle.
3. The Temporal Muscle.
4. The Masseter.
5. The Nasal Muscle.
6. The Orbicularis Muscle of the Mouth.
7. The Levator Menti Muscle.
8. The Sterno-thyroid Muscle.
9. The Sternocleidomastoideus.
10. The Trapezius.
11. The Fascia of the Neck.
12. The Collar Bone.
13. The Pectoralis Major. (Cervical portion).
14. The Deltoid Muscle.
15. The Pectoralis Major. (Pectoral portion),
16. The Biceps.
17. The Serratus Magnus.
18. The Rectus Abdominal Muscle.
19. The Navel.
20. The Oblique Abdominal Muscle.
21. The Supinator Longus Muscle.
22. The Extensor Primi Internodii Pollicis.
23. The Iliac Muscle.
24. The Sartorious Muscle.
25. The Pectineus Muscle.
26. The Adductor Longus.
27. The Gracilis Muscle.
28. The Quadriceps Extensor.
29. Breast Bone. Sternum.
30. The Ensiform Process.
31. The Ribs.
32. The Intercostal Muscles.
33. The Triangularis Sterni Muscle.
34. The Œsophagus.
35. The Pharynx.
36. The Stomach.
37. The Small Intestine.
38. The Pancreas.
39. The Spleen.
40. The Cœcum.
41. The Vermiform Process.
42. The ascending Colon.
43. The transverse Colon.
44. The descending Colon.
45. The Rectum.
46. The Heart.
47. The Pulmonary Artery.
48. The Pulmonary Vein.
49. The Aorta.
50. The inferior Vena Cava.
51. The superior Vena Cava.
52. The Diaphragm.
53. The Kidneys.
54. The Liver.
55. The Quadratus Lumborum Muscle
56. The Bladder.
57. The cervical Vertebrae.
58. The dorsal Vertebrae.
59. The lumbar Vertebrae.
60. The Sacrum.
61. The Ilium.
62. The Os Pubis.
63. The Ischium.
64. Upper portion of the Femur.
65. The Ribs.




1
1
3
3
2
2
2
2
5
5
4
6
6
7
8
8
9
9
10
10
11
11
12
12
14
14
15
15
13
13
16
16
17
17
18
18
18
19
20
20
21
21
22
23
23
24
24
25
26
26
26
27
27
28
28

Anatomical Model

of the Male Body.