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HUMPHRY AND REYNOLDS

NURSE'S SERVICE DIGEST

A MANUAL OF NURSING

BY

LAURENCE HUMPHRY, M.A., M.D.. M.R.C.P., M.R.C.S.

PHYSICIAN, AND FORMERLY LECTURER TO PROBATIONERS, AT ADDENBROOKE'S HOSPITAL, CAMBRIDGE, ENGLAND; TEACHER OF PATHOLOGY AND EXAMINER IN MEDICINE, UNIVERSITY OF CAMBRIDGE.

FIRST AMERICAN EDITION

REVISED AND ENLARGED

BY

W. MYRON REYNOLDS, M.D.,

FROM THIRTY YEARS OF RESEARCH IN HOSPITAL, CLINIC AND ACTIVE PRACTICE IN NEW YORK CITY

ILLUSTRATED

1918

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HUMPHREY AND REYNOLDS

NURSE'S SERVICE DIGEST

A MANUAL OF NURSING

$1.50

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PREFACE TO THE TWENTY-NINTH ENGLISH EDITION

The following pages are based upon lectures given by me to the probationers at Addenbrooke's Hospital during the last two years. The plan adopted is to give a short account of the anatomy of each set of organs, and immediately afterwards to treat of the diseases of those organs and the appropriate nursing. A description of baths, enemata, poultices, bandaging, and various nursing appliances will be found in the final chapters. An appendix contains receipts of food suitable for invalids

The symptoms and management of common diseases and the complications likely to occur are described in order to assist the nurse in following the course of the malady the treatment of which is assumed to be in the hands of a medical attendant.

I am indebted to Sir Dyce Duckworth for the use of his notes of Lectures to Probationers at St. Bartholomew's Hospital, and to Mr. Croft of St. Thomas' Hospital for valuable hints on nursing in surgical cases. The chapter on the management of child-bed contains many of the rules and directions drawn up for nurses at the General Lying-in Hospital, York Road.

In addition to illustrations prepared expressly for the work, permission has kindly been given me to utilize some of the woodcuts from Messrs. Caird and Cathcart's Surgical Handbook, and Dr. Thompson's Dictionary of Domestic Medicine.

LAURENCE HUMPHRY, M.D.

Cambridge, England.

PREFACE TO THE AMERICAN EDITION

A preface is for explanation or apology; no apology is necessary for the able way Dr. Laurence Humphry has compiled the English edition of this valuable aid to nurses; our explanation will be enlarged and incorporated in the American edition, gathered from thirty years of careful observation of others, and research in hospital, clinic and active practice by myself.

An eminent member of the Speakers' Bureau of the American Medical Association, in an able address, contends undeniably, that "public health is a purchasable commodity, as truly as milk, flour, sugar, or any other article of commerce;" and that "every fifty seconds a human life is *needlessly wasted*."

Also, Dr. Irving Fisher, Professor at Yale University, and President of the Committee of One Hundred on National Health, in his masterly address before the National Congress of Physicians, makes the conservative and amply proven statement, that out of 1,500,000 deaths which occur annually in the United States, "at least 630,000 *are preventable*."

The President of the Life Extension Institute, writes: "The life waste in war, enormous as it is, is almost trifling compared to the *life waste* in peace from ignorance, and neglect of ordinary preventive measures."

Every well informed physician knows the sad truth of the above statements; notwithstanding this stupendous death rate, admitted by the highest medical authority to be chiefly preventable, the great majority of people are not interested in their health, until they are sick and need a physician.

No prudent mechanic would run a complicated machine continually without a frequent careful

overhauling; he does not wait till it breaks down!

The human system is the most complicated and delicate machine known to man; moreover, the chief asset of the entire human race is *good health;* many persons think they are in good health, but unknowingly are suffering from latent disease, that could readily be discovered and probably remedied by a skilled physician.

When we pause to think that scientific research has made it possible to *prevent* ninety-eight per cent of the ordinary ills, and nearly one half of all the untimely deaths that occur, is it any wonder we stand *appalled,* that more care is not taken to prevent unnecessary sickness and untimely deaths.

Nature provides but one way to nourish the system, and *four ways* to remove the waste material, namely, the bowels, kidneys, pores of the skin and lungs.

Is it not more wise to *prevent sickness,* by the occasional timely advice of a competent physician, giving these organs more attention and better care, to keep them in a normal state of health, than by neglect to permit them to become impaired by disease?

The well-informed nurse will see at a glance the enormous field of usefulness that is open to her! surely, such a work is akin to Divine service.

We shall be fully rewarded for the revision of this work, since we realize it will prove an indispensible help to the nurse, both in the home and at the front, whose aid to the physician and surgeon is so highly important.

We have purposely made our comments and additions plain and comprehensive, realizing that herein is the opportunity of a lifetime for the nurse, to relieve the sick and aid the suffering, and to all such we bid a hearty welcome.

W. Myron Reynolds, M.D.

New York, September, 1917.

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THE NURSE'S SERVICE DIGEST

CHAPTER I.

THE GENERAL MANAGEMENT OF THE SICK-ROOM.

The Sick-Room:—Temperature—Ventilation—Nurse's Dress—Furniture—Flowers—Carpets—Bed and Bedding—Water-Beds—Cleanliness—Quiet. Attendance on Patient:—Washing and Personal Care—Bed-Sores—Changing Sheets—Draw-Sheet—Lifting and Moving the Patient—Bed-Pans—Inspection of Excreta—Feeding-Cups—Medicine Glass—Hot-Water Bottles—Bed-Rest. Observation of the Sick:—General Suggestions—Administration of Food, Stimulants, and Medicine—Arrangement of Room for Operations.

THE SICK-ROOM.—The selection of the sick-room does not usually devolve upon the nurse, but she may have opportunities of giving advice, especially as to its arrangement, ventilation, warming, and furniture.

The ideal sick-room should have a southern aspect, a fair possibility of sunshine, and should be spacious and lofty, quiet, and well ventilated. If possible, it should be isolated from the rest of the house, especially in infectious cases. It is also a great advantage to have a second room opening into it, and a lavatory and closet on the same floor. It is needless to say that the drainage should be in perfect order.

With all such attendant advantages, the nurse

experiences little difficulty in keeping the sick-room cheerful and healthy. It is, however, in small houses and in the dwellings of the poor, where the patient inhabits a dark, close, and squalid chamber, that her resources are tried to the utmost, and her skill and efficiency are put to the severest proof.

Temperature.—A thermometer is the only safe guide as to the temperature of the room. It should be hung against the wall near the bed, and the record taken at intervals during the day. The temperature should be kept as nearly as possible at 60° F., and on no account be allowed to descend below 50°; but it should be remembered that infants and old people require more warmth than adults. In some laryngeal and pulmonary complaints, again, as high a temperature as 70° F. may have to be maintained.

The moisture of the atmosphere can be regulated to a certain extent when desirable by a steam-kettle, or by the evaporation of water placed in open dishes. An open fire-place is by far the best and healthiest means of warming a room; stoves are not nearly so agreeable, since they never create sufficient ventilation, and have a tendency to produce dryness in the air. This may, however, be counteracted to a certain extent by placing a dish of water on the stove and allowing it to evaporate. The temperature of the room should be carefully ascertained to be sufficiently warm before the patient is washed or dressed, or rises to have the bed made, and it is advisable to have a flannel dressing-gown ready for these occasions.

In hot weather there may be difficulty in keeping the room sufficiently cool, especially when the sun is shining on it. A dark green linen shade. outside shutters, or Venetian blinds are the best protection.

VENTILATION.—The purity of the atmosphere in the sick-chamber is of the highest importance; it is secured by ventilation, by which means a constant stream of fresh air is admitted to replace the air which has been rendered unhealthy by the impurities poured into it from many sources. Elsewhere an account will be found of the changes which the air undergoes in its passage through the lungs, whereby the amount of oxygen is diminished, and the carbonic acid and organic material are increased (see *Expired Air*). In addition to these impurities, there are emanations from the surface of the body, and particles of putrefying matter from the surface of sores and ulcers, and from the sputum and excreta being constantly thrown off. These, together with the dust and impurities from the combustion of gas or candles, combine to render the air unwholesome and unsuitable for respiration. Where many sick people are congregated together, the fouling of the air is materially increased, and is at once obvious to any one entering the room from the fresh air, if the ventilation is imperfect. This is most noticeable in the early morning, especially if the windows and doors have been closed during the night, as is often the case in cold weather.

The process of ventilation consists in the removal of the warm foul air, and the introduction of fresh air to supply its place. Extraction of the foul air is best accomplished by the chimney when there is a fire burning, for nothing ventilates a room so well in all respects as an open grate with a fire. A continual diffused current of air is produced in the direction of the chimney, and fresh air enters from all quarters to take its place, so that the air of the room is frequently changed. In large rooms

there are frequently open gratings or holes near the ceiling, communicating with the outside, or with shafts for the extraction of the warm foul air which ascends by reason of its warmth.

The admission of fresh air should be managed as far as possible without draughts; if these cannot be avoided altogether, the bed should be placed so as to prevent currents of air from passing over the patient. When necessary, screens may be arranged round the bed. Air should be admitted fresh from the outside. It is useless to open the door and allow air to enter from an ill-ventilated passage or staircase, containing the foul air of the house. The windows are the proper means for obtaining a fresh supply of air, and in cold or windy weather, those on the sides away from the wind should, of course, be used. Less draught is produced by opening a window at the top, but in warm weather it may be opened both at the bottom and the top.

How to Avoid Draughts.—It should be remembered that windows opened at the bottom are likely to create a draught on a level with the patient, and are, therefore, dangerous unless carefully managed. An excellent plan of arranging an open window is to open the lower sash a few inches from the bottom, and to fasten a wooden board, eight to ten inches deep, across the lower opening; or to fit a piece of wood accurately in, and close the opening beneath the sash. The air thus enters at the middle, where the raised lower sash overlaps the lower end of the upper one, and the current is directed upwards towards the ceiling, and is thus gradually diffused through the room without draught. When the room does not admit of ventilation by this means, other substitutes must be employed. For example, the windows in ad-

joining rooms or passages may be opened and air admitted, or the door may be opened and a current of air created by shaking a clean towel or sheet about the room. In very cold or windy weather, when it is impossible to keep windows always open, the room should be aired several times a day; the patient being entirely covered up, the window may be thrown open, and, if necessary, the door also for a few minutes, until the air has been changed and feels fresh. If the patient is able to leave the room, advantage should be taken of his absence to have it thoroughly aired and warmed again before his return. Amongst the poor, the nurse will find the greatest objection to having windows open, partly from ignorance and partly from dread of draughts, and she will have to be on her guard that the windows are not shut directly her back is turned. This is especially necessary at night, when it is of the utmost importance to keep the air fresh.

Nurse's Dress.—The uniform should consist of cotton, alpaca, or of some washable material of light colour. For midwifery or infectious cases, a print dress should be worn, being less likely to become contaminated with dust and dirt, besides being more easily cleansed. It is usual for a nurse to wear a neat cap, apron, and cuffs; she should also be provided with a pair of quiet shoes without high heels, and should abjure creaky boots.

In surgical cases where constant dressing of wounds, or removal of offensive discharges is required, the arms should be bare, or linen sleeves may be worn, which can be drawn off and on. The nurse should always be provided with a good pair of scissors, dressing-forceps, a pin-cushion with needles and pins, and a thermometer.

FURNITURE.—The ordinary furniture of the room should be of a simple kind. Those chairs are best which have a wooden framework with a cane bottom. Stuffed chairs and sofas with coverings of woolen material only retain the dust, and may spread infection. A light invalid couch with wheels is useful in convalescence. The room should be made cheerful and pleasant to the eye, and arranged as little like a bedroom as possible; the pictures and wall-paper should be considered in cases where the invalid has to keep the room for a great length of time.

FLOWERS with bright colours, and devoid of scent or strong odour, should be selected, and should always be removed at night. Some persons are very sensitive in this respect, and are rendered faint by the presence of flowers with a strong scent.

CARPETS should not extend over the whole room, but are useful to prevent unnecessary noise; they should be light and easily removed for cleaning; but India matting, especially in summer, is an excellent substitute. It should be remembered that fluffy mats and long-haired rugs are most objectionable, and that in infectious cases carpeting of all kinds must be excluded.

BED AND BEDDING.—The simplest form of bedstead, such as the ordinary narrow iron frame, is convenient; but if of a larger size, it has this advantage that the patient can be moved to the other side while the bed is being remade. Four-post beds with hanging curtains are out of place in the sick-room; if the apartment is draughty, the patient may be protected by well-arranged screens.

The bedstead should not be placed with one side against the wall, as the nurse should be able to attend to the patient on either side of

the bed. The position should be adapted to the situation of the windows when possible, so as to avoid light falling on the eyes in cases in which this is undesirable; but yet so as to enable a convalescent or chronic invalid to look out of the window, or, if preferred, to have the light at the back when reading.

The mattress may be of thin horse-hair, placed on another of similar material. A spring-mattress, however, or a woven-wire bed is preferable, and forms a clean, cool, comfortable bed. If these are too expensive, some cheaper form, such as a wool or flock mattress, will have to be substituted. The undersheet should be spread smoothly, well stretched and tucked in under the mattress; nothing is so uncomfortable as lying on wrinkled sheets. After food, the bed should be carefully freed from crumbs; and several times during the day it should be aired by raising the covering twice or thrice, and getting rid of the close warm air of the interior of the bed. Comfortable pillows, not too soft, may be arranged according to the patient's liking; it should be borne in mind that the back requires support when the patient is lying propped up.

Heavy bed-clothes should be avoided, and if extra warmth is required a light quilt or coverlet is the best, eider-down being the warmest. Counterpanes are heavy and bad for ventilation. It is a luxury to the patients if the room is provided with a second bed, into which they can be moved for a change during the day, while the other is being aired and remade.

Water-Beds and Air-Cushions.—In cases of chronic illness, when the patient has to be kept constantly in bed, or where bed-sores are likely to occur, a water-bed is invaluable. The empty water-bed should be first placed on the bedstead, and water at about 90° F. (or less,

according to the time of the year) gradually poured into it until it is about half-full or rather more; the rest may be distended with air. A folded blanket should be placed over it before the bed is made. The water-bed should never be lifted with the water in it, and it should always be carefully handled, as it is easily damaged and is expensive. Care should be taken before it is placed on the bed to see that it does not leak. The water may require changing after a time in cold weather. Water-pillows may be filled in the same way.

Air-cushions are not so serviceable, but are less expensive.

CLEANLINESS.—The room should be dusted, tidied, and cleaned every day. The floor should be swept with a hand-brush, damped to avoid raising the dust; or old tea-leaves or sawdust may be used for the same purpose. The dust should not be allowed to accumulate under the bed or in the corners of the room. If the room is cleaned every day, there will be less need of scrubbing the floor; but in long illness, when this is necessary, it is desirable to move the patient into another room until the boards are dry.

QUIET.—The nurse, as before stated, should never wear rustling dresses or creaking shoes (felt slippers are the most desirable to be worn in the sick room), and should avoid heavy or clumsy movements, as all such noises are extremely irksome. In cases requiring to be kept especially quiet, there is often difficulty in limiting the number of visits from anxious friends and relations; but the nurse should ask for definite guidance on this point from the medical attendant, and will then have no difficulty in acting on his instructions.

In making up the fire at night, or when the patient is asleep, a stick may be used instead of

a poker, and the coal should be arranged previously ready for use in paper bags, or be put on gently by hand, with a glove kept for the purpose.

Attendance on Patient.

WASHING AND PERSONAL CARE.—The face and hands should be washed night and morning, and if the patient is not well enough to take a bath, the whole body should be sponged over with warm water and soap once a day (see *Tepid Sponging*). The teeth should be cleaned regularly with the tooth-brush, or with a piece of lint fastened on to the end of a stick, and moistened with some mouth-wash.

The hair should be carefully combed and brushed, and in female patients neatly plaited into braids.

BED-SORES: PREVENTION OF.—The back should be examined in all cases of chronic illness, especially in those in which bed-sores are apt to occur, and systematically dusted with violet powder, or finely-powdered boracic acid. If necessary, the skin may be hardened by rubbing with spirits of wine, eau-de-cologne, or brandy.

CHANGING SHEETS.—In severe illness, this has to be managed without uncovering the patients or removing them from the bed. It is best done from side to side in the following manner:—All the upper bed-clothes should be removed except the top sheet and one blanket; the top sheet is then taken out, leaving the blanket next the patient.

To change the under-sheet the pillow must be removed, and the patient gently turned on his side to about the middle of the bed, the soiled sheet being folded close up to the patient's back. A clean sheet, half-rolled, is then placed against the soiled one, and the unrolled half is smoothly laid on the bed and firmly tucked in; the patient

is then turned over on to the clean sheet, the soiled one removed from the other side; and the clean one then unrolled over the rest of the bed. When it is not possible to turn the patients on their side, the under-sheet may be changed in a somewhat similar manner from head to foot.

To change the upper-sheet spread the clean sheet over the covering blanket, and whilst holding it with one hand draw out the blanket, then replace the remaining bed-clothes.

Draw-Sheet.—This has constantly to be used in different cases in order to prevent the bed from being soiled. It consists of a small sheet folded lengthwise two or three times, so as to be of sufficient depth to reach from the middle of the patient's back to the knees. It should be firmly tucked in on both sides under the mattress, and when soiled it may be drawn away underneath by slightly raising the patient, and a clean part substituted, the soiled part being rolled up and pinned. It is preferable, however, to change the sheet altogether, and not to leave the soiled part inside the bed; this may be done in the manner above described in changing the under-sheet. If the patient cannot be turned on one side, the nurse should carefully raise him, whilst an assistant draws underneath a clean sheet, which has been temporarily fastened to one side of the soiled sheet. The bed linen should always be aired and warmed before it is used, and the airing should be carried on in another room.

Lifting and Moving the Patient in Bed.—The helpless patient requires lifting or moving from time to time, in order to alter the position, change the bed, or give the bed-pan. If the nurse is strong, she may be able to lift the body, single-handed, by passing her arms well underneath, one under the knees, the other un-

der the back below the shoulders. Heavy patients may be moved and turned over on one side by means of the under-sheet or the draw-sheet.

When a heavy patient has to be lifted any distance, several persons are required; two of them join hands under the upper and lower part of the patient, while a third takes charge of the head.

BED-PANS.—Those made of earthenware are the cleanest and best. Two forms are commonly used: the round pan and the slipper; the former being suitable for men, the latter for women. A flannel covering should be adapted to prevent the contact of the cold earthenware with the patient's body. The round pan can easily be passed from the side under the patient's body, which must be slightly raised. In order to pass the slipper, the patient lying on her back should draw up her knees; and the thin end of the slipper can be gently inserted under the back. When removed, the pan should be immediately covered, and carried out of the room.

URINALS.—Special urine-bottles should be obtained for male patients of such a form that the urine is prevented from flowing back into the bed.

DISINFECTION.—After the bed-pan or urinal has been emptied, it should be well rinsed out with some disinfectant solution (carbolic acid 1-20), thoroughly cleaned with hot water by means of a bottle-brush or mop, and wiped quite dry. Disinfectant powder may be placed in the pan before using, but strong fluids are apt to run over the sides or otherwise reach the patient's skin, producing irritation and bed-sores. This disinfection should be rigidly observed in typhoid and other infectious cases.

EXCRETA.—The excretions should on no account be allowed to remain in the room, or hidden under the bed. After being removed into the lavatory or closet, they should be kept covered and arranged for easy inspection by the medical attendant. Vomited matters should always be preserved, and the motions also in all cases connected with bowel or abdominal complaints. In any case of doubt, it is wiser not to throw them away until they have been inspected. The urine should be saved at first for examination, and specimens when required from day to day. In all cases before operation, a sample of the urine should be preserved.

In infectious cases the excreta require special treatment (see *Fevers*).

FEEDING-CUPS.—Patients unable to sit up in bed will have to be fed by a spoon, or, more conveniently, by a feeding-cup. This latter is simply a half-covered cup with a spout and handle, and when the patient's head cannot be raised from the pillow, the spout should have an extra curve, so that its mouth almost points downwards. Too much fluid should not be put in at a time, as it may run over the side when the cup is tilted.

MEDICINE-GLASS.—A measured glass to contain two or three ounces of fluid is useful in order to measure the quantity of nourishment or medicine to be given. The glass is usually graduated, and marks the different-sized spoonfuls and measures.

Thus: ℥i; or one ounce = two tablespoonfuls.
℥ss; or half an ounce = one tablespoonful.
ʒi; or one drachm = one teaspoonful.
ʒij; or two drachms = one dessertspoonful.
♏i; or one minim = one measured drop.

A minim-measure, or a small measure-glass, should be used for drop-doses up to one teaspoonful.

An ordinary wine-glass holds about two ounces, a small tea-cup four ounces, and a tumbler about half a pint of fluid.

Hot-Water Bottles.—These vessels are essential furniture of the sick-room in cold weather, and should always be in readiness for warming the bed after severe surgical operations or in cases of collapse. They may be of metal or earthenware, and should be covered over with flannel; the india-rubber form is soft and comfortable. As a substitute in emergencies, hot bricks wrapped in flannel, hot bran-bags, or ordinary strong wine- or beer-bottles, filled with hot water and securely corked up, may be used, it being carefully ascertained that there is no leakage.

Caution.—In giving hot-water bottles to unconscious patients, or those who are paralysed and have lost sensation, great damage may be done by the nurse carelessly placing a hot bottle against the skin, and so producing a sore place or slough. In all cases a blanket should intervene, or the bottle hould be placed so as not to be in immediate contact with the patient.

Bed-Rest.—During convalescence, and for those who are obliged to be propped up in bed, some form of bed-rest is often necessary. Soft pillows act very inefficiently, becoming displaced in a short time. A firm support, such as the hinged bed-rest with cane or carpet-back is the best, pillows being comfortably adjusted to the back and head. As a substitute, a light chair or stool may be placed between the pillows and the head of the bed.

There is often a tendency on the part of the patient to slip down in bed, which may be par-

tially obviated by a firm support at the feet; or, better still, by placing a long firm "roller pillow" under the buttocks, the ends of the pillow being securely fixed to the head of the bed by strong tape.

Observation of the Sick.

General Suggestions.—On the visit of the medical attendant, the nurse should be prepared to give an account of what has happened, or what she has observed during the time she has been on duty. True observation and correct statement of facts are only gained by practice and close attention, and, when carried out with precision and without exaggeration, are good proof of one of the most valuable qualities in a nurse. It is an excellent plan for her to write down her observations, and the time at which they were noticed, as it will assist her to give a clear report when required. At no time is a nurse expected to offer an opinion unasked about the facts which she has observed.

As the result of experience, a watchful nurse will acquire some instinctive knowledge of her patients, and of the course of special diseases. She will be able to tell whether progress is being made, or whether her patient is getting worse, and to recognise some of the more important symptoms which denote the development of complications in the disease, and the peculiar effects of some remedies on susceptible patients. Lastly, she may gain a very valuable instinct which warns her that her patient is in danger, when this is not obvious to an inexperienced person, an instinct only gained after long practice and constant attendance on the sick.

Definite instructions as to the diet, nursing, and medicines should be taken by the nurse when she comes on duty, and must be handed

on by her to the nurse or attendant who relieves her. The nurse who is on duty at the time of the medical attendant's visit should be prepared with a report, not only of the hours during which she herself has been in attendance on the case, but also of the whole time since his last visit.

REPORT.—The report should comprise the following points:—

1. *Temperature-chart* and state of pulse.
2. *Bowels*, action of.
3. *Sleep*, hours of.
4. *Symptoms*, notes of anything special, such as vomiting, rigors, &c., with the time at which each occurred.
5. *Diet*, amount, and time at which taken.
6. *Medicine*, time of giving, and effects noticed.

In addition to the report, the excreta should be ready in an adjoining room for inspection.

ADMINISTRATION OF FOOD AND STIMULANTS.—When the patient is well enough to take meals, these should be brought punctually. They should be hot, and not lukewarm, and nicely and cleanly served. When finished, the remains should be taken away at once, and not left about, creating an odour in the room.

If the patient is able to sit up in bed for meals, these may be served on a tray or on a small bed-table. This table stands on four short legs, and one of its sides is scooped out. It is placed on the bed with the legs on either side of the patient's thighs, his body being received into the hollowed-out portion. A ledge running round the three sides prevents things placed on the table from slipping off. It may be used for various purposes.

FEEDING OF HELPLESS PATIENTS.—When a helpless patient requires to be fed, the nurse

should gently raise them by passing the left arm behind the shoulders, or better, by passing the hand behind the pillow, and raising the pillow and head together, giving the fluid in a spoon or feeding-cup with the other hand. In all cases, a napkin should be placed under the chin to prevent wetting the night-dress and the mouth should be wiped dry afterwards.

Feeding in States of Exhaustion.—In cases of serious illness, nourishment may have to be given in small quantities and at frequent intervals. The nature of the food and the quantity should be previously ascertained from the medical attendant, and no other food should be given without his sanction. Feeding is often most difficult when most important, and the life of the patient may depend upon care in this respect. Two, three, or more ounces of milk, beef-tea, or egg-flip, every two, three, or four hours, may be ordered, and it is sometimes impossible to persuade the patient to take it. The nurse will thus have to use her discretion and her tact by varying the nourishment, or giving it in smaller quantities oftener, thus managing to get down a fair amount in the twenty-four hours. A little stimulant given first may enable the patient to take nourishment better afterwards. When the mouth is dry and parched, or clammy with crusts, it should be cleansed with lemon-juice and water, or rinsed with a weak solution of boracic acid, before nourishment is given.

During the night a nurse must use her discretion and avoid waking the patient out of a good sleep to administer nourishment; but in cases of great weakness patients should not be allowed to sleep long without support. It should be remembered that the early morning is a time when prostration is much more marked, and

that some stimulant or nourishment is specially required then (see *Nutrient Enemata*).

STIMULANTS should be measured and diluted with water or milk to the taste of the patient, and champagne may be diluted with Seltzer or Apollinaris water. They should be given at regular intervals, and alternate as far as possible with the nourishment.

ADMINISTRATION OF MEDICINES.—The following rules should be observed:—

1. The directions on the label of the medicine bottle should always be read before giving the medicine, which should be given punctually at the times ordered.

2. The dose must be measured accurately in a measure-glass, or by the marks on the bottle.

3. Medicines and external applications, such as Liniment and Lotion, must not be kept near one another, as mistakes are apt to occur in the dark, and fatal poisoning has thus resulted in several instances.

4. Medicine should be shaken before being poured out, and the bottle held with the label side upwards, to prevent the directions from being soiled and rendered illegible.

5. The medicine-glass must be carefully cleansed after using, and oily or strongly-flavoured medicines should be administered in a glass kept separately for the purpose.

6. The patient may wash out the mouth after taking nauseous or acid medicines, and a crust of bread or biscuit will assist in removing the taste, or rinsing the mouth with peppermint water.

TIMES FOR GIVING MEDICINE.—When medicine is ordered to be taken three times a day without special directions as to the hour, it should be given about mid-way between meals—for instance, about eleven, four, and seven o'clock.

During the night, sleep should not be broken in order to give medicines at the exact time, unless special orders have been given. There should always be an interval of not less than half an hour between the medicine and a meal; but cod-liver oil, malt, and tonics of iron and arsenic are usually prescribed on a full stomach, either at, or soon after, a meal. Aperients are best administered the last thing at night, or early in the morning before breakfast.

DRUGS.—Effects of and overdoses.

It will be the duty of the nurse during the intervals of the medical attendance to notice the effects of any remedies prescribed. This is especially important where strong medicines or poisonous drugs are being employed. It is often desired to push these to their full effects in order to control the disease, and the physician will inform the nurse what symptoms to expect and when to reduce or withhold the dose between his visits.

The symptoms which may follow large doses, or the continued use of drugs in common use, are as follow:—

Symptoms following the use of certain Drugs.

ANTIPYRIN.—Papular rash, sweating, faintness.

ARSENIC.—Watering of eyes, vomiting, and diarrhœa.

BELLADONNA.—Dilated pupils, dry mouth, difficulty in micturition, rose rash.

CARBOLIC ACID.—Brown or olive green colour of urine, fainting, collapse.

DIGITALIS.—Giddiness, faintness, vomiting.

DIPHTHERIA ANTITOXIN.—Urticaria rash.

OPIUM AND MORPHIA.—Vomiting, drowsiness, small pupils, dusky colour, sweating, unconsciousness.

PILOCARPINE.—Sweating, faintness.

POTASSIUM IODIDE.—Running at the eyes and nose, frontal headache, acne rash.

QUININE.—Giddiness, headache, noises in the ears, deafness, vomiting.

SALICYLIC ACID AND SALICYLATE OF SODA.—Noises in the ears, deafness, sweating, delirium, heavy breathing, sweat rash.

The effect of medicines should be carefully observed and noted down.

ABBREVIATIONS.—The following abbreviations directing the use of remedies are frequently appended to prescriptions:—

Stat. or statim sumendus—to be taken at once.

Horâ somni—at bedtime.

P. r. n., or pro re natâ—as circumstances arise.

Omni nocte, omni mane—every night, every morning.

Tertiâ quâque horâ—every third hour.

Quotidie—daily.

Semel, bis, ter die—once, twice, thrice daily.

Repetatur—repeat.

Sæpe utendus—to be used frequently.

Applicetur lotio—apply the lotion.

Regioni cordis or præcordio—to the region of the heart.

ARRANGEMENT OF ROOM FOR OPERATION IN PRIVATE HOUSES.—Slight operations, or those of minor importance, are performed while the patient remains in bed—this having been previously arranged with a rubber-sheet.

For greater operations, or those taking a long time, or requiring good light, an operation-table can be devised. A firm wooden table about three feet high, four feet long, and two feet wide, such as a dressing- or kitchen-table, will answer the purpose, provided it be strong and

steady. This should be furnished with blanket, pillows, and rubber-sheets arranged as directed (see *Operation-Table*). The table should be placed in a room with a good light, and near the window. Where the room is a small one, it should be completely cleared of all unnecessary furniture, rugs, hangings, and toilet utensils, and in all cases there should be small tables ready at hand for surgical instruments, dishes, and necessaries for the operation. It is convenient to use a room adjoining the bed-room, so that the patient does not see the preparations or instruments, which should be kept covered until the operator is ready to use them, but can receive the anæsthetic in bed, and then be carried into the operating-room.

CHAPTER II.

GENERAL PLAN OF THE HUMAN BODY

Anatomy:—Skeleton—Skull—Spine—Vertebræ—Thorax—Ribs—Sternum—Clavicle—Scapula—Humerus—Radius—Ulna—Carpus—Metacarpus—Phalanges—Pelvis—Femur—Patella—Tibia—Fibula—Tarsus—Joints—Muscles—Fat—Internal Organs—Nervous System—Respiratory System—Circulatory System—Digestive System—Excretory System—Work and Waste—Blood—Capillaries—Clotting—Blood Serum—Excretion—Temperature of Body.

ANATOMY is the science which treats of the structure, form, and position of the various parts of the body. The human body is obviously separable into the head, trunk, and limbs; and if divided down the center from before backward by a vertical line, the two halves would almost exactly resemble one another.

If the limb of any animal be examined, there will easily be recognized an external covering of soft material, and of varying thickness, termed the soft parts, and an internal hard part consisting of bone. If the limb be dissected, and the skin with the fur be cut through and turned aside, the pale red flesh is seen underneath, arranged in bundles or columns. On tracing these columns of flesh, they will mostly be found to terminate at one or both ends in a firm white cord attached to some part of the bone. These white cords are called *tendons*, and the columns of flesh, *muscles*. Between the muscles are soft white threads, the *nerves*, running down the limb and giving off fine branches.

Close by the nerves are other threads, which are really hollow tubes or *blood-vessels*. These appear of dark-reddish color when they contain blood, but are pale and flat when empty.

All these together make up the soft parts, and they are loosely bound to one another by a fine delicate material called *connective tissue*, and are arranged around the central bone of the limb.

The bones of the head and face, in like manner with the limbs, have their covering of soft parts, but here the bones are arranged in the form of a hard case enclosing a cavity, which contains the main organ of the nervous system, the *brain*.

The trunk has its bony framework, and together with the soft parts includes a large cavity in its interior, which serves the purpose of lodging and protecting the various internal organs.

The Skeleton.

The skeleton, or bony framework, forms the main support of the human body, and is composed of upward of two hundred bones of various shapes and sizes—long, flat, and irregular (figs. 5, 6).

Each bone has a covering of thin tough membrane, called the *periosteum*, wherein the blood-vessels which go to nourish the substance of the bone are distributed. This bone-substance, or tissue, consists partly of animal matter, like gristle, and partly of earthy material, such as chalk and phosphate of lime, these latter giving the hardness which is characteristic of the bones of adults. In infants, the amount of this earthy material is much less; their bones, accordingly, are softer and more easily bend and become curved, if not properly cared for.

The skeleton includes the bones of the head, trunk, and limbs.

THE SKULL (fig. 7) is formed of twenty-two separate bones. Eight of these compose the brain-case, or cranium, and fourteen the face.

THE CRANIUM.—The bones of the cranium are —*one Frontal; two Parietal; two Temporal; one Occipital; one Sphenoid; one Ethmoid.*

The Frontal bone forms the forehead, and surrounds the eye-sockets at their upper part.

The Parietal bones form principally the crown and side-walls of the skull.

The Temporal bones surround the ear, and contain in their interior the organ of hearing.

The Occipital bone forms the back and part of the floor of the skull, and presents at the lower part a large round hole, the *foramen magnum*, through which the spinal marrow or cord passes from the skull to the spinal canal. On either side of this hole, on the under surface of the skull, are two smooth projections, which rest on the first or uppermost bone of the spine.

The Sphenoid bone forms also part of the floor of the skull, and its wings extend to the side-walls, acting in the manner of a wedge.

The Ethmoid bone is situated at the root of the nose. It is of spongy structure, and is perforated by numerous small holes, through which pass the nerves of smell to the nose.

If the top of the skull be removed, and the hollow interior in which the brain is contained examined, it is seen to be of oval shape from before backward. The vault and sides of the

cranium are fairly smooth, but the floor or base on which the brain rests is irregular, with several projecting prominences of bone. The base of the skull is also perforated with numerous apertures of different sizes, in addition to the foramen magnum already mentioned. These apertures serve for the exit or entrance of the several nerves and blood-vessels which have to pass through the skull to connect the brain with other parts of the body. Some especially may be noticed—for instance, one for the optic nerve leading through the back of the orbit to the eye; another for the nerve to the ear in the ridge on the temporal bone; and others, again, near the foramen magnum for the carotid artery, jugular vein, and the nerve to the heart and lungs.

THE FACE is composed of fourteen bones, the more important of which are:—

The Nasal bones, forming the bridge of the nose, and enclosing the cavity which contains the organ of smell.

The Malar, or cheek-bones.

The Upper Maxillary, or upper jaw-bone, containing the upper teeth.

The Lower Maxillary, or lower jaw-bone, containing the lower teeth.

This is the only movable bone of the skull, and the joints are situated on either side of the base of the skull behind the ears.

The bones of the skull and face together form cavities for the reception of the organs of special sense, viz., the orbits for the eyes, the nasal cavities for the nose, the mouth for the taste-organs, and other cavities for the organs of hearing. All the bones, with the exception of the lower jaw, are united by dented edges, fitting together and called *sutures*.

In infancy, the bones of the skull do not meet

at the top of the head, and a soft place may be found there, under which the brain can be felt throbbing. This soft spot is called the *fontanelle.*

THE TRUNK is naturally divided into the chest and the abdomen. It supports the head, and gives attachment to the limbs on either side.

THE SPINAL COLUMN (fig. 8), the central support of the whole skeleton, is a chain of thirty-three small bones, called vertebræ, which are placed one above the other:—

The Cervical Vertebræ form the neck, and are seven in number.

The Dorsal Vertebræ, or next twelve, carry the twelve ribs on either side.

The Lumbar Vertebræ, five in number, are situated in the loin.

The remaining vertebræ are united together in the adult, the upper five to form the *sacrum*, the lower four to form the *coccyx* or tail-vertebræ.

If one of the vertebræ from the dorsal region be examined, the following parts may be noticed:—The body or solid portion; a ring of bone, surrounding a central aperture; and three spikes or processes (fig. 9).

The vertebræ are placed one above the other so that their bodies form a strong continuous column, and their rings surround a central canal which extends through the whole length of the column, and in which is contained the spinal cord. Between each of the bodies is placed a cushion of gristle, called the *inter-vertebral cartilage*, which forms an elastic pad, preventing undue shocks or jars to the spine.

THE PROCESSES project, one backward in the middle, the *Spinous* Process; and one on each side, the *Transverse* Process. The projecting spinous processes can eaily be seen and felt

down the middle of the back in the naked body. Thee processes serve for the attachment of the powerful muscles of the back.

The vertebræ are all firmly braced together by strong bands or ligaments, which, whilst permitting the various movements of the column, prevent displacement of the several vertebræ and consequent injury of the delicate spinal marrow contained in the spinal canal.

The two upper vertebræ of the neck are specially modified for bearing the head, and for the performance of the more extensive movements in this region.

THE SACRUM, or rump-bone, is strong and massive, and well adapted to form the base and support of the column. It gives attachment on either side to the *hip-* or *innominate-bones*, and these three, together with the *coccyx*, form a kind of basin called the *pelvis* (fig. 10). In the outer side of each hip-bone is a deep cup, called the *acetabulum*, which receives the head of the thigh-bone.

THE THORAX, OR CHEST, is a cavity situated between the neck and the abdomen. It is formed by the spinal column behind, the sternum or breast-bone in front, and by the ribs on either side. This important cavity contains the heart, lungs, and large blood-vessels, and is separated from the abdomen below by a strong muscular partition, the *diaphragm*.

THE RIBS, twelve on each side, pass round from the dorsal vertebræ behind, and give strength to the side walls of the Thorax.

The seven upper, or *true* ribs, are connected by their own cartilages directly with the sternum. The five lower or called *false* ribs; of these the upper three are connected only indirectly with the sternum; while the

two lower are quite free in front, and are termed *floating* ribs.

THE STERNUM, or breast-bone, is the broad flat bone which can be felt in the middle of the front of the chest. It has attached to it the true ribs on either side.

THE CLAVICLE, or collar-bone, exends from the outer edge of the sternum to the shoulder.

THE ABDOMEN is formed by the lumbar vertebræ and lower ribs above, and by the *pelvis* below; the cavity being completed by the muscles and soft parts. It contains the bowels and various other viscera.

THE LIMBS.—Two upper, the arms, and two lower, the legs, obviously exhibit a rough correspondence in their divisions,—the thigh and upper arm, the leg and fore-arm, the ankle and wrist, the fingers and toes.

THE UPPER LIMB is attached to the trunk by means of the shoulder-blade.

THE SCAPULA, or shoulder-blade (fig. 11), is a triangular bone, situated at the back of the thorax, and covering the upper ribs. Its point and sharp edge may easily be felt on the back in the naked body. A cup-shaped depression may be noticed at its outer angle, the *glenoid cavity*, which receives the head of the upper arm-bone.

THE HUMERUS, or upper arm-bone, is one of the long bones. Its upper end, or head, is rounded, and fits into the glenoid cavity forming the shoulder-joint. Its lower end is shaped to receive the upper ends of the two bones of the fore-arm, and forms the elbow-joint.

The fore-arm is composed of two bones, the *Radius* and the *Ulna* (fig. 12).

The Radius is attached to the humerus and ulna above, and expands below to carry the hand.

The Ulna is connected by a hinge-joint with the lower end of the humerus, and projects backward to form the prominence at the back of the elbow-joint, called the *olecranon.*

THE CARPUS, or wrist, is composed of eight small bones arranged in two rows, and with the lower end of the radius forms the wrist-joint (fig. 13).

The palm of the hand is formed by five longer bones, called *metacarpal bones*, which fit on to the second row of the small wrist-bones.

THE PHALANGES, or digits, constitute the fingers and thumb. Each finger has three digits, the thumb two. The last digit carries the nail.

THE LOWER LIMB is attached to the trunk by the *pelvis.*

THE FEMUR, or thigh-bone (fig. 14), is the longest and strongest bone in the body. Its upper end or head is rounded, and is received into the deep cup of the *acetabulum*, in which it is retained by a strong ligament called the round ligament. Its lower end terminates in two semicircular prominences called the outer and inner *condyles*, which rest upon the upper end of the leg-bone, and form the knee-joint.

THE PATELLA, or knee-pan (fig. 15), is a small three-sided bone lying in front of, and forming part of, the knee-joint; it is connected below with the leg-bone by a strong ligament.

THE TIBIA and FIBULA are the two bones of the leg (fig. 16).

The former is by far the stouter and stronger of the two, its front margin is very sharp and is known as the shin. The lower ends of the tibia and fibula project strongly on either side of the ankle-joint.

The foot (fig. 17) is built on the same plan as the hand.

THE TARSAL bones are seven in number.

The largest, or *os calcis*, projects backward to form the heel; another fits between the lower ends of the tibia and fibula in the ankle-joint, and the rest are arranged in rows to carry the next set of bones, the five metatarsal bones. These have each their three digits, which form the toes, except the first metatarsal bone or great toe, which, like the thumb, has only two digits.

The hand and foot are admirably adapted for the work which they have to perform. In the hand, the bones have greater mobility for the purpose of prehension, or grasping, and the thumb can be easily apposed to any of the fingers. In the foot, they are firmly massed together to form a good support, and in walking the arch of the instep, situated between the heel and the ball of the great toe, enables the weight of the body to be received and distributed without risk of jarring or jolting.

THE JOINTS are devised to give easy movement between the bones which enter into their formation. There are several different kinds of joints. The hip-joint is a good instance of the *ball-and-socket joint*, and is one of the most secure; the shoulder-joint, of the same kind, is much more liable to displacement on account of the shallowness of the receiving cavity.

Another form of joint is the *hinge-joint*, an instance of which occurs in the eblow. The ends of the bones which move one upon the other inside the joints have a thin covering of gristle or *cartilage*, and are enclosed in a kind of sac, which also lines the side walls of the

joint, and contains a thin oily fluid, the *synovial* fluid, which lubricates the interior of the joint. In addition, the bones are held together by firm bands and covering of strong membrane, called *ligaments*, which serve to keep them in their proper position. The movements of the joints are in great measure limited by the shape and nature of the bones of which they are composed; some joints, like the shoulder, having very free movement in almost all directions; others, as the elbow, being more confined. Extension or straightening, flexing or bending, rotation, and movement to one or other side comprise most of the ordinary movements of a joint.

Muscles, or flesh, constitute a large portion of the soft parts of the body. By means of these are produced all the movements of which the organism is capable. A muscle is connected with the bone at one or both ends by a tendon; if one of these muscles be carefully traced out near a joint, one end will be found to be attached to the upper bone, and the other end to the lower bone. Now, when a muscle acts, it becomes thicker and also shorter, thus its ends approach nearer together, and with them the two bones to which these are attached, and so movement is produced at the joint. All movements are produced by the shortening or contraction of the muscles, and this mechanism is variously adapted to the requirements of the different parts. The set of muscles, by whose action a joint is straightened or extended, are called *extensors*, those which bend the joint are called *flexors*. The muscles are of two varieties: *voluntary* and *involuntary*.

The Voluntary muscles act under the influence of the will; by them such movements as walking, grasping, etc., are produced.

THE INVOLUNTARY muscles are independent of the will; for instance, the heart, and the muscles of the alimentary canal, arteries, and viscera.

FAT, or ADIPOSE TISSUE, exists in the body in various situations, and there is in all persons between the skin and the muscle a layer of varying thickness. It is also stored up in other part of the interior of the body, assists in preserving the bodily warmth, and is in a measure an indication of the state of nutrition of the individual.

The Internal Organs.

The internal organs are contained in the interior of the several cavities which have been mentioned as included by the bones of the skeleton and the soft parts. They are grouped into different systems according to the nature of the work which they have to perform, thus:—

The Nervous System.
The Respiratory System.
The Circulatory System.
The Digestive System.
The Excretory System.

THE NERVOUS SYSTEM comprises the brain, spinal cord, nerves, and the sympathetic system.

The Brain and Spinal Cord constitute the central organs of the nervous system. They are contained in the long cavity and canal formed by the bones of the skull and the arches of the vertebræ which have been already described.

The Nerves, slender white cords, serve to connect the central organs of the nervous system with all the distant parts of the body, tissues and organs of all kinds.

The Sympathetic System to a great extent governs and controls the working of the internal organs in conjunction with nerves from the brain and spinal cord. It forms a chain of

small masses of nerve matter and nerve-fibers on either side of the vertebral column, and from it numerous fine threads pass off to the different internal organs and along the vessels.

THE RESPIRATORY SYSTEM.—The organs of respiration are the lungs.

Lungs.—They are two in number, and occupy by far the greater part of the cavity of the thorax, lying on each side of, and the lower part of the left lung partially covering over, the heart. The air-passages commence at the mouth and nose, and comprise the *larynx*, or voice organ, the *trachea*, or wind-pipe, and the two *bronchial tubes*. The larynx and the wind-pipe may be easily felt in the middle line of the front of the neck. The cartilage of the larynx is very prominent, and is popularly called "*Adam's Apple.*"

THE CIRCULATORY SYSTEM.—The main organ of the circulation is the heart.

The Heart is situated in the middle lower left of the thorax. It is an involuntary muscular organ, and pumps the blood into the vessels, which are distributed through the most distant parts of the body. How true to nature are the scriptures, that tell us that out of the heart are the issues of life. Those vessels which carry blood *from* the heart are called *arteries;* those which return it *to* the heart are called *veins.*

THE DIGESTIVE SYSTEM commences at the mouth where mastication is effected. The food is then conveyed down the *œsophagus*, or gullet. This tube lies in the neck, behind the wind-pipe, and in the thorax, close to the spine. It passes through a hole in the *diaphragm* and opens into the stomach.

The Stomach is a bag in which the food remains for some hours; it opens into the intestines, or bowels, which finally terminate in the rectum.

The Bowels form a tube between thirty and thirty-six feet in length, through which the food is slowly passed along by a wormlike movement. They lie in coils, and occupy a large amount of the abdominal cavity.

The Parotid and *Submaxillary Glands* are salivary glands or organs which aid digestion, the former situated near the ear, the latter in the floor of the mouth. Each gland has a duct, or tube, through which the fluid is conveyed into the mouth.

The Liver is not only the largest organ but is one of the most important in the human body. Its weight in the healthy adult is about four pounds; it is brownish-red in color, occupying the right upper quarter of the abdominal cavity, having a most complicated structure and a very momentous function.

Shaped somewhat like an inverted bowl, with its convex surface fitting into the cavity of the diaphragm, while its concave surface lies in contact with the intestines, stomach and right kidney.

It is not in one whole mass, but divided by a firm ligament into two unequal parts, and from its under surface three small pieces project; from its under surface is attached a small sack, called the *gall-bladder*, which serves as a reservoir for accumulated bile. This sack is frequently the seat of a very painful inflammatory disease, attended with the formation of solid calcareous material, called gall-stones.

Like all the other abdominal organs, the liver is completely covered by an expansive membrane called the *peritoneum*. The liver is abundantly supplied with veins, arteries, nerves and lymphatics; the essential part of this structure is that of a secreting organ which contains millions of small bodies called *hepatic lobules*,

about a tenth of an inch in diameter, composed of liver cells, which are closely packed together throughout the organ.

Each lobule contains near its border a small branch from the large portal vein, that brings to the liver from the stomach, spleen, pancreas, and small intestine, the blood that has been charged with the products of digestion.

Each of these branches send out smaller branches to the interior of the lobule; there they unite in one vein, to connect with the general system of the liver veins. The product of these cells of the lobules is a brownish-green fluid called bile, which is gathered up by the minute bile-canals surrounding the cells, then delivered into larger canals, and finally discharged into a large duct or canal, which passes from the lower surface of the liver into the upper part of the small intestine.

It is in the obstruction of these minute cells of the liver, either from overeating or habitual use of alcoholic stimulants, that is the cause of its disarrangement, and that of other important organs; in fact, of the whole system, starting with fermentation, then irritation, and inflammation follows, which, if allowed to continue, becomes a slow but sure poison to the entire organism.

The *bile* is a very complex substance, consisting of important mineral salts and organic matter, which plays a very important part in aiding the process of digestion and assimilation.

An adult of average size and weight secretes about two pints of this fluid daily. One of the important functions of the liver is that it serves as a reservoir for glycogen, or animal sugar, brought to the liver in the form of glucose by the large portal vein from the digestive organs.

The glucose are being continually changed by the chemistry of the liver into glycogen, then back into glucose when needed, which are carried in the blood to each portion of the body where required.

The joy of living depends on the liver; many a good disposition has been ruined by it; even the best liver needs watching. Look well to the liver!

The Pancreas is a small triangular-shaped gland about six inches long and one and a half inches wide; it is placed transversely across the abdominal cavity, situated between the first section of the small intestine and spleen; its weight in the adult is from four to six ounces.

Although it is small, it is exceedingly active, and absolutely essential to assimilation and digestion. This gland pores its secretion into the upper section of the small intestine, immediately below where the bile is discharged from the liver.

Its secretion is called *pancreatic juice*, and contains albuminoid substances, which have powerful action in emulsifying the fats that have come through the stomach to the small intestine undigested.

This fluid also contains powerful ferments, which convert the starchy elements of food into sugar and prepare both the starches and fats for better assimilation and absorption.

It also has a certain amount of powerful action in digesting albumen; in the healthy adult more than a pint of this fluid is secreted daily by this active little gland.

As starches and fats from the principal part of the food of a very large majority of the inhabitants of the civilized world, we can readily see what a tremendous influence this busy little organ must have on animal life.

The Spleen is somewhat like the liver and pancreas, but, unlike the other two organs, it is a gland having its secretion, but without a duct or canal by which its secretion is discharged.

This organ is one of a group of ductless-glands, which includes the *pineal, thyroid* and the *supra-renal capsules.*

Just what the exact functions of the spleen are we do not yet fully know; it is certain, however, its secretion is taken up by the blood currents and carried to the different parts of the body and utilized, where it is most needed. It is the belief of many physicians that it has some important influence upon the digestive process, as an extract obtained from the spleen of animals is frequently used in the treatment of indigestion.

The spleen, like the other organs of the body, is subject to disease and tumors of various kinds. In malerial climates, and where typhoid fever is prevalent, it is frequently greatly enlarged, and often becomes disorganized.

The spleen resembles a bean in shape; it lies in contact with the extremity of the stomach, below the diaphragm, and close to the bend of the large intestine.

In the adult the spleen is about five inches long, three to four inches wide, an inch and a half thick, weighing about seven ounces.

Its chief importance is that it is one of the sources of, or the origin of, the white blood corpuscles.

In addition to the separate digestive organs, the wall of the stomach and intestine contain small glands, which secrete fluid for digestive purposes.

The Lacteals and *Lymphatics* are distributed in the walls of the alimentary canal, and assist in absorbing the nutrient material after it has

been prepared by digestion. The food enters these lacteals and is ultimately collected into a tube called the *thoracic duct*, which ascends the back of the abdomen near the spinal column, and finally opens into one of the large veins near the neck. The lymphatic vessels in their course frequently join small masses of gland-material called *lymphatic glands*, in which they become closely connected with small blood-vessels.

The Excretory System comprises the glands and their accessory parts, by means of which the blood is enabled to get rid of the waste products.

The Skin contains in its deeper parts numerous small glands, sweat-glands, which excrete the fluid called *sweat*, or perspiration.

The Urinary Organs comprise the kidneys, ureters, bladder, and urethra.

The Kidneys are the largest and most important of the excretory glands. They are two in number, of dark-purple color, and in shape like a French bean. They are situated in the loins at the back of the abdominal cavity, one on either side of the lumbar vertebræ of the spine. A duct called the *ureter* passes down from each kidney and opens into the *bladder*. The bladder forms a bag, which lies in the pelvis in the lower abdomen. The urine is secreted by the kidneys, passes down the ureters, and is collected in the bladder, being got rid of from time to time through the urinary passage, or *urethra*.

Work and Waste.

During life the body, or some part of it, is constantly moving and performing work, either obviously with the voluntary muscles, or less appreciably, as in the beating of the heart, the movements of respiration, and other vital ac-

tions which continue during sleep. This mechanical work involves a loss or expenditure of material, and a giving off of heat attended with the production of waste substances, such as carbonic acid and water, a chemical process similar to combustion. In order to prevent wasting, new material has to be supplied in the form of food and water; and in order to preserve the heat of the body, the supply of oxygen must constantly be renewed, but waste-products injurious to it need to be removed.

The same principles may be applied to the constituent parts of the body; a single muscle, such as the heart or biceps, in doing work gives off heat, water, carbonic acid, and other waste-products, and loses substance. It then requires to be built up again with new material, and to receive fresh supplies of oxygen, while the waste material has to be got rid of. The processes of combustion, nutrition, and excretion are thus brought into play in every muscular contraction.

Blood and Capillary Circulation. — The changes which have just been described as occurring during a muscular contraction are brought about by the agency of the blood. The muscular tissue is permeated at every part by minute thin-walled tubes in which the blood circulates. The small arteries break up in the muscle, and divide and subdivide to form a fine branching net-work of minute tubes or capillaries; these collect and form into a small trunk, the vein, which returns the blood to the heart. The muscle is by this means constantly supplied with a stream of fresh blood. All the tissues of the body are in like manner permeated by capillary blood-vessels. These can be easily studied by examining under the microscope the web of a frog's foot arranged in a

suitable manner, when the blood can be seen coursing through the small channels (figs. 20, 21).

The blood is kept moving through the body by the action of the heart, which pumps out a certain quantity into the arteries at each beat, pushing onward the column of fluid through the already full vessels into the capillaries. The veins receive the blood, and their walls are provided at intervals with minute pocket-valves, which are attached so as to permit the passage of the blood toward the heart, but which become filled out and obstruct the vessel if the blood flows in a backward direction (fig. 22).

THE BLOOD when drawn from the body in moderate amount is a fluid of deep-red color, but it is pale when seen in a thin layer. If a drop be examined under the microscope (fig. 23), it will be seen to contain a multitude of minute bodies, or corpuscles, floating in the liquid part. These *corpuscles* are of two kinds, red and white. The red are the most numerous; they are very minute, of circular form, and flattened on either side, like a disc, when seen separately; but they have a great tendency to cling together and look like rolls of coins. They impart the red color to the blood, and have the power of absorbing oxygen in large quantities, and distributing it to the various tissues of the body. The white corpuscles are larger than the red, but only exist in the proportion of three or four white to a thousand red. They are round, not flattened, but have the power of moving and of altering their shape.

CLOTTING OF THE BLOOD.—Blood is fluid when first drawn, but soon becomes solid, unless it is stirred up, or constantly whipped. By beating or whipping up, a stringy substance called fibrin is removed, without which it cannot clot. If blood is allowed to remain standing for

some time in a basin, the clot forms and then gradually contracts, while a thin yellowish fluid exudes, which is called the "serum." The clot itself is formed of corpuscles held together by the fibrin. While circulating through the heart and healthy vessels, the blood remains fluid; but in certain diseases, and under some conditions, it clots in the vessels and causes grave symptoms. Clotting of the blood is one of the most important agents in the arrest of hemorrhage.

Blood Serum.—If the fluid which has exuded from the clot be put in a test-tube, and heated over a spirit lamp, it will soon become opaque, thick, and finally almost solid. Like the white of egg, it coagulates on boiling, because it contains the substance known as *albumen*. Albumen is a *proteid* substance, and is chemically composed of nitrogen, carbon, hydrogen, and oxygen; when burnt with oxygen, this latter unites with the carbon to form carbonic acid, and with the hydrogen to form water, and the nitrogen and hydrogen combine to form ammonia. This combustion, or process of exidation, of albumen is constantly going on in the tissues, and in the muscles whenever they contract, and is accompanied by the production of ammonia, carbonic acid, and water. The blood-corpuscles contain, besides albumen, small quantities of other chemical elements, such as sulphur, phosphorus, iron, potassium, sodium, calcium.

Nutrition.—The blood supplies material for the nutrition of the tissues, carrying oxygen in the red corpuscles for oxidation purposes, and a store of material of various kinds, proteids and minerals, to help in building up and restoring the worn-out parts. The blood also requires to be fed, since it is constantly deprived of its oxy-

gen and nutriment. Provision is, therefore, made for the restoration of its oxygen by means of respiration, while the nutritive material is supplied from the alimentary canal.

The capillaries which line the walls of the minute air-vesicles of the lung are only separated from the air by the thinnest membrane, and the red corpuscles are thus enabled to absorb the oxygen from the air, carrying it to the tissues. The blood is also fed by the food after this has been digested and made soluble during its passage through the alimentary canal. The capillaries are disseminated through the walls of the different parts of the digestive tract, ready to suck in the nutritive fluids. Water is easily absorbed in large quantity to assist in supplying the fluid part of the blood, and some of the minerals and sugar are easily soluble and pass into the blood in a fluid form. The majority of foods, as meat, bread, starchy materials, fats and oils, have to be submitted to the secretions of the alimentary canal, and undergo digestion before they can be absorbed.

The term *osmosis* is used to denote the property possessed by substances of passing through an animal membrane in a fluid or gaseous form, and it is by this process that the oxygen in the lungs, and the nutritive material in the alimentary canal, pass into the blood through the thin walls of the capillary blood-vessels. By similar means the interchanges between the blood and the tissues take place, only here the blood gives up its oxygen and nutriment to the tissues.

Excretion is the process by which the body gets rid of the waste materials. In the oxidation or combustion of the tissues, such as takes place during a muscular contraction, certain waste-products are formed of no further use in the economy. Some of these—namely, carbonic

acid, ammonia, and a substance, urea, closely allied to ammonia—are actually injurious, when accumulated in any quantity. The water, which is also a product of combustion, is got rid of in considerable quantity, holding in solution much of the soluble waste material. The waste materials are excreted from the blood mainly through three channels: the lungs, the skin, and the kidneys:—

The lungs, at each expiration, send out air charged with carbonic acid and water.

The skin, by means of small glands embedded in it, called sweat glands, pours forth water containing in solution a small quantity of salts.

The kidneys excrete the greater part of the water, and also the ammonia, urea, and salts.

By these different means the blood coming from the tissues charged with waste-products becomes purified after it has passed through the capillary circulation in these excretory organs.

Temperature of the Body.—A large amount of heat is produced by the constant combustion of the food and tissues, and is distributed to all parts of the body by the blood-current. On the other hand, by the radiation of heat from the surface of the body, and by the warming of the cold air which is received into the lungs at every breath, the blood is robbed of its heat. There is then a source of constant loss as well as a constant supply of heat. If the temperature of the body in a healthy person be noted with a thermometer at different times in the twenty-four hours, it will be found to be approximately at 98.4° F., showing that there is a regulation of heat in addition to production and loss.

The temperature of the interior of the body

taken in the mouth or rectum is nearly a degree higher than that of the surface, taken in the axilla, or arm-pit. Again, there is a slight variation between the morning and evening temperature, the latter being, perhaps, half a degree higher. The temperature is commonly lowest at between four and six o'clock A. M., a time in the sick and aged when the vitality is at its lowest.

In fevers and inflammation there is an increase in heat-production, and loss of balance in regulation, so that the temperature rises, and perhaps varies to the extent of several degrees at short intervals (see *Fever*).

CHAPTER III.

DISEASES OF THE NERVOUS SYSTEM.

The Nervous System:—Brain—Spinal Cord—Membranes—Nerves—Motion—Sensation—Paralysis—Loss of Sensation—Reflex Action.

Symptoms and Management of Brain Paralysis:—Coma—Spinal Paralysis—Bed-Sores—Nerve Paralysis—Infantile Paralysis—Locomotor Ataxy—Meningitis—Cerebral Tumors—Epilepsy—St. Vitus' Dance—Hysteria—Delirium—Delirium Tremens—Insanity.

Introduction:—The Nervous System.

The central organs of the nervous system, the *brain* and *spinal cord*, are invested with membranes, which form a complete covering, and also line the interior of the bony cavity in which they lie.

THE MEMBRANES are three in number: the *Pia Mater*, the *Arachnoid*, and the *Dura Mater*.

(a) *The Pia Mater*, the innermost, is a delicate membrane, containing a large number of fine blood-vessels, which penetrate the substance of the nerve-matter of the brain and cord.

(b) *The Arachnoid* lies between the pia mater and dura mater, and secretes a thin fluid called the *Arachnoid fluid*.

(c) *The Dura Mater*, a strong, tough membrane, lining the interior of the skull and spinal canal, forms a protective covering to the delicate organs, and contains numerous blood-vessels.

THE BRAIN is divided into the Cerebrum (or Large Brain), the Cerebellum (or Little Brain), and the Medulla Oblongata (fig. 25).

(a) *The Cerebrum* forms the greater mass, and is divided lengthwise by a deep cleft or fissure into two hemispheres; a band of nerve-substance, called the *corpus callosum*, joins these together.

The outer surface of each hemisphere is mapped out into a number of folds, or convolutions, separated by clefts. In the interior, the brain-matter is white, and encloses the central cavities, which are a continuation upward of a small channel in the center of the spinal cord. Normally these cavities contain a small quantity of fluid, like the arachnoid fluid.

The nerve-substance, or "gray matter," covering the convolutions on the exterior of the brain is of gray color, and differs from the deeper parts, which are white.

From the under-surface of the brain may be seen white threads passing through the small holes at the base of the skull. These are the cerebral nerves; amongst them are the nerves for smell, sight and hearing.

(b) *The Cerebellum*, or little brain, lies beneath the back of the large brain, and is also partially divided into halves.

(c) *The Medulla Oblongata* is the continuation upward of the spinal cord into the brain. It is about one and a half inches in length, is situated at the base of the brain just above the foramen magnum (see p. 23), and is covered by the cerebellum. A large number of important nerves leave the brain at this spot, and the nerve-matter in its interior is so intimately connected with the regulation of the vital functions of the heart and lungs that destruction of the medulla is immediately fatal.

THE SPINAL CORD is a column of gray and white nerve-matter from sixteen to eighteen inches in length, extending from the top of the

spinal column to the upper lumbar region, where it terminates in a fine thread. The membranes covering it are similar to those which have been described as investing the brain.

In the center of the spinal cord is a minute channel which extends along its whole length, and opens above into the cavities of the brain. Two fissures partially divide the cord into halves from above downward—one on the front, the other on the hind surface. Attached on each side are two parallel series of bundles of fibers, one set situated in a plane in front of the other. They join together, and pass out of the spinal canal through apertures between the adjoining vertebræ. These two sets of fibers are called the *anterior* and *posterior roots*, and they join together to form a *spinal nerve*. There are in all thirty-one pairs of spinal nerves.

The Gray Matter lies in the interior of the cord, and when cut across has the shape of a crescent or half-moon in each half, joined by a central band. One horn of the crescent lies in front, and is connected with the fibers of the anterior root, the other receives the fibers of the posterior root of the spinal nerve (fig. 26).

The Spinal Nerve, after leaving the spinal canal, divides and splits up into branches, which terminate in the muscles and skin.

In the performance of any voluntary movement, such as that of a limb, all three parts of the nervous system—brain, spinal cord, and nerves—are concerned. The motor impulse, as it may be called, is started in the gray matter of the convolutions of the brain, traverses the tracts of white matter in its interior, through the medulla, down the spinal cord, and emerges at one of the anterior or motor roots of the spinal nerves, passing to the particular mus-

cle, or set of muscles, which performs the necessary movement. It is possible by means of experiment to trace to a considerable extent the course taken by this impulse. For instance, it is found that the movements of one side of the body are chiefly governed by the opposite side of the brain, so that the nerve impulses must cross at some part. In the case of the motor impulses, this crossing is found to take place in the medulla oblongata.

If the path of the motor impulse is interrupted, either in the brain cord or nerve, loss of power of voluntary movement or *paralysis* occurs: thus, if the nerve to a muscle be cut, the muscle will be paralyzed. In the same way, if the spinal cord be crushed, all the muscles below that part will be paralyzed. Again, if the motor path in the right hemisphere of the brain be diseased or damaged, there will be paralysis on the left side of the body.

The motor impulses have been shown to travel from the brain to the distant parts. A sensory impulse, or sensation, on the other hand, passes in the opposite direction. The prick of a needle on the skin sends an impulse traveling up a sensory nerve by the posterior root to the spinal cord; here it crosses over to the opposite side of the cord, and ascends to the brain. If a sensory nerve is cut, there is loss of sensation, or *anæsthesia*, in the part it supplies; or, if the cord is destroyed, the body loses sensation below the injury. Destruction of the sensory path in the brain causes loss of sensation on the opposite side of the body.

Thus, the spinal cord is seen to be a conductor of impulses both to and from the brain, but it also has, under certain conditions, the independent and peculiar power of reflecting a sensory as a motor impulse, a process to which

the term *reflex action* has been applied. If, for instance, we tickle the sole of the foot of a patient who has received an injury damaging the spinal cord, the leg is immediately drawn up or moved; yet the individual is unconscious of any sensation, and is quite incapable of voluntary movement in that limb.

Nervous Diseases: Their Symptoms and Management.

The ordinary forms of nervous diseases with which a nurse should be acquainted may be arranged, for the sake of convenience, into Paralytic Affections; Chronic Diseases of the Spinal Cord; Meningitis and Cerebral Tumors; Epilepsy, Chorea, Hysteria, and Insanity.

(A) *Paralytic Affections.*

The following are common instances of paralytic affections:—

Hemiplegia, or Brain Paralysis;
Paraplegia, or Spinal Cord Paralysis;
Neuritis, or Nerve Paralysis.

HEMIPLEGIA (= a stroke on one side, or one *half*, of the body), *Apoplectic fit*, or a *stroke*, are terms constantly applied to this form of paralytic seizure.

Symptoms.—"The onset is sudden, and usually due to the bursting of a blood-vessel or the blocking of a vessel in the brain. The person may be in good health at the time of the attack, when suddenly he feels pain in the head and falls on one side, or, as frequently happens, falls down on getting out of bed. One side of the body is found to be paralyzed, and perhaps to have lost sensation. The face may be drawn on one side, and if the paralysis is

on the right side there is often loss of speech, or *aphasia.* The attack may be attended with loss of consciousness, complete or partial, or the senses may be perfectly retained. In most cases, the loss of consciousness is temporary, but the paralyis continues for some time afterward, gradually lessening until power is restored; or else the limbs remain in a state of incomplete recovery, accompanied, perhaps, with stiffness, contraction, or trembling.

"In severe cases, the loss of consciousness is more profound and increases, the breathing becomes heavy and stertorous, or "snoring," the face grows pale or livid, and after a time the patient dies."

Coma.—The term "coma" is given to this condition of profound unconsciousness. In many cases of nervous disease, or other diseases in which death takes place through the nervous system, it is preceded by the onset of coma.

"During apoplectic fits the temperature remains unaltered or rises slightly, but in some fatal cases death is preceded by a considerable rise in the temperature."

Management.—"The patient should be undressed with as little disturbance as possible, and placed in bed with the head slightly raised on a pillow. No stimulant need be given, especially if there is any insensibility. If there is profound coma with much stertorous breathing, and accumulation of phlegm in the throat when the patient is lying on the back, he may be turned over partially on one side, and kept so by means of pillows or some form of support. If the coma continue for any length of time, it is important also to ascertain if any urine has been passed, as the bladder will become overfilled, and constantly overflow, keeping the bed wet. The medical man should be informed of

this and also of the condition of the bowels, that he may determine whether it is necessary to draw off the urine, or order an enema. As consciousness returns, there may be vomiting and some faintness, with confusion of the intellect, and if there is aphasia the patient is unable to explain what he wants, failing to find the right words to express himself, or making use of wrong ones. The nurse will soon be able to understand him by means of signs. The nature of the diet, and the stimulant (if any is necessary), will be prescribed by the medical man. Milk or some other form of fluid nourishment may be given at first, and this, if there is any paralysis of the muscles of the face, may be noticed to dribble out of the mouth on the paralyzed side.

"There is nothing special in the after-treatment that requires notice. The patient is, of course, more or less helpless, and care should be taken to keep the paralyzed limbs warm, as they are apt to become cold. If there is loss of sensation in a limb, especial care should be taken in the use of hot-bottles or other hot appliances not to scald the skin, as the patient is quite unable to judge of the temperature; otherwise very troublesome sores may be produced. The nurse should first ascertain the temperature with the back of her own hand, and interpose a blanket or flannel between the bottle and the patient's limb.

"Convalescence is often slow, and in favorable cases the leg recovers before the arm; in unfavorable cases, great weakness and loss of power remain, and the limbs become stiff, contracted, and useless; or the memory is defective, the mental powers fail, and imbecility supervenes. There is often a tendency to a recurrence of the fit."

PARAPLEGIA, or spinal paralysis, may be sudden, and is due to inflammation of the cord, injury or disease of the spine, or anything causing damage to the cord.

Symptoms.—In paraplegia there is loss of voluntary movement and of sensation below the diseased part, but reflex action may be obtained in the paralyzed limbs. There is sometimes pain at or above the spot affected, extending round the body.

Loss of control over the bladder and rectum is also observed; the urine dribbles away, or the bladder may become full and then overflow, and the bowels may act unconsciously in the bed.

There is, further, a tendency (much greater in some cases than in others) to the formation of sore places, or *bed-sores*, in the paralyzed regions, on the back or sacrum, hips, shoulders, or heels, or any prominent part which presses against the bed.

The course of the disease is usually long, and the symptoms are very distressing. In the more favorable cases recovery, complete or partial, takes place. In others, the inflammation spreads upward as high as the neck, and death occurs from paralysis of the diaphragm and respiration, or gradual exhaustion supervenes from bad bed-sores, inflammation of the bladder, or lung complications.

The temperature is often above the normal, and when the disease affects the higher parts of the spine, remarkable elevations of the temperature are apt to occur.

Management.—There are no cases more difficult to nurse well than bad cases of paraplegia, with great tendency to bed-sores. The sores may have begun or advanced to any stage in neglected cases before the nurse has to deal with

them, and to cure them may seem hopeless. At first, the constant dribbling of the urine and incontinence of fæces greatly increase the liability to their formation, and together with the complete helplessness of the patient combine to make their avoidance almost an impossibility. But a very great deal may be done, and if the case is well managed from the beginning, and the proper appliances can be obtained, success is almost certain.

Prevention of Bed-Sores.—Of first importance is prevention, and to attain this two main points should be attended to: to remove pressure; to keep the patient dry.

1. *To Remove Pressure.*—The first may be best managed by placing the patient on a water-bed, or an air-bed, at the commencement; failing this, a water-cushion or ring-shaped air-cushion should be placed under the pelvis, and by this means any undue pressure at one spot will be prevented. If none of these appliances are to be obtained, the patient's position in the bed must be altered frequently, and pressure removed by ring-shaped pads adapted to encircle the prominent bone or tender spot.

2. *To keep the patient dry*, a utensil of suitable shape may be arranged to catch the urine as it constantly dribbles away, and a draw-sheet smoothly laid under the pelvis, and moved when requisite (see *Draw-Sheet*).

The nurse should every day examine the back for tender or reddening spots, and should cleanse the parts with soap and water and dry them thoroughly, dusting with zinc-, starch-powder or finely powdered borax; or they may be rubbed with spirits of wine or brandy, which helps to harden the skin. Perfect cleanliness, dryness, and constant attention to the draw-sheet are essential. In any case, if the skin

become red, or rawness appear, or if black spots or sloughs form, the medical man must be informed, as suitable dressings will be required, and the treatment should be carried on under his directions.

The condition of the urine requires attention, as the bladder is very liable to inflammation, a state which is usually associated with turbid and offensive urine. The catheter has often to be used, and the bladder washed out. The urine should be saved, in order that it may be examined or analyzed from time to time. One of the first changes noticed is that it becomes alkaline, and turns red litmus paper blue; a smell of ammonia may be also observed, and a white sediment is apt to form at the bottom of the utensil; all these are indications of bladder-trouble.

Neuritis, or nerve paralysis, is due to inflammation or disease of the spinal nerves. The most common cause is constant overindulgence in alcohol, and the affection more often attacks intemperate women than men. It may, however, also occur as the result of lead poisoning, cold, or an attack of diphtheria.

Symptoms.—It commences with pains and tenderness in the legs or arms, with gradually increasing loss of power. It may progress until the patient is quite unable to walk, with tenderness and loss of sensation in the feet and legs; the arms become affected in the same way, and more or less distortion of the limbs ensues. The intelligence is often obscured, the appetite impaired, and the digestive organs disordered.

The greater number of patients recover partially or completely, even when bedridden and almost entirely paralyzed, if proper treatment be adopted sufficiently early. In alcoholic cases total abstinence is essential.

Management.—In the management of these alcoholic cases, especially in private houses, the nurse has to adopt every precaution, and to be constantly on the alert to ascertain that the patient (generally a female) does not continue to indulge her craving by means of friends or servants, as she will pursue any means to get the stimulant in some shape, and will take spirits of wine or *eau-de-Cologne*, if nothing else is obtainable.

The feeding is very important, and as the appetite returns a liberal diet is usually recommended. There is often much wasting of the muscles, and general emaciation in these cases, and if the patient has to be confined to bed for any length of time, a water-bed is desirable. Mental derangement of various forms is not an uncommon complication in this disease, but is usually of a temporary character.

When improvement commences, assistance should be given to the paralyzed limbs and wasted muscles by shampooing, massage, and electricity, all of which have commonly to be applied by the nurse. To be thoroughly competent to manage these cases, therefore, a nurse should have studied both massage and electricity (see *Batteries* and *Massage*).

(B) *Chronic Diseases of the Spinal Cord.*

This class includes such affections as:—

Chronic Spinal Paralysis;
Infantile Paralysis; and
Locomotor Ataxy.

Paralytic Forms.—In these the chief symptoms are wasting and loss of power in particular groups of muscles, or the muscles of one extremity, and in extreme cases of nearly all the voluntary muscles in the body.

The paralysis is often attended with distortion of the limb, due to the contraction of the unparalyzed muscles, or the limb becomes rigidly bent at the joints, or there is shaking or tremor which cannot be controlled.

Infantile Paralysis is a common cause of the many instances of club-foot which have to be dealt with surgically, and its onset is usually attended with a feverish attack, after which there is generally weakness in one or more limbs.

Management.—The treatment of these paralyses frequently involves rubbing or electrical applications to keep up the nutrition of the paralyzed muscles. In children, the distortion requires special boots or splints, or perhaps the division of tendons before it can be rectified.

Locomotor Ataxy is the name given to a common disease of the spinal cord, because of its most prominent symptom, the patient's inability to control or direct the movements of his legs in walking.

Symptoms.—There may be various degrees of want of muscular control, from slight difficulty in walking in the dusk, in turning round quickly, or in standing upright with the feet together and the eyes closed, to the most exaggerated want of control of the muscular movements, the legs being jerked out in all directions in the attempting to walk. Other symptoms are: severe pains in the limbs, or in the abdomen; impairment of sight and of sensation; and bladder disorder.

The malady is very chronic, lasting for years. In many cases there is some improvement or arrest of the symptoms, if taken in hand early; complete cure is rare; in others there is slow progression of the disease.

Management.—Pains in the stomach and bowels, and in the limbs, are often some of the most distressing symptoms of the malady, and are very obstinate. The bowel-pains are sometimes increased by constipation, which may be relieved by aperients. Mustard-plasters may be applied to the stomach or limbs.

The condition of the bladder is important, and it should be well emptied; the use of the catheter may be necessary. Sore places and eruptions which require attention may appear, lest they should enlarge and form troublesome complications.

Corns on the feet should never be cut, as deep ulcers are apt to follow.

In all nervous cases, when there is much emaciation, precautions should be taken to avoid bed-sores, and, if the patient is likely to be entirely confined to bed, a water-bed is advisable.

(C) *Meningitis and Tumors of the Brain.*

MENINGITIS, or inflammation of the membranes of the brain.—The causes of meningitis are various. In many cases it proceeds from the spreading of inflammation from the neighboring parts, either from disease of the bones, or of the dura mater of the skull. The extension of inflammation from disease of the bones of the ear inside the skull is a familiar instance. It may arise from blood-poisoning, blows on the head, or drink.

Tubercular meningitis is a very common form of the disease. It occurs often in the children of consumptive parents, and attacks adults who are the subjects of consumptive complaints.

Symptoms.—There may be considerable variety in the onset in different cases, and in the

symptoms presented; but the following may be taken as a fair example of a fatal case of meningitis, following ear-disease. A young man, who has had a discharge of matter and been partly deaf in one ear since an attack of scarlatina in childhood, is seized with violent headache and vomiting; the pulse is 100, the temperature 104°, and he has some shivering. The tongue is foul, the bowels are confined, and the appetite is bad. He is irritable in manner, resents being disturbed, and is inclined to be delirious at night, though he does not sleep. The headache is intense and persistent, there is some intolerance of light, and the vomiting comes on regardless of food. In a day or two he becomes stupid and rather drowsy, and unable to see well. The pulse has become slower, 80 or 60, and the temperature remains about the same; he is noticed to pick at the bed-clothes. A convulsive attack comes on and lasts for several minutes, and he is completely unconscious for some time after; as consciousness returns, he is found to have some paralysis on one side of the face and arm. Further attacks of convulsions ensue, and he gradually becomes more deeply unconscious; his breathing becomes stertorous and irregular, sometimes stopping for half a minute, and then becoming exaggerated He passes everything unconsciously under him, the face becomes pale and dusky, profuse perspiration breaks out, and he gradually sinks, or dies in a convulsive seizure.

Tumors of the Brain, arising from constitutional diseases, from an abscess, or from cancerous affections, give rise to symptoms of much the same kind as those referred to in meningitis, but the course is much less acute, and the disease may extend over months or even years.

Symptoms.—The headache is often very in-

tense, and may attack one particular part of the head; vomiting may be present or absent, and the general symptoms are often obscure. There may be few or many signs of affections of the special cranial nerves, such as loss of eyesight, squint, or drooping of the upper eyelid, and loss of power in any of the voluntary muscles of the body occurs, or there may be loss of memory or mental derangement, or convulsive seizures limited to certain muscles, or affecting the muscles generally.

Acute inflammatory affections of the head are very dangerous, but recovery takes place in a certain number of cases. The tubercular form of inflammation is, however, generally fatal. In some of the chronic diseases depending on particular constitutional poisons recovery takes place under treatment by appropriate drugs. In others, such as abscess and some kinds of tumors, an operation is performed by which the skull is opened and the abscess enabled to discharge, or the tumor is removed.

Management.—The room which the patient occupies should be kept quiet, cool, and darkened, especially if there is intolerance of light. Headache is often one of the most distressing symptoms of the disease, and the hair will probably have to be cut, or the head shaved, and cold applications placed on it. The application of cold to the head may best be managed by means of ice broken up into small pieces and tied up in a thin sheet of rubber, the ice being renewed from time to time. Special ice-bags made of india-rubber are often employed. Less efficient substitutes are cold water applications, or lint steeped in evaporating lotions, all of which have to be very frequently renewed. In many instances, especially with children, it is impossible to keep the ice-

bag or application in position, the head being constantly moved to and fro. If the cold application has to be persisted in, some other method must be adopted, such as an ice-cap, which fits onto the head, and through which a stream of ice-cold water can be kept constantly flowing, by means of tubes, from a receptacle above the bed into one below (see *Ice-Bags*).

The removal of blood from the head by means of leeches is sometimes required, either from the temple or behind the ear (see *Leeches*).

Feeding is best carried on by giving cold fluids, and iced drinks containing milk and soda-water, and to allay the vomiting small pieces of ice to suck are useful. An enema will probably be required for the bowels, or they may be evacuated by giving a heaping tablespoonful of phosphate of soda, dissolved in hot water, then cooled.

If *convulsive* seizures occur, the nurse should watch them carefully, noting, if possible, the part of the body in which they seem to commence, and whether they are confined to one particular part, or to one-half of the body and face, or whether they affect the body generally. Also she should observe the position of the head during the attack, and, if possible, the direction of the eyeballs, or anything else peculiar in the patient's appearance. It often happens that the nurse is the only person present who can give any intelligent account of the seizure, and her report may be of considerable value to the attending physician (see *Epilepsy*).

In the course of acute head-affections, and sometimes even a short time before death, it may happen that a patient, previously quite unconscious, wakes up and takes notice of things around him, speaks to and recognizes his friends, appearing as if he were going to re-

cover; but shortly afterward he relapses into a state of unconsciousness, from which he never recovers. This delusive amendment is not very uncommon, and is sometimes called the "lucid interval."

(D) *Epilepsy, Chorea, and Hysteria.*

EPILEPSY.—Epileptic fits are commonly divided into two classes: the severe, or *grand mal*, and the slight, or *petit mal*. The severe form is attended with loss of conscipusness and extensive spasm of the muscles. In the *petit mal* there is mere temporary loss of consciousness.

Symptoms.—The severe epileptic fit is sometimes preceded by a warning, by which the patient knows that an attack is impending. The warning, or "aura," varies in character, from mere dizziness to a sensation commencing in an extremity, or at the pit of the stomach. At the time of the fit the patient perhaps cries out, and suddenly falls down; his body and limbs become set fast in a violent muscular contraction, the head and eyes turn to one side, and the features are distorted. The face, pale at first, becomes gradually livid as the respiration is stopped, and foam mixed with blood issues from the mouth. The pupils become widely dilated as the lividity increases, and the urine is perhaps passed unconsciously. The muscles then become slightly relaxed and jerky movements occur, the respiration commences again, the lividity lessens, and the spasm is at an end. The patient remains senseless and prostrate, and often passes off into a deep sleep for some time. In awaking it is found perhaps that he has bitten his tongue, and received other wounds or abrasions from his fall.

In the slight fit, or *petit mal*, the individual loses consciousness for a brief interval, and perhaps stops in his occupation, looks strange or staring, becomes pale, and then recovers. He is often dull for a time afterward, and unable to recollect what has been happening. Occasionally he becomes violent or maniacal.

The severe and the slight fits frequently occur in the same individual. The *petit mal* is also common in children and young persons, and is apt to be mistaken for a fainting fit. Epilepsy may attack persons at any time of life, but its onset is most common at from ten to twenty years of age. It may be inherited, or it may be brought on by mental excitement or fright. There is sometimes only one attack, but more usually others follow. The night is a very common time for fits to occur. In some cases the fits do not occur again, but in the majority, once established, they are more or less likely to recur throughout life, probably lessening in frequency after middle age. The risk to life is not great, and the convulsive attack is rarely fatal. The main danger is from accidents, such as falling into the water or into the fire, or from the face becoming turned over on to the pillow, when the fit occurs during the night. The mental condition of the confirmed epileptic often deteriorates, varying from loss of memory and moral control to complete imbecility. The most serious and dangerous complication is Epileptic Mania, in which the patient becomes violent, and may commit assaults and murder.

Management.—If the fit is preceded by a warning, the patient should be quickly put into a safe position, and made to lie down, the clothes being loosened about the neck and body. During the fit nothing particular can be done

except to prevent the tongue from being bitten by placing a piece of india-rubber or several folds of a pocket-handkerchief between the teeth, the lower jaw being held down, and the tongue pushed in, if it is already caught. After the attack the patient should be allowed to sleep for a short time, if so inclined. No drink or fluid of any kind should be given during the fit. In some cases where the aura or warning begins in the hand or foot, a ligature may be tied tightly round the limb at some part above, as this occasionally prevents the convulsion. In the intervals, moderate bodily and mental exercise is good, and excitement should be avoided. Moderate diet with some animal food, abstinence from stimulants, and careful attention to the bowels is needful. An outdoor occupation is best, and one in which the individual is not exposed in dangerous situations, in case of an attack.

CHOREA, or SAINT VITUS' DANCE, is a disease that occurs usually in young persons. It is more common in girls than boys, is sometimes brought on by mental excitement, school-work, or fright, and is frequently associated with rheumatism or rheumatic fever and heart-disease.

Symptoms.—The first symptoms are often weakness and jerky movements of the limbs on one side of the body. The muscles of the face, too, are perhaps noticed to twitch, the lips are moved about, and there is a tendency to drop things out of the hand, and ordinarily quiet movements are performed in a jerky, irregular manner. All these symptoms are increased by excitement and observation, and cease during sleep. They are often accompanied by mental dulness and general debility.

In milder cases the movements are less vio-

lent, and perhaps only affect one side of the body, or are more marked on one side than on the other.

In severe cases the jerky and irregular movements become excessive, and there is complete loss of self-control; the muscles of the trunk become involved, and the body and limbs are twitched and jerked about to such an extent that they become bruised and damaged by striking against surrounding objects; feeding becomes difficult, and sleep is interfered with. There is great weakness, and the mind is affected. In a few instances the patient becomes maniacal. This condition occurs more commonly in puerperal women, or male adults in a first attack.

Young persons who have had one attack of chorea are very liable to a recurrence; but the majority get well, some in a few weeks, while in others the attacks are more obstinate. In adults the severe attacks sometimes terminate fatally; these are usually first attacks, and associated with mania or with heart-complications; sometimes the patient dies from want of sleep and inability to take sufficient nourishment, or from bed-sores.

Management.—Complete cessation from mental and physical fatigue is essential. Lessons should be discontinued, and emotional excitement and much playing with other children should be avoided. A temporary rest in bed is desirable and usually very beneficial, but should not be continued so long as to cause depression. In weak, pale children a good diet is essential. In severe cases when the movements are very violent, it is most important to prevent bruising and sore places which are very liable to occur, and prove very troublesome, or even the cause of death. For this purpose a padded room is

desirable, or, in emergency, the adjacent articles of furniture should be removed, and the mattress placed on the floor in a corner of the room, the walls being covered with cushions or mattresses, and the limbs of the patient may be protected with pads of cotton batting, and gently held in check by the nurse. The feeding is very important and often difficult. The nurse will have to feed the patient with a spoon and steady the head, and assistance may be necessary.

The bed should be kept scrupulously clean, as the evacuations may be passed unconsciously when there is much mental failure.

Hysteria is the term applied to a disordered state of the nervous system which is far more common in women than men; the term hypochondriasis being used for an allied condition in the male sex. It should be understood that the word "hysteria" implies medically a real malady, and is not employed to denote mere simulation of symptoms, or for imposture, as it frequently is by the public. It would be impossible even to mention here all the various phenomena which may occur in hysteria; in fact, there is hardly any function or organ which may not be implicated in different instances.

Symptoms.—In the more ordinary class of cases, the individual exhibits continuously some mental peculiarity, either imperfect self-control, irritability, or depression; on the other hand, in a few there is complete mental balance. Then from time to time there is a paroxysm or outbreak of hysteria, which may take some well-marked form and simulate one or another organic affection. For instance, there may be a convulsive seizure, paralysis, or vomiting.

The patient will, perhaps, complain of the

sensation of a lump in the throat, and a fixed pain in one temple, and there may be vomiting, or spitting of blood-stained juice in the morning; she may refuse all food, and deny that she has slept for nights. The bowels are usually constipated, and the monthly periods often irregular. The urine is often copious in amount and very light colored, and the patient may have the idea that she is unable to pass it. There is never incontinence. There is often a peculiar loss of sensation, affecting one limb or perhaps the whole of one side of the body, which has a remarkable tendency to change its position from time to time. There may be paralysis of one or more limbs, and rigid contractions of joints, with tenderness and great complaint of pain. Loss of voice, or a whispering voice, called "hysterical aphonia," is also common. The convulsive seizures or fits vary in character. In some the patient is boisterous, crying out and throwing the limbs and body about, but careful not to fall down and hurt herself; obviously in full possession of her senses, conscious of pain when hurt, and exaggerating the paroxysms when under observation. In others the fits have a very close resemblance to an epileptic attack, and the term Hystero-epilepsy is applied to them.

Management.—The attack will probably cease as soon as the patient is left to herself, and removed from observation, but will continue or increase as long as she is under the influence of anxious and sympathetic friends. The nurse should treat the patient with firmness and kindness, assuring her that there is no cause for alarm, and that the attack will soon subside. She may give a little water or sal-volatile, or distract her attention in some other way until she has calmed down. A cold douche of water

or more severe measures should not be employed except under medical advice.

In cases of imposture the nurse will have to watch the patient carefully, in order to assist in clearing up the doubtful symptoms; for instance, she should watch whether patients who decline their meals contrive to obtain food by other means; whether a limb supposed to be paralyzed is moved when the patient thinks she is unobserved; or if blood expectorated is produced by artificial means.

In hysterical aphonia and other hysterical affections the interrupted current is of great value, but should only be used under medical direction (see *Batteries*).

Mental Derangements.

Delirium is an acute mental derangement occurring often in the course of the specific fevers, pneumonia, or other feverish states; it is also common in brain-disease, kidney- and heart-affections, in inanition consequent on wasting diseases, and after severe hæmorrhage.

Delirium may be "quiet" or "active." In quiet delirium there are delusions of sight, the patient fails to recognize his friends, and he talks constantly in a low monotonous voice, a condition termed "low muttering delirium." In the "active delirium" the patient tries to act on his own ideas; he may get out of bed, try to walk downstairs, put on his clothes, or attempt to jump out of the window; when more violent he may attack his attendants or commit suicide.

In some there is "busy delirium," during which the patient is constantly moving about, under the impression he is at his work.

Delirium Tremens is the result of alcoholic excess, or occurs in an intemperate subject in

the course of disease or after severe injury. After a few days of disturbed sleep, loss of appetite, and irritability, the patient is attacked with delirium, horrible dreams, and visual delusions. He imagines he sees animals, insects, or devils in the room under his bed, and tries to brush them away. There is marked tremor about the hands, the lips, and tongue; and the delirium is often busy, active, violent, and associated with extreme restlessness and picking at the bed-clothes. The temperature may or may not be raised, and should in all cases be tested by the thermometer.

The majority of uncomplicated cases get well, others sink from exhaustion, an attack of pneumonia, or other causes.

Management.—Attendance on delirious patients requires the utmost tact, care, and watchfulness. The nurse should endeavor to humor them by listening to them, and must avoid annoying them by contradiction or harshness. They may often be persuaded into doing what is wanted by management, and by utilizing their own ideas.

The delirium of exhausting diseases and fevers is common at night, and may be diminished or controlled by the administration of food or stimulants at bed-time. In all cases sleep is of the utmost importance, and quiet should be obtained by the exclusion of friends, and the light may be obscured in the daytime. Tepid sponging or the application of cold to the head is often useful.

In active or violent delirium measures must be taken to prevent the patient from injuring himself or his attendants. The fire-irons, knives, razors, or crockery will have to be removed from the room, and the windows securely fixed or fitted with stays to prevent the pa-

tient jumping out. More than one attendant may be required, or men should be ready within call in case of need, especially at night-time. For violent patients it may be necessary to have resort to mechanical restraint, by the straight-jacket, and the restraining-sheet. The jacket is of canvas fastened with tapes at the back; the sleeves are made to extend beyond the fingers, and should be tied up at the ends, and further secured by a bandage round the wrist. The patient is then placed on the bed with the arms crossed, and each hand is tied to the opposite side of the bed. A folded sheet is passed across the legs and ankles and fastened to the sides of the bed. The patient is covered in the bed-clothes, and the restraining-sheet is then fastened over the top to the bars of the bedstead, care being taken not to fix it too tightly over the chest.

When all food is refused, it will be necessary to feed with the stomach pump or with a tube passed through the nose.

In delirium tremens it is of the utmost importance to the patient that he should be fed constantly, and this may be difficult as there is often great loathing of food. Stimulants must be withheld unless specially ordered.

INSANITY.—Under the heading of *Lunacy and Unsoundness of Mind* may be included various mental disorders, to which different terms are applied, according to the special characters manifested in each. Mania, melancholia, dementia, paralysis of the insane, idiocy, and imbecility are some of the more common disorders.

Management.—The treatment and management of these cases is usually undertaken in an asylum, as they cannot be satisfactorily treated at home. In cases of violence, restraint is necessary (see *Active Delirium*).

The laws relating to the custody of lunatics are very stringent, and certain formalities are necessary before a patient can be placed in a lunatic asylum.

For a pauper lunatic, application should be made to the courts of the district; and a certificate is required to be signed by a magistrate and one medical man.

In private cases it is necessary for two medical men to examine the patient separately and sign the regular certificates before he can be removed to an asylum. In cases of urgency, the signature of one medical man is sufficient for temporary restraint.

CHAPTER IV.

DISEASES OF THE RESPIRATORY SYSTEM.

The Respiratory Tract and Respiration—The Lungs — Air-Passages — Larynx — Trachea—Bronchi—Mechanism of Respiration—The Respiratory Act—Importance of Ventilation—Cough and Dyspnœa.

Symptoms and Management of Laryngitis—Bronchitis—Asthma—Pneumonia—Pleurisy—Empyema—Pulmonary Consumption—Hæmoptysis or Spitting of Blood—and other Complications.

Introduction: The Respiratory Tract and Respiration.

Reference has already been made to the scarlet-red color of the arterial blood on its way to the capillary circulation, and to the purple or dark-blue tint of the venous blood as it returns to the heart. The change of color takes place during the passage of the blood through the capillary circulation, and is due to the loss of oxygen which has been abstracted from it for oxidation in the tissues. At the same time, waste-products, such as carbonic acid, water, and urea have been entering it from all sides, so that the blood, on returning to the right chambers of the heart, is loaded with these impurities.

Respiration is the process by which the impure purple blood is purified and replenished with oxygen, and the lungs are the organs which perform this function.

THE LUNGS are two large spongy structures

of pinkish color, surrounding the heart, and occupying the greater part of the cavity of the thorax. The right lung is divided into three lobes, the left into two, and each lung has a covering of delicate membrane, called the *pleura*, which also lines the inner wall of the cavity of the thorax. The internal structure of the lung consists of a number of sacs or bladders, small air-tubes and blood-vessels, and the air finds an entrance to the interior by the air-passages, which first merit description.

The Air-Passages.—The air enters by the nose and mouth, then passes through the larynx down the wind-pipe, or trachea.

The Larynx, or voice-box, is situated at the top of the wind-pipe, and can easily be felt as a hard prominence in the front of the neck, popularly called "Adam's Apple." In its interior are the vocal cords, and the passage for air between them is a narrow slit.

The Trachea, or wind-pipe, is the continuation of the passage downward, and is provided on the front and sides with rings of cartilage, which serve to protect and keep it open. Soon after entering the chest, the wind-pipe divides into two tubes, called the *bronchi*, one going to each lung. The tubes and passages are provided with a soft lining, the *mucous membrane*, which exudes a fluid called *mucus*, serving to keep the surface slightly moist.

The Bronchus, on reaching the lung, divides and subdivides into a large number of smaller tubes, and these again divide and subdivide into still smaller ones, while the smallest passages finally end in the minute *air-sacs* which make up the spongy lung-tissue. The lungs thus consist of millions of minute air-sacs, or vesicles, with small tubes opening into them, which are covered and surrounded by blood-vessels, and

are only separated from the air in the interior of the air-sac by the thin wall of the sac itself.

The blood-vessels, or small divisions of the pulmonary artery, break up into capillaries in the walls of the air-sac, and carry the impure venous blood through this delicate membrane, thus facilitating the exchange of gases between the blood and the air in the air-sac. The carbonic acid and some other impurities are removed, and the blood receives a fresh supply of oxygen from the air, and is then returned by the pulmonary vein as arterial blood to the left side of the heart, ready to be again distributed through the tissues of the body. It will be observed that in the lung is the only instance of a vein carrying arterial, and an artery venous blood.

The Mechanism of Respiration.

It is obvious that the air in the air-sacs of the lung must lose oxygen and become loaded with carbonic acid, requiring on this account constant renewal.

The movements of respiration ensure the continuous passage of air in and out of the lungs in the following manner:—

The cavity of the Thorax is an air-tight chamber, having for its floor the roof or arch of the Diaphragm. The lungs fill this cavity, having their outer surfaces closely applied to the walls of the cavity and to the diaphragm—not being adherent, but kept in contact by atmospheric pressure.

During the process of breathing, the diaphragm is constantly ascending and descending; by its descent the cavity of the thorax is *enlarged*, and by its ascent *diminished*. The lungs follow the movements of the chest closely, be-

coming expanded when the diaphragm descends, and contracted when it ascends. This expansion and contraction of the lung causes a consequent entrance and exit of air, which constitutes *respiration.* In addition to the action of the diaphragm, there are other muscles which assist in the movements of respiration,—the most important being the *intercostal muscles,* which extend from rib to rib, and by their action draw up the ribs and help further to expand the cavity of the thorax.

The Respiratory Act is divided into two parts —*inspiration,* during which the lung is expanding, and the air being drawn-in down the wind-pipe; and *expiration,* during which the lung is contracting and air being forced-out of the wind-pipe.

In a healthy adult, the number of respirations varies from fourteen to eighteen a minute; in children, from twenty to twenty-five; while in infants the number may amount to thirty or forty in a minute. But the number of respirations is greatly increased by excitement or exertion.

Importance of Ventilation.—The expired air differs from the inspired, or pure atmospheric, air in the following particulars:—

1. *The air expired* is nearly as hot as the blood, and contains almost as much watery vapor as it can hold.

2. There has been, roughly speaking, a loss of five per cent. of oxygen, and a gain of five per cent. of carbonic acid.

3. It also contains a greater quantity of decaying animal matter.

It is estimated that about four hundred cubic feet of air are passed through the lungs of an adult taking no exercise in the course of twenty-four hours. This air is charged with car-

bonic acid, watery vapor, and decaying animal products, and deprived of a large amount of its oxygen. It is clear, therefore, that the air in a small room with people in it soon becomes quite unfit for breathing, and requires constant renewal to prevent its becoming actually poisonous. The importance of ventilation in pulmonary affections, in which the air soon becomes vitiated, cannot be over-estimated (see *Ventilation*).

Cough and Dyspnœa.

These two symptoms are of common occurrence and of extreme importance in all affections of the respiratory organs. They present peculiarities in character according to the part of the tract affected, and may occur in disorders other than those of the respiratory organs —as, for instance, in disturbance of the digestive system. It is, therefore, necessary that a nurse should pay particular attention to their special characters.

Coughing is the sound produced by a sudden and forcible expiration, arising from an irritation of the sensitive nerves distributed to the various parts of the respiratory apparatus, usually by too sudden a change of atmosphere or from exposure to wet, acting on the unhealthy or enfeebled system as the seat of the incipient disease.

Cough depends upon an impression received by the nervous center; the purpose is the removal of some irritating substance from the mucous membrane or the air passages; it may be sympathetic, from some disease of the stomach or other abdominal viscera, as frequently occurs, or from inflammation of the vocal cords and larynx.

The glottis is especially sensitive, for the pur-

pose, no doubt, of guarding the entrance to the air passages from injurious agents, dust, or other foreign substances entering them.

There is a wide diversity in the character of the cough, which receives names corresponding with the peculiarities of the disease.

We have the *dry cough* without, and *moist cough* with, expectoration. The *dry hacking cough*, resulting from irritation, which indicates a want of proper secretion; then we have the violent *spasmodic, convulsive cough*, which, if allowed to continue beyond the incipient stage, frequently becomes first acute, then chronic. It is vexatious and exhausting to the patient, as well as annoying to others who hear it; it often produces spasmodic contraction of the larynx, with a feeling of suffocation to the patient.

Don't neglect coughs and colds! They should be treated at once, while in their incipiency; if not, they often lead to serious consequences.

In laryngeal disease, the cough is often hoarse and croaking, the latter especially, if there is obstruction to the passage of air.

In bronchitis, the cough may be attended with wheezing or rattling sounds.

In pleurisy, the cough is usually short, sharp, and staccato.

In whooping-cough, a number of short coughs succeed one another, rapidly followed by a long-drawn inspiration—the same series being often repeated several times. The long-drawn inspiration may be crowing or "whooping" in character, or the whoop may be absent.

Dyspnœa, or difficulty in breathing.—In the simplest form the number of respirations is increased to twenty, thirty, or more in the minute, and the breathing is usually shallow in character, as in pneumonia.

In laryngeal disease, inspiration may be difficult, and accompanied by a whistling, crowing, or stridulous noise—a feature of great importance especially in children, as it indicates obstruction to the entrance of air through the larynx.

In bronchitis and asthma, expiration may be difficult, prolonged, and accompanied by wheezing sounds.

In some cerebral effections, or at the close of Bright's disease, and in some heart affections, a peculiar form of breathing supervenes. The respiration ceases at times altogether for a few seconds, and then recommences—being at first rapid and shallow, afterward deeper and slower, and then ceasing again.

Diseases of the Respiratory System.

A nurse should be familiar with the commoner varieties of these affections—for instance, with the inflammatory forms attacking both air-passages and lungs, including Catarrh, Laryngitis, Bronchitis, Pneumonia, and Pleurisy; also with Asthma and Pulmonary Consumption.

Catarrh, or a catarrhal cold, are the most common affections of the respiratory tract. An ordinary cold in the head is an inflammation of the mucous membrane lining the nostrils and upper part of the throat. The membrane is at first swollen and reddened, and then secretion takes place—the mucous fluid being poured out in a larger quantity than is normal. In some cases, a cold passes away without any special treatment, but it may be the commencement of a more serious illness, and should not be neglected. A neglected cold in a delicate person is liable to develop into one or other of the more

severe inflammatory disorders of the respiratory system.

LARYNGITIS is an inflammation of the larynx or voice-organ, and may result from cold and exposure or from an irritant, or it may supervene in the course of some other affection, such as tubercle or cancer.

The inflammation affects the vocal cords, causing fever with hoarseness of the voice and cough, and there may be such narrowing of the orifice that the breathing becomes difficult, as in croup.

Symptoms.—Dyspnœa, such as has been described, occurs in extreme cases; there is great distress, the face is flushed and livid, the lips are blue and the eye-balls prominent; the cough is harsh and croaking, often accompanied by mucous expectoration. The urgent symptoms have a great tendency to come on at night-time, or to increase during the night. In milder cases there is often fever with hoarseness of voice and cough, but no difficulty in breathing.

There is always greater cause for anxiety in the case of children than of adults, the urgent symptoms of dyspnœa in the former arising rapidly and soon becoming dangerous.

Management.—The temperature of the room should be maintained at 65°, and the air kept moist in the patient's neighborhood by means of steam from a bronchitis-kettle.

The bed-clothes should be kept away from the mouth and nose, and the head and shoulders should be raised by means of pillows, if there is any difficulty in breathing. But if the symptoms of dyspnœa increase, the surgeon should at once be informed, as suffocation may be imminent, and tracheotomy prove necessary to save life. (See *Tracheotomy.*)

BRONCHITIS.—Inflammation of the mucous

membrane lining the bronchial tubes and their divisions is usually the result of cold, and may take either an acute or chronic form.

Acute bronchitis, if extensive, is a serious affection when it occurs in feeble old people or young children.

Symptoms are: feverishness, dyspnœa, or shortness of breath, cough, and tightness on the chest. The dyspnœa is often considerable, expiration being difficult and accompanied by wheezing sounds. Cough is frequent, with expectoration, and in the early stages the phlegm is white, watery, and frothy, as the mucus in passing through the air-tubes becomes mixed up with air-bubbles; it is also occasionally streaked with blood. In the later stages, the phlegm increases in quantity, comes up more easily, and becomes yellowish or greenish-yellow in color, or else is viscid, tenacious, of dirty-white or yellowish appearance, and adheres closely to the sides of the vessel. The majority of patients recover in a few weeks, but when the inflammation spreads to the smallest bronchial tubes, or to the alveoli of the lung, causing broncho-pneumonia, the danger is greater, as this extension proves fatal in a large number of delicate or rickety children.

In chronic bronchitis, the symptoms are of much the same character as in the acute form; but the fever and the other symptoms are less severe, though perhaps of longer duration. The chronic forms of bronchitis are often recurrent at the colder seasons of the year, and may become more or less permanent, complicated by over-distension of the lungs or emphysema (infiltration of air into the interstices of the connective tissues), asthmatic seizures, or dilatation and weakness of the heart.

Management.—The temperature of the room

should be maintained at from 65° to 70°. Draughts should be carefully avoided, and ventilation managed as far from the patient's bed as possible, the atmosphere being kept moist by means of steam (see *bronchitis-kettle*). The position most comfortable for the patient—especially if there is much dyspnœa—is on the back with the head and shoulders raised; in some cases sitting up in bed is preferable. The sputa or phlegm should be noticed as to quantity and appearance, and the nurse should especially pay attention to the extent of lividity of the lips and face, or other symptoms of the dyspnœa becoming dangerous.

The remedies in common use which will have to be administered by the nurse are: inhalations, poultices, and the medicines prescribed (see *Inhalations*, *Poultices*). The effect of these upon the cough, expectoration, and dyspnœa, must be noticed, and also whether nausea or sickness is produced; if opiates are ordered, watch should be carefully kept against stupor, mental wandering, or increase of lividity. In cases of exhaustion, plenty of fluid nourishment will have to be administered, and stimulants, if prescribed. During convalescence, the avoidance of chills is absolutely essential, as bronchitic patients are very susceptible to sudden change in temperature. On first going out, a respirator or some covering over the mouth is a useful precaution.

Asthma, or asthmatic attacks, are often associated with the chronic form of bronchitis, but may exist independently in the spasmodic form.

Symptoms.—An attack of asthma very commonly occurs in the night or early morning. The person wakes with a feeling of constriction about the chest, sits up in bed with the knees

drawn up and the elbows on them, and begins to gasp for breath. The air is drawn in by a long, deep inspiration, the chest seems to remain expanded, the expiration is long and difficult, and attended with a wheezing or whistling sound. There is often a great desire for fresh air, and suffocation seems to be imminent; but after a time the attack subsides, and, perhaps, a cough commences with some expectoration, or without this the breathing becomes again easy and natural.

Management.—Asthma is more distressing than dangerous; a fatal termination is very rare, so that the patient may be assured that the attack will pass off. Various remedies are employed in different cases, and many sufferers are acquainted with the remedies that relieve them most, whether it be a cup of strong coffee, the fumes of nitre papers, or the vapor of nitrate of armyl (see *Inhalations* and *Throat-Applications*). In many instances some error in diet is liable to start an attack, and this is especially the case with children, consequently such articles as sweets and jam should always be avoided where there is *a tendency* to asthma.

Pneumonia.—Inflammation of the lung-substance, like bronchitis, is frequently the result of cold or chilling of the surface of the body, and is most common in the spring-time. It may also be produced by the inhalation of irritant particles, or poisonous gases, or it may arise as a complication in the course of rheumatic or typhoid fever, heart-disease, or any of the infectious fevers.

In its acute form, attacking a healthy person, pneumonia should be treated promptly and vigorously; do not delay until it presents well-defined characteristics or runs a fairly definite course.

Symptoms.—After a day or two of premonitory illness, the invasion of the disease is marked by a sense of chilliness or a sudden and severe rigor, or less commonly a succession of rigors. Such a condition should be met vigorously and treated by a skilled physician. The temperature is found to be raised often to 103° or 104°, and this is accompanied by other signs of fever. In the course of the day, fresh symptoms supervene, such as rapid breathing, cough, and pain in the affected side. When the disease has developed, the patient lies in bed, usually on the back—the cheeks are flushed, the nostrils working, and sometimes a patch of vesicles of herpes appears about the lips. The respirations are shallow and rapid, out of proportion to the pulse (30-40 in the minute), and temperature 103-104, often accompanied by a sucking sound.

There is usually cough, which increases the pain, and the expectoration is viscid and tenacious. The color of the sputum is often characteristic, being of reddish-brown, or rusty hue, due to the intimate admixture of blood.

The urine is scanty and high colored, and the skin in dry, pungent, and sometimes slightly tinged with jaundice.

Nervous symptoms in the form of tremulousness, and a tendency to delirium, especially at night, are often present. In favorable cases, improvement takes place from the fourth or fifth to the eighth or ninth day, and the temperature comes down suddenly at the crisis, the skin becomes moist, and the other symptoms of fever disappear (see fig. 30). The cough, however, often continues for some time, and the expectoration gradually diminishes and loses its color. Cases vary extremely in severity, and in the more unfavorable ones the dangerous symp-

toms depend greatly on the condition and physique of the person attacked.

In old and feeble people, death may take place from exhaustion; the pulse becomes rapid and weak, and the appetite fails. The tongue is dry and brown, crusts appear on the lips, there is delirium, and the strength gradually fails.

In persons of broken-down constitution, there is danger of gangrene of the lung. The symptoms of general debility are present with those of pneumonia; but the sputum rapidly changes and becomes of "plum-juice," greenish, or dirty-yellow color, and gives off a fœtid odor.

In drunkards, the nervous symptoms of the disease are accentuated; tremulousness and delirium appear early, while in others delirium tremens, or mania of a violent kind, develops (see *Delirium Tremens*).

If the amount of lung affected be great, or the disease attack the other lung, there is danger of asphyxia and the symptoms indicating dyspnœa—such as rapidity of the breathing, with dusky complexion and profuse sweats—increase. The patient becomes restless, and wants to be lifted higher in the bed.

In pneumonia secondary to rheumatic fever, or the specific fevers, the access is often very insidious—a rise in temperature with increased frequency of respiration being the only indications of the inflammation having attacked the respiratory organs.

Management.—The nursing in pneumonia is of the highest importance. The patient should be placed in bed at once, and will soon find for himself the most comfortable position. The room should be warm and well ventilated. The temperature, pulse, and respiration should be carefully registered, and the character of the cough, of the expectoration, and of any com-

plaint of pain in the chest noted. The clothing on the bed should be light and warm. Absolute quiet should be insisted on, and the patient restrained from talking more than necessary. The diet should be fluid, and some beverage may be kept ready, as the patient often suffers from thirst. The pain may be relieved by mustard poultices, and a cotton-batting jacket may be used to cover the affected side afterward. Attention should be paid to the bowels and kidneys, both of which should be thoroughly acted on to give as quick relief as possible to both, and a bed-pan should be used, as the patient is not allowed to get out of bed.

The crisis may be expected with sudden fall of temperature, and moist skin from the fifth to the tenth day.

Where there is great exhaustion in debilitated subjects, or feeble old persons, the strength has to be maintained by constant nourishment and stimulants. The delirium is often increased by weakness, and is especially troublesome at night. The character and smell of the sputum should be noticed, and, if offensive, should be disinfected or deodorized and constantly removed. Bed-sores should be guarded against by a water-bed or other means.

In drunkard's pneumonia, if there is delirium tremens, or a tendency to violent mania in powerful patients, the nurse should insure that there is assistance at hand in case of necessity, and this especially at night, to guard against damage to herself or the patient. Food should be administered freely, and stimulants if ordered by the medical attendant.

If sedatives or opium have to be given, the effect should be carefully watched for symptoms of stupor, blueness, dyspnœa, or profuse sweating, and the dose omitted or lessened ac-

cording to discretion, if there is no opportunity of referring to the medical attendant.

PLEURISY, or inflammation of the pleura, or membrane covering the lung, may be due to cold or exposure, or may result from injury to the chest or from broken ribs. It is also a complication of rheumatic fever, scarlet fever, and pulmonary consumption, and may be secondary to any inflammatory disease of the lung itself.

Symptoms.—Inflammation of the pleura in the first stage is called "dry pleurisy"; the surfaces of the membrane are roughened, and are incapable of gliding easily over one another. The symptoms are: fever, sometimes preceded by a sense of chilliness; a short, sharp cough, and acute pain in the chest on expanding the lungs. The pain is described as "stabbing" or cutting in character, and is increased by drawing a deep breath; it is much intensified by any sudden expiration, as coughing or sneezing. The patient endeavors, as far as possible, to keep the affected side of the chest fixed, and usually lies in bed on the back, or on the sound side. The attack may not increase beyond the first stage, and with general treatment and vigorous counter-irritation gradually subsides.

The pain may be lessened by the application of counter-irritation, by a mustard poultice, or by painting with iodine (see *Leeches* and *Counter-Irritation*).

The second stage is that of effusion of fluid, or "pleurisy with effusion." The inflamed membrane pours out a fluid, which is received into the cavity of the pleura between the lung and the chest-wall. As the fluid increases, the lung is pressed on and collapses, the air being gradually squeezed out of it, until more or less of the lung is rendered airless, and therefore useless. If the fluid becomes excessive, other

organs, as the heart or liver, are pushed out of place. The pleural cavity is capable of containing a large quantity of fluid, several pints in young persons, and several quarts in the full-grown adult. The symptoms of the second stage are usually characterized by diminished pain, but a continuance of fever and increasing difficulty of breathing. There may be little or no cough. The main danger to be apprehended is from the dyspnœa, or faintness from embarrassed breathing and displacement of the heart. The patient will probably now be unable to lie on the sound side, since that side of the chest has to be left free to move, and to carry on all the breathing, as the affected lung becomes more and more pressed on by the fluid, and he may prefer to be propped up in the bed.

Management.—The patient should be kept in bed, and any sudden movement or exertion avoided, as liable to increase the dyspnœa, or bring on faintness. It is usual to apply strong counter-irritation to the affected side by iodine, in order to promote the absorption of fluid. The *bowels* should be kept *freely open*, and the skin encouraged to perspire. If the dyspnœa become at all urgent, the surgeon should be summoned, as relief from any danger can be afforded by the operation of tapping the chest.

Aspiration, or tapping the chest, consists in the introduction of a hollow needle into the pleural cavity, between the ribs. A tube leads from the needle into a bottle, which can be exhausted by a pump. By this means the necessary amount of fluid is drawn out of the chest, and the needle withdrawn. If this operation is required, the nurse should have in readiness some carbolized oil for the needle, a measured glass (capable of holding a pint) to receive the fluid, and a pad of antiseptic gauze, with collo-

dion and strips of plaster to close over the seat of the puncture. A few pieces of ice and salt to render the skin insensitive may be kept in readiness, and a broad flannel bandage is sometimes applied afterward (see fig. 31).

In simple serous effusion, the fluid drawn off is seen to be watery, and of greenish or straw-colored hue. Recovery may take place after one aspiration, but the operation may have to be repeated more than once.

EMPYEMA is the term used when the fluid consists of matter, or "pus," and the case may have a somewhat different aspect from simple effusion. In young children pleural effusion is commonly purulent, and may arise after scarlet fever or other acute illness; the fluid is very rapidly formed, and urgent dyspnœa soon supervenes unless relief is afforded. In adults pus is less common, and is rather an indication of a debilitated subject. The temperature is often higher than in simple effusion, especially at night, and may be associated with hectic fever and rapid emaciation.

Management.—The treatment adopted for empyema is to drain the pleural cavity, by means of a free opening and drainage tubes.

Draining of the Pleural Cavity.—The operation is rather more extensive than aspiration. The patient is commonly given an anæsthetic, and the chest being uncovered, a mackintosh is arranged under the affected side, which should be previously cleansed with carbolic lotion. The nurse should be prepared with dishes of suitable shape, to catch the discharge of matter which issues from the wound, as soon as the pleural cavity is opened. Several india-rubber drainage tubes of various sizes should be ready in carbolic solution for insertion into the wound. A threaded needle and slips of plaster

for maintaining the tubes in position should also be prepared. The dressings to be used should be ascertained beforehand from the surgeon, and as the discharge is very copious at first, and will soon work through, the wound will require dressing frequently for the first day or two. In all cases of operation for pleural effusion, the fluid withdrawn should be saved by the nurse, in order that it may be examined. The temperature of the body usually descends after the removal of the purulent matter from the chest, and when the fluid has freely drained away for a day or more, the temperature sinks to the normal. A fresh rise of temperature and return of feverish symptoms would be an indication that there was some interference with the escape of the matter, possibly from the tube having become blocked with the more solid flakes of the discharge; or the matter may become offensive, and change from yellow to green or greenish-yellow, owing to an unhealthy condition of the pleural cavity, and it may be necessary that it should be washed out by the surgeon with an antiseptic solution. An irrigator or a funnel and an india-rubber tube are required for the purpose, and the antiseptic fluid should be ascertained to be of the right temperature, about 100° F., before its introduction.

The shape of the chest, especially in children, is altered after empyema. The affected side becomes contracted and smaller, and the spine curved in cases of long standing.

PULMONARY CONSUMPTION — PHTHISIS.—The popular term, "decline," is often used to denote this fatal malady, which carries off more victims than any other disease in this country. The disease-material is called *tubercle*, a little nodule deposited in the organ affected, which is

most commonly the lung; but it may attack almost any organ in the body, producing symptoms peculiar to the part attacked. The nodules may combine together in the lung to form masses, which create inflammation, breakdown, and carry away parts of the diseased lung-tissue, leaving holes in the damaged lung. The tubercular-nodule has a great tendency to spread and infect neighboring parts, and it may be carried by the blood into distant regions of the body, setting up inflammation in these also. Hereditary taint has been observed to exist in a very large number of those attacked; but in addition there is often some other cause which has determined the onset of the malady. For instance, cold, want, overwork, drink, and excess are sometimes the exciting causes, both in the hereditary form and that acquired by disease. When there is hereditary taint in both parents, the liability to its development in the offspring is much increased.

Pulmonary consumption may be either acute or chronic; in either form its symptoms may be very diverse in different individuals.

(a) *The Acute Form* more commonly attacks persons under twenty-five or thirty years of age, and may prove fatal in less than three or four months, or even in a few weeks.

Symptoms.—The onset may be preceded by emaciation and cough, accompanied by sudden fever with rigors, and symptoms resembling those of pneumonia develop. The cough and sputum may be pneumonic in character, or denote bronchial irritation. The temperature is high, hectic in character, and there is a tendency to lividity and sweats, along with great weakness, tremulousness of the limbs, and sometimes nocturnal delirium. A variety of other symptoms may be present, and apparent

improvement take place for a while; but the tubercular disease, once fairly established, soon terminates fatally.

(b) *Chronic Pulmonary Consumption*, as the name implies, has a longer duration, lasting from several months to years. The disease may commence at any period of life; but the greater number of consumptives are attacked between the ages of fifteen and thirty-five.

The onset is usually gradual; a neglected cold, or a troublesome cough not much noticed, may be the starting-point. In other cases, spitting of blood, followed by cough, is the first indication; the cough increases, and there is expectoration of yellowish or frothy sputum; at the same time other symptoms begin to supervene. There are often gastric derangement with retching, white fur on the tongue, loss of appetite, and gradual emaciation.

At night, or on awaking in the early morning, the body is covered with profuse perspiration. There is shortness of breath; the sputum becomes thicker, and when expectorated into the vessel, forms round masses of a yellow or greenish-yellow color. From the beginning the temperature is often above normal, especially toward evening, and a bright flush is noticed on the cheek; the pulse-rate is also increased. After a varying time, the symptoms begin to decrease, the night-sweats diminish, the appetite improves, the cough is less frequent, and there is less expectoration. The patient gains flesh, and strength returns, though the cough may not altogether disappear. During all this time certain changes are going on in the lung. Tubercular material is being deposited in the upper part of one or the other lung; this breaks down or softens, and is coughed up and expectorated through the bronchial tubes. This process is

accompanied by the progressive symptoms above described. When this has been accomplished, and there is no further increase in the disease, the lung is left with a hole or cavity at that part, which gradually contracts and heals up in favorable cases, though the lung tissue is not reproduced. In a few instances there may be no return of the disease, and the person lives on with a slightly damaged lung. In the majority of cases the improvement is only partial or temporary, and after a varying interval another portion of the same lung, or a portion of the other lung, is attacked in like manner, and a similar series of symptoms supervenes; until, finally, the lung becomes riddled with cavities, and the patient sinks from exhaustion, or from one of the numerous complications incident to this disease.

Management.—Those invalids who, for various reasons, are able to do so, should seek a higher altitude and drier air, as such a climate is better suited to their condition, and to make such changes in their mode of living as may tend to remove, as far as possible, any injurious influences which may have been productive of the disease, or which in any case serve to increase it. Amongst these hurtful influences are:—

1. A damp atmosphere.

2. Occupations where dust or small particles fill the air, and cause bronchial irritation; for instance, the trades of stone-masons, miners, and grinders.

3. Overwork, excitement, bad habits, such as indulgence in stimulants, and excess of any kind, are also predisposing causes.

4. Defective ventilation and over-crowding, again, produce the same result, and are the

most important factors in exciting tubercular complaints.

On the other hand, ventilation and plenty of fresh dry air are potent preventives, and invalids should be instructed to keep their windows open in the day and, when possible, at night, and should be encouraged to go out of doors when the weather is sufficiently fine.

For the poorer classes an out-of-door occupation is the most healthy. A *dry* bracing atmosphere, with *plenty of sun* and free from wind, is the most favorable, and a residence situated on a hill, protected from the north and east, with a *dry soil*, is most suitable.

Want of food and defective assimilation diminish the power of resistance and hasten the disease, and loss of flesh may precede the development of the consumptive symptoms when plenty of food can be obtained, but is not digested. A careful diet—with plenty of *milk, cream, and butter*—is suitable, but has to be varied according to idiosyncrasy. Cod-liver oil is commonly prescribed, when it can be digested, and is best taken soon after a meal in orange-wine, lemon-juice, or some other vehicle, commencing with a teaspoonful and increasing the dose to a tablespoonful or more, if it can be assimilated. Nausea and a tendency to diarrhœa would indicate that the dose should be diminished.

Symptoms which call for special alleviation are: cough, high temperature, profuse sweating, and pain in the chest.

Cough.—For this some cough-mixture will be prescribed by the physician; or simple remedies, such as barley-tea, slippery-elm tea, or equal parts of glycerine, honey and water, with a small portion of camphorated tincture of opium added, may be given. A respirator of

Coghill's form, or one in which a few drops of some antiseptic solution can be introduced, worn in front of the mouth often relieves the cough.

Sputum.—The sputa should be carefully preserved for inspection and examination. The spittoon used by the patient should be frequently emptied into another receptacle and the sputa saved for the twenty-four hours. It is important that this secretion should be carefully *disinfected* by mixing it with 1-20 carbolic solution. Consumptive patients living at their own homes should be warned that *their expectoration* may *convey the disease to others* of the household, and should be instructed how to disinfect it, or burn it.

High Temperature and heat of the skin may be alleviated by tepid sponging, or different parts of the body may be so treated while the rest is kept covered (see *Tepid Sponging*).

Profuse Perspiration.—Apart from the treatment by special drugs and tepid sponging, it is advisable that a light *flannel garment* should be worn *next the skin*, so that the moisture does not soak the linen night-dress, a source of great discomfort. The flannel should be changed and dried every morning, or during the night in bad cases.

Pain in the chest is usually caused by an outbreak of dry pleurisy, and may be relieved by the application of iodine to the skin over the painful part, or by a light coating of equal parts of essential oil of mustard and menthal, or some other form of counter-irritation (see *Counter-Irritation*).

Complications of greater or less urgency, which require special attention, are liable to supervene in the course of pulmonary consumption. Pneumonia and pleurisy produce their particular symptoms; others, such as Hæmo-

ptysis, Pneumo-thorax, Tubercular laryngitis, Meningitis, and Ulceration of the bowels, require special mention.

Hæmoptysis, or spitting of blood, is a common incident in consumption, but may also occur in heart disease and congestion of the lungs. It is necessary to distinguish it from bleeding from the stomach or hæmatemesis (see *Hæmatemesis*). The blood comes up in mouthfuls and is coughed up, not vomited; it is bright red, often frothy, mixed up with phlegm, and the quantity of blood is variable. In slight hæmoptysis there is a mouthful or two of blood occasionally; in moderate cases a few ounces or a quarter to half a pint are gradually brought up at intervals; in profuse hæmoptysis a pint of blood or more is expectorated in a short time; but in the suffocative form, the blood comes up so rapidly and profusely that it is inhaled back into the lungs with each inspiration, and death from suffocation takes place in a few minutes.

Management.—The nurse may assure the patient that the bleeding will soon cease of its own accord, as it is sure to do in the majority of cases, and she will send for a medical man.

In the meantime, the patient should be placed sitting up in bed, or on a chair, in a cool room. The dress may be loosened about the chest, and ice applied externally, while small pieces of ice are given to suck. No speaking, excitement, or moving about should be allowed. After the immediate attack has subsided, the sputum is usually blood-stained for some days. The diet should be light, without stimulants. The bowels should be *thoroughly relieved*, and perfect rest maintained for some time afterward. In fatal cases the rapidity of bleeding is so great that nothing can be done. The patient gets

breathless, begins to look blue, becomes fidgety and very anxious, the eyes staring widely, the blood pouring from mouth and nostrils in a constant stream. Death takes place in three or four minutes from suffocation, and the urine and fæces are sometimes passed unconsciously in the bed. In profuse hæmoptysis, the tendency to bleed is diminished when fainting and depression are induced. Great care should be taken not to excite a fresh outbreak by overstimulation.

PNEUMO-THORAX, or air in the pleural cavity, is a serious complication, produced by an opening in the surface of the lung, through which the air is able to pass out into the cavity of the pleura. This cavity becomes distended with air and the lung collapses; this may occur suddenly.

Symptoms.—After a sudden movement or exertion, the patient feels a sharp pain in the affected side, and suffers from shortness of breath. In severe cases the dyspnœa increases and becomes urgent, accompanied by lividity, perspiration, and collapse.

The nurse should assist the patient into as comfortable a position as possible, and obtain assistance, since relief may in some cases be afforded by aspirating the chest and removing the pent-up air.

TUBERCULAR LARYNGITIS.—The deposit of tubercles in the larynx, and consequent inflammation, add very greatly to the gravity of the disease, and tend to shorten the duration of the life to a considerable extent.

Symptoms are: hoarseness, weakness of voice, and a husky, somewhat metallic, cough.

The emaciation seems to progress more rapidly in these cases, and there is greater general weakness. The irritation in the larynx is a

constant source of discomfort; and when ulceration has taken place, there may be much pain, and perhaps difficulty in swallowing.

Tubercular meningitis and tubercular ulceration of the bowels may supervene in the course of pulmonary consumption. The symptoms are described elsewhere (see *Meningitis* and *Ulceration of Bowels*).

CHAPTER V.

DISEASES OF THE HEART AND BLOOD-VESSELS.

Heart, Pericardium — Valves — Aorta — Pulmonary Artery—Systemic, Portal and Pulmonary Circulations — Movements of Heart — Pulse—Dyspnœa—Dropsy—Ascites.

Symptoms and Management of Pericarditis—Mitral Valve Disease—Aortic Valve Disease—Angina Pectoris — Fatty Heart — Congenital Heart Disease—and Aneurysm of Aorta.

Introduction: The Heart and Blood-Vessels

The Heart (fig. 33) is a pear-shaped organ, weighing, in the adult, from eight to ten ounces. It is situated near the left center of the thorax slightly left of the breast-bone, with the broad end or base upward and the pointed end or apex downward and toward the left.

The Pericardium is a thin serous membrane or bag, which surrounds the heart, and contains a small quantity of fluid, which lubricates the interior and permits the easy movement of the heart.

The heart itself is of muscular structure of the *involuntary kind*, a wise provision of the Great Creator, otherwise some in a moment of despondency might command the heart to stop beating. It contains four cavities in its interior. A partition from the base to the apex divides it into halves—the right side receiving venous, and the left side arterial, blood. Each half is again divided by another partition into an upper and a lower chamber.

The two upper chambers are called the *Auricles*, the two lower the *Ventricles*.

The Right Auricle receives the two veins which bring the blood back from the upper and lower parts of the body, and at its lower part is an orifice opening into the right ventricle, guarded by valves (fig. 34).

The Right Ventricle has thicker walls than the auricle, and in its interior may be seen the valves just mentioned. They are triangular flaps of delicate membrane, attached by thin threads to projecting pillars of the ventricle; they are three in number, and called *tricuspid.* When the ventricle contracts, the valves are floated up and close the orifice between the auricle and ventricle, preventing the blood from passing back again. Another opening in the right ventricle leads into the pulmonary artery, which also has three valves to guard its orifice. Each valve is half-moon shaped, or *semilunar,* and forms a pocket on the wall of the artery. After the ventricle has contracted, these three semilunar valves fill out, and their edges come together, thus preventing any return of blood into the ventricle.

The Left Auricle receives the pulmonary veins from the lungs, and opens into the left ventricle (fig. 35).

The Left Ventricle has a very thick wall, and is the most powerful part of the heart. The orifice from the auricle is guarded by valves similar to those in the right ventricle; they are, however, only two in number, and are called *bicuspid,* or *mitral.* The other opening from the left ventricle is into the aorta.

The Aorta has thicker walls than the pulmonary artery, and its orifice is similarly guarded by three semilunar valves. Behind two of these valves are two small openings in the arterial wall, which are the mouths of the coronary vessels, through which the heart is supplied with blood.

The Circulatory System.

THE GENERAL OR SYSTEMIC CIRCULATION commences with the aorta, one of the large vessels which springs from the broad end or base of the heart. The aorta leaves the left ventricle, and then forms an arch, from which important vessels are derived—namely, the *carotid arteries* to the head and neck, and the *subclavian arteries* to the upper limbs. The main trunk then descends through the thorax and abdomen, giving off vessels to the different viscera and to the walls of the trunk. In the pelvis it divides into two main trunks, which supply the two lower limbs.

The blood-supply to the upper limb is carried by the subclavian artery, which passes through the arm-pit as the *axillary artery*, and on to the inner side of the arm, forming the *brachial artery*. At the elbow it divides into two branches —one, the *ulnar*, which descends along the inner side of the fore-arm; the other, the *radial*, which passes down the thumb side, and unites with the ulnar in the palm of the hand, forming an arch from which vessels are given off to the fingers. The pulse-beat in the radial artery may be easily felt in the wrist close above the thumb.

The main artery to the leg is called the *femoral*, and can be felt beating in the middle of the groin or hollow of the thigh; the vessel then curves round to reach the back of the knee, where it is called the *popliteal artery*. It then divides into branches, which descend the leg and unite, forming an arch in the sole of the foot, from which the toes are supplied.

The veins collect the blood from the capillaries through all the tissues of the body. The jugulars from the head and neck unite with

the subclavian, or veins from the arms, to form the *superior vena cava*, a large trunk opening into the right auricle. The femoral veins from the legs pass up into the pelvis, and open into a large main trunk, the *inferior vena cava*, which ascends the abdomen, gathering veins from the interior and viscera before opening into the right auricle.

The Portal Circulation is a branch of the general circulation; the stomach, intestines, pancreas, and spleen receive their arteries from the aorta; and the blood, on leaving these, is received into various veins, uniting to form the *portal vein;* this enters the substance of the liver and breaks up into numerous capillaries. The blood is then collected by the *hepatic vein*, which opens into the inferior vena cava just before the vessel enters the right auricle.

The Lesser or Pulmonary Circulation.—The *pulmonary artery*, carrying impure venous blood, leaves the right ventricle and divides into two branches, one for each lung. Inside the lung this vessel breaks up into small branches, which form a network round the alveoli, or air-cells. The pure oxygenated blood is collected by the *pulmonary vein* and carried to the left auricle.

The Movements of the Heart.—In the healthy adult the heart beats from sixty to eighty times in a minute; in children and infants the beat is more frequent, varying from a hundred to a hundred and forty in a minute.

The two auricles contract together, and squeeze the blood into the ventricles; the two ventricles then contract, and the tricuspid and mitral valves close their orifices, the blood being forced on into the large vessels—the pulmonary artery and the aorta—the semilunar valves then closing. The blood cannot get from

the right side of the heart to the left without passing through the lungs, or lesser circulation; neither can the blood get from the left side of the heart to the right without passing round the general, or portal, circulation. The beat of the heart is often perceptible against the front of the chest, especially when beating with undue force and frequency.

The Pulse is caused by the alternate distension and contraction of the arteries at each beat of the heart, and this beat can be felt and counted in those vessels which lie near the surface of the body, such as the radial, carotid, or temporal arteries. The number of beats should correspond to those of the heart, and should be regular in time and force; irregularity in this respect is a common feature of heart-disease.

Symptoms of Heart-Disease.

In the different forms of heart-affections there are many symptoms varying in character and importance which present themselves during the several stages of the disease, and which will be mentioned subsequently. There are two, however, in which the attentive care of a nurse is specially necessary, and which are commonly present, either separately or together, in the later stages of most forms of heart-affections—namely, dyspnœa and dropsy.

Dyspnœa. — *Management.* — Difficulty of breathing in heart-affections is very much increased by exertion; and when the patient is able to go about, he finds that walking uphill or hurrying produces palpitation and rapid breathing, which cease when he has remained quiet for a time.

In more advanced cases, dyspnœa is apt to be a constant and distressing feature, even when the patient is in bed and remaining quiet.

There may be paroxysms of the bad breathing, and the respiration is often panting and gasping in character. The patient is intolerant of a recumbent position, and prefers to be propped up in the bed, with the shoulders well raised, but the heart's action is always relieved by placing the body in a recumbent position. Others have a great desire to get out of bed and sit in a chair, or to let their legs hang down; the breathing may be much relieved by this position, care being taken that the body is properly covered up, and the legs wrapped in blankets.

Dyspnœa from pulmonary congestion is a common complication secondary to heart-disease, and is usually accompanied by cough. The lividity in these cases is often very intense—affecting the lips, face, ears, hands, and feet.

Dropsy is caused by the more fluid parts of the blood escaping from the blood-vessels and capillaries, and filling up the spaces in the connective-tissue of the body, or collecting in the cavities of the abdomen or thorax. Difficulty in the return of blood to the heart is a common cause of dropsy.

Œdema is the term given to dropsy of the subcutaneous tissues, and by *Ascites* is understood a collection of fluid in the peritoneal cavity of the abdomen.

Dropsy from heart-disease commonly appears first as a slight swelling about the ankles or insteps, which comes on toward evening; if the parts are firmly pressed by the finger for a few seconds a dent is left. The swelling, or "œdema," may extend up the leg and appear in all parts of the subcutaneous tissues, being more marked where the skin is loose, as in the eyelids, beneath the eyes, and through the scrotum.

Management.—The dropsical condition is sometimes severe enough to prevent the patient from getting out of bed, or even moving himself in bed, and bed-sores are apt to form on parts where there is much pressure, which should always be guarded with care.

Heavy and dropsical patients are very helpless, and the nurse requires assistance in moving and raising them. Some help may be given by a rope fastened to a ring firmly fixed into the ceiling above the patient's head, by which he is enabled to pull himself up by his hands.

In some cases the skin, which has been first thoroughly cleaned and oiled, should be frequently anointed with some stimulating absorbent which should be recommended by the medical attendant, the object being to drain off the fluid from the parts, through the pores of the skin.

The nurse will have to attend constantly to the bed, which becomes wet unless the exudation is soaked up in absorbent cotton batting, and she must watch the skin, observing great cleanliness, as cellulitis or erysipelas may supervene.

ASCITES causes distension of the abdomen with fluid; this distension may become so great as to interfere with the breathing by pressing on the diaphragm.

Management.—Tapping the abdomen may be necessary, for which the nurse should be prepared with a broad flannel binder of sufficient breadth to reach from the lower part of the sternum to the pubes, of sufficient length to pass once and a half or twice round the body, and arranged to fasten with safety pins or tapes. A pad of antiseptic gauze and collodion will be necessary for the puncture, and large pails to catch the fluid, which may amount to

several gallons. In the case of a female patient, the nurse should draw off the urine immediately before the operation. The bed may be prepared with a mackintosh sheet under the body, and the patient should occupy a position on one side, so that the protuberant abdomen projects over the edge of the bed.

Diseases of the Heart.

The common causes of heart-affections are: rheumatic fever, over-strain, bronchitis, and emphysema. Of these, rheumatic fever takes the first place. In the course of the fever, inflammation may attack the valves or the pericardium, and lay the foundation of a disease that is permanent, and produces more or less obstruction to the circulation through the cavities of the heart.

Pericarditis.—Inflammation of the interior of the pericardium interferes with the action of the heart, and is a common and serious complication of rheumatic fever, and of pyæmia.

Symptoms.—The symptoms of the acute form are: fever, pain in the region of the heart, difficulty in breathing, and feeble pulse. If effusion of fluid takes place, filling the pericardial sac, graver symptoms are present; the pulse is more affected, there is a tendency to faintness, and the dyspnœa is urgent and accompanied by lividity and sweats. The disease may begin very insidiously in children, and the inflammation may advance considerably without any special complaints having been made.

Management.—Apart from the special management of rheumatic fever, patients suffering from pericarditis with effusion should not be allowed to sit up in bed, move suddenly, or exert themselves in any way, as fainting may be induced, with fatal termination. For the relief

of pain, blisters or some form of counter-irritation over the heart are useful.

VALVULAR DISEASE OF THE HEART.—As the result of inflammation of the valves, changes are produced which interfere with the circulation of the blood through the different orifices, and cause enlargement of the walls of the heart. There are two sets of valves which suffer in the majority of cases: the mitral and the aortic valves. The course and symptoms of the two affections have in many respects quite different characters.

MITRAL VALVULAR DISEASE. — *Symptoms.* — A large number of individuals suffer from minor degrees of disease of the mitral valve, but are able to engage in the ordinary affairs of life, exercising rather more care than a healthy person. In this way they may attain a fair age, though their lives are checkered with intermittent periods of illness, and they should be examined at frequent intervals by a competent physician, whose advice may add many years to their lives. It is in the course of the many complications to which they are liable, or toward the end of their existence, that they may require the care of a nurse.

Complications of mitral disease are dropsy (see *Dropsy*) and congestion or inflammation of the lungs.

The pulmonary complications are among the most common, and are caused by bronchitis or congestion of the lungs.

Symptoms.—Cough, difficulty of breathing, and lividity, with perhaps slight œdema of the feet, and a trace of albumen in the urine, which should be analyzed at frequent intervals.

Management.—A patient with mitral disease exhibiting these symptoms should stay in bed, keep to light diet, and take some preparation

that will act on the liver and bowels, until the bowels are freely relieved. The attack may subside with these simple measures, or the symptoms may tend to increase, and the dyspnœa become more urgent. It is not uncommon for hæmoptysis to come on in these cases with sometimes considerable relief to the pulmonary symptoms (see *Bronchitis*, &c.).

Digitalis is a drug constantly employed in the treatment of heart-disease, steadying and strengthening the action of the heart and pulse, and increasing the quantity of the urine.

Symptoms of Overdose.—The nurse should be acquainted with the symptoms indicating an overdose or an accumulation of the drug in the system. In such cases the patient complains of nausea, loss of appetite, and a sense of flickering in front of the eyes; he feels giddy and sick, and the pulse becomes very irregular, vomiting and faintness may occur, and the urine is diminished in quantity. Patients taking digitalis, especially if the drug is being pushed, should remain in bed, or lie down, and avoid suddenly raising the head. If symptoms arise indicating an accumulation of the drug in the system, the nurse should omit the dose until the physician's visit.

Fatal terminations in mitral disease are usually preceded by severe attacks of one or the other of these complications, or by failure or dilatation of the walls of the heart. Sudden death in the ordinary acceptation of the term is uncommon.

Aortic Valvular Disease.—Males are infinitely more subject to this form of heart-disease than females. When severe, it is most dangerous to life, and sudden death is not uncommon termination. It may result from over-

work, rheumatic fever, or excess, and it may be associated with disease of other valves.

Symptoms.—Persons suffering from this affection are usually pale, though well-nourished, and complain of shortness of breath, with perhaps pain in the chest and a feeling of faintness, especially on exertion; sleeplessness and great restlessness are also common features.

Management.—In aortic disease, sudden death may occur from syncope or faintness, and patients suffering from this disease should avoid hurrying, especially uphill, should eschew heavy or large meals and excesses of any kind. If these is faintness, they should lie down, the head being placed as low as, or lower than, the body.

ANGINA PECTORIS, or pain in the chest, is the name given to a painful and dangerous symptom, sometimes occurring in connection with aortic disease, or some other heart-affection.

Symptoms.—It is characterized by a more or less sudden spasm of pain in the region of the heart, with dyspnœa, and a sense of approaching death. The pain is of a peculiar nature, often described as "crunching," and radiates down the left arm to the fingers, and into the back, producing a sensation of numbness. In severe attacks the breathing is much affected, the face becomes pale or livid, and is covered with drops of sweat. In a short time, the severity of the pains usually passes off; but in some instances the attack proves fatal.

Management.—Since the attacks are very liable to occur after exertion, any unnecessary strain should be avoided. The state of the stomach seems in some cases to influence the attacks; and heavy meals, especially at a late hour, are unadvisable, and must be avoided.

The greatest relief is sometimes experienced

during the attack from the inhalation of nitrite of amyl. This fluid has the odor of pear-drops, and when a few drops have been inhaled, a warm sensation is felt over the surface of the body, and the face and neck become flushed, the spasm in many cases being cut short or immensely relieved by the inhalation. Five or ten drops may be used at a time on a pocket-handkerchief, but is better inhaled from a small-sized bottle, and repeated, if necessary, until the full effect is produced or relief gained. It is better for the patient to be recumbent when using the inhalation.

DILATATION OF THE HEART AND FATTY DEGENERATION of the walls may exist apart from valvular disease, and are often fatal.

The former may supervene upon long-standing bronchitis and emphysema; the latter from drink and various other causes; both these affections frequently end in sudden death. Pulmonary complications or dropsy often appear at a late stage in the disease.

CONGENITAL MALFORMATION OF THE HEART.—The subjects of this affection are born with an imperfect condition of the heart, the cavities being sometimes incompletely separated on the two sides.

The marked features in these cases are: extensive blueness, lividity, and coldness of the lips, face, ears, and extremities. There is dyspnœa, and sometimes the ends of the fingers and toes are knobbed or "clubbed," as it is called, the last digit being rounded and larger than is normal. The majority of these patients die in childhood, either with convulsions or pulmonary complaints. They suffer much from cold and impeded circulation, and require to be well wrapped up, the extremities being kept warm.

ANEURYSM is a disease of the arteries, and may affect almost any vessel, although it is much more common in regions where the artery is exposed to strain. Disease or an injury creates weakening of the wall of the vessel, and bulging at the part affected. The swelling increases and forms a tumor, varying in size, in which pulsation can be felt.

The aorta, subclavian, femoral, and popliteal arteries are common sites for aneurysm.

ANEURYSM OF THE AORTA is a very grave affection, and may produce a variety of symptoms from pressure on the many important structures near it. Among these, pain, difficulty in swallowing or breathing, loss of voice, and swelling of the arm and neck are not uncommon. Sudden death may occur from rupture of the aneurysm and hæmorrhage into internal parts.

Management.—Attempts are sometimes made to cure the disease by absolute rest in bed, and restricted diet; in these cases the nurse may have difficulty in insuring that the patient attends to the rules and restrictions, which are irksome, and are perhaps infringed as soon as her back is turned.

Aneurysm of the Vessels of the Extremities is treated by rest, or surgically by pressure or operation (see *Pressure* and *Hæmorrhage After Operation*).

CHAPTER VI.

DISEASES OF THE DIGESTIVE SYSTEM.

The Organs of Digestion—The Mouth—Teeth — Tonsils — Pharynx — Epiglottis — Parotid Glands—Gullett—Stomach—Liver and Bile—Intestines — Peritoneum — Foods — Digestive Processes—Lymphatics—Indigestion—Vomiting—Hæmatemesis—Jaundice.

Symptoms and Management of Gastric Ulcer—Colic—Gall-Stones—Peritonitis—Typhlitis—Intestinal Obstruction — Diarrhœa — English Cholera.

The Organs of Digestion.

The tube through which the food passes is called the *Alimentary Canal*, and consists of several divisions. The upper part, into which the food passes from the back of the mouth is the *Pharynx*. Below the pharynx is the œsophagus, which is situated in the neck behind the windpipe, and descending the hind part of the thorax pierces the diaphragm and opens into the *Stomach*. The stomach lies in the upper part of the abdomen and opens into the *Intestine*, which finally terminates in the *Rectum* (see fig. 38).

THE MOUTH.—The interior of the mouth should be inspected in order that the main features may be identified.

The Teeth.—The complete permanent set in the half of each jaw counting from the middle

line are as follows:—Two incisors, one canine, two bicuspids, and three molars, making in all thirty-two in both jaws.

The Teeth, were intended to remain for our use as long as the body should last, and would probably do so, if our food was properly selected as nature intended, and they were given the care they required for the exacting service demanded of them.

They are the first of two all important agencies, that of mastication and insalivation, consisting in cutting and grinding the food, by their action it is reduced to a minute subdivision, during this process the salivary glands, situated in the cavity of the mouth, inject their fluid into the mass being triturated, this fluid softens and lubricates the food, aiding materially in deglutition and the first stage of digestion.

Next to the beauty of the eye, the clean, healthy teeth, stand forth prominently claiming our admiration, materially adding to the attractiveness of the features, besides preserving the contour of the jaws, by rounding out the symmetrical shape of the entire face.

Nothing is more unattractive than coming face to face with a person showing a mouthful of decayed, broken and discolored teeth.

Unfortunately, like the neglect of bodily health, many pay little or no attention to their teeth, until they begin to ache, which usually occurs only when decay has exposed the pulp of the tooth, which contains a nerve, an artery and vein.

In the case of children, they should have their teeth examined by a competent dentist every six months, and adults at least once a year; when decay is discovered, in either case, the cavity

should be properly filled to arrest the decay, and prevent the entire destruction of the tooth.

Decay of the teeth is caused by particles of food remaining between them after mastication; the food held in this position decomposes, and soon does its deadly work of destroying one or both of the teeth. These particles of food should always be promptly removed with a stiff quill pick, or with floss-silk, after each meal.

The wooden tooth-picks, furnished in some hotels and restaurants, should not be used, as they are too thick to pass between the teeth properly, besides they splinter on the used end, and these sharp splinters wound and irritate the gums.

The teeth should be brushed after the morning and evening meal; a four- or five-row brush is best for the use of adults, and a three-row brush for children's use. The brush should never be passed back and forth over the surface of the teeth; the upper teeth should always be brushed *down*, giving the brush a rotary motion, both inside and out and the lower teeth brushed upward, giving the same rotary motion to the brush. In this way, the bristles pass *between the teeth*, removing the particles of food lodged between them; this way of brushing may appear awkward at first, but with a little practice, will become very easy, and is far more beneficial. While brushing from front to back of the mouth, the bristles run in the depressed parts of the teeth, close to the gums, where the enamel is *thinest*, and in time this process of brushing, will wear through the thin enamel, often making the teeth unnecessarily sensitive.

A tooth-paste, or dentifrice, should not be used more than once a day, preferably after the evening meal.

The tongue occupies the floor of the mouth and its surface is covered with raised papillæ or projections, some at the back being of large size; under the tongue is a thin band of mucous membrane, the frænum, and on either side of this may be seen the two small orifices of the salivary ducts, the glands of which are situated underneath the floor of the mouth. The palate, or hard part of the roof of the mouth, forms an arch between the upper teeth; the soft palate, depending from the back, rises and falls with the breathing. The uvula hangs down as a projection from the middle of the soft palate, and on either side are the pillars of the throat or fauces, from the sides of which project two rounded bodies, the tonsils. The posterior nares are the openings at the back of the nostril behind and above the soft palate.

The Pharynx is the cavity at the back behind the fauces into which open the upper end of the windpipe and the top of the gullet (see fig. 39).

The Epiglottis.—Situated at the root of the tongue is a flap of cartilage, hardly visible on looking into the inside of the mouth, which covers over the opening of the glottis or larynx in the act of swallowing, and prevents food from passing into it and "going the wrong way."

If food, or any foreign body, enters the larynx by accident, a violent expiratory effort, "choking" or coughing, is produced to dislodge it.

The Parotid Glands are situated one in front of each ear; they are salivary glands, and their secretion is carried to the mouth by a duct which opens on the inner side of the cheek. It is the swelling and inflammation of these glands which produces the enlargement of the face in the disease known as "Mumps."

The Œsophagus, or gullet, conducts the food into the stomach; its length is about nine inches, and it is lined by mucous membrane.

The Stomach is a large bag capable of holding two quarts; it lies transversely below the diaphragm; its left larger end being connected with the gullet; the right is narrower and becomes constricted where it opens into the first part of the small intestine. The constricted portion is called the *Pylorus* or *Pyloric Valve*, and when closed prevents the food from passing out of the stomach. The mucous membrane of the stomach presents a honeycomb appearance, and contains millions of little tubes, which are really glands, producing a fluid called the *gastric juice*, which is constantly poured out into the stomach, and contains a substance, *pepsin*, which digests the proteids.

The Intestines, or bowels, form the remainder of the alimentary canal, and are from twenty-eight to thirty-six feet in length, being divided into the small and large intestine.

The Duodenum, or the first part of the small intestine, commences at the pylorus and receives the bile duct. The remainder forms numerous coils, terminating in the cæcum, or first part of the large intestine, its orifice being guarded by a valve.

The Liver is the largest and most important gland in the body, and is situated below the ribs on the right side. It secretes the bile which is stored up in the *Gall Bladder* on the under surface of the liver. The bile duct is joined by the duct from the *Pancreas*, another gland, and conveys the *bile* and *pancreatic fluids* into the duodenum, small intestine (see fig. 40).

Cæcum and Large Intestine.—The first part of the large intestine, or the cæcum, is a pouch situated in the right iliac region. A small trap-

like tube, with a closer extremity opens into the cæcum, and is called the *Vermiform Appendix*. The large bowel, or *Colon*, then ascends, crosses the abdomen above the navel, and descends the left side to end in the rectum or lower bowel, its orifice being controlled by muscular fibers or a *sphincter* at the anus. The interior of the intestines is lined by mucous membrane containing glands of various kinds in the different regions. Those in the intestine called *Peyer's glands* are noteworthy, as being inflamed in typhoid fever.

The walls of the alimentary canal contain muscular fibers, which by their action cause a "worm-like" movement of the tube called *peristalsis*, the food being forced onward.

Peritoneum.—The many feet of bowel are coiled up, filling the greater part of the cavity of the abdomen, and are covered by a fine, delicate, elastic membrane, the "peritoneum," which also lines the interior of the wall of the abdomen, and serves to attach the bowels to the vertebral column.

Food.

The diet of a healthy individual is commonly a *mixed diet*, and contains different forms of foodstuffs. A fair average daily diet for a grown man would be—

Bread, 12 ounces; butter, 1 ounce.

Meat, 6 ounces (dressed); potatoes, 6 ounces (dressed).

Rice, sago, tapioca, or bread pudding, 6 ounces.

Milk, tea, coffee, or beer, 1 pint.

A mixed diet should contain foodstuffs capable of restoring the waste of the tissues, and keeping up the heat of the body, and should never be more than what could be fully digest-

ed; any excess only adds to surplus fat and obesity, and if not assimilated, acts as an irritant, sometimes passing off in diarrhea.

The different foods may be classified as proteids, fats, and amyloids.

Proteids contain carbon, hydrogen, oxygen, and nitrogen; under this head may be mentioned meat, flour, egg or albumen, cheese, gelatine, etc.; being rich in nitrogen, they are sometimes called nitrogenous foods.

Fats are composed of carbon, hydrogen, and oxygen, and include oils, vegetable and animal fatty matters—best suited for cold-weather diet.

Amyloids contain less hydrogen than the fats, and comprise starch, sugar, bread, rice, sago, arrowroot, potatoes, etc., best suited for warm weather.

In addition to these foodstuffs, water and minerals enter largely into the composition of the body.

Digestive Processes.

DIGESTION.—The processes in the alimentary canal by which the different foodstuffs are prepared for absorption and made use of in the economy of the body are called "digestion."

The proteids are acted upon by the gastric juice, which is acid and contains the ferment *pepsin*, the albumens being transformed into *peptones*.

The fats are reduced to an *emulsion* by the action of the *bile*.

Of the amyloids sugar is easily dissolved, and requires no further change to enable it to pass into the blood. Starch, on the other hand, is useless and insoluble until it has been acted upon by the saliva, which contains a ferment, *ptyalin*, possessing the power of converting starch into sugar.

During a meal, a mouthful of bread and meat, for instance, is ground up by the teeth, rolled over in the mouth by the tongue, and should be *thoroughly mixed* up with the saliva, which converts much of the starch in the bread into sugar. The mouthful is then swallowed and received into the stomach, where the gastric juice acts upon the proteids contained in the meat and bread, and converts them into soluble peptones. The food now rendered more fluid, passes through the pyloris into the duodenum, where it becomes mixed with the bile and pancreatic juice.

The bile converts the fats into an emulsion which can pass into the lymphatic vessels, and the pancreatic juice acts upon the rest of the starch which has escaped the saliva, and also assists further to complete the other digestive processes. The food, now in the form of a creamy-looking fluid, called *Chyle*, is forced onward through the intestines by the peristaltic action, the most soluble parts being absorbed at once by the blood-vessels, while the fatty particles are taken up by the other vessels of the lymphatic system.

Lymphatic System.—The mucous membrane lining the alimentary canal is abundantly supplied with minute tubes; those of the intestine being called *Lacteals*, because the fluid they contain, and which they have absorbed from the chyle, is of milky appearance. The lacteals unite together to form larger vessels, which finally open into a duct called the *Thoracic Duct*. The thoracic duct ascends the trunk in front of the spinal column, and opens into the left subclavian vein, pouring its contents of nutritious milky fluid directly into the blood stream.

The water and minerals are readily absorbed

by the blood-vessels without any further changes.

Diseases of the Digestive System.

DISEASES OF THE ALIMENTARY CANAL.—There are certain symptoms which are common to a large number of disorders of the digestive system; for instance, indigestion, vomiting, hæmatemesis, and jaundice. These may be considered separately, but they will receive notice under the particular diseases in which they occur.

Indigestion, or Dyspepsia, means difficulty to digest, and is indicated by a group of minor symptoms, one of the most common being pain; loss of appetite, furred tongue, fetid breath, flatulence, pain and burning sensation in the region of the stomach, tension, dull headache, drowsiness after eating.

It is one of the most prevalent diseases of the day, and may be caused by whatever interferes with the healthy action of the stomach and intestines. That this disease is becoming more prevalent year by year is plainly seen by the careful observer.

An eminent practitioner has said that no person could be persuaded to pay due attention to his digestive organs until death was staring him in the face.

There is little doubt that the increase of dyspepsia is caused by the *present imperfect way of living;* as the mode of living apparently cannot be changed, we must provide other means to correct the evil as we find it.

Happily, of all the organs of the body, the stomach is the one on which we can exert the most powerful action, both directly and indirectly.

The pain varies in character, affecting the

left side and the back between the shoulder blades, and it usually bears some relation to the meals and the kind of food eaten, commencing a few minutes or an hour or more afterward. Flatulence, or gas in the stomach or bowels, often accompanies the other symptoms of indigestion, and is apt to cause palpitation of the heart. Flatulence is often increased by potatoes, green vegetables, or strong tea. Pain and a sense of fulness are frequently due to a large meal eaten hurriedly.

Indigestion may be a symptom of grave disease of the stomach, such as ulcer or cancer, but commonly it is a functional disorder. The common causes of indigestion are: indigestible food, constipation, chills, overwork, or excess in alcohol.

Food may be indigestible from being improperly cooked or deficiently masticated, and the kind of food unsuitable to one dyspeptic may agree with another, so that no one rule applies to all cases.

It is doubtless true that the stomach occasionally requires the assistance of medicine to enable it to act efficiently, for we must remember the battle of life is often severe, and the digestive organs, which are usually overworked, are the first to sympathize with the depressed mind and fatigued body.

Management.—Inquiry should be made to ascertain the cause of the indigestion, in order that it may be removed. A healthy mode of life, regular habits, and *attention to the bowels* are of *first importance.* When there is much acidity or burning in the throat, sugars, sweets, and wines should be avoided.

VOMITING, or the ejection of the contents of the stomach by the mouth, is frequently preceded by a sense of nausea, and may be accompa-

nied by faintness. In many cases it is an effort of nature to get rid of obnoxious material from the stomach, and the effect is salutary. A glass of hot water with a teaspoonful of table salt will evacuate the stomach and will often bring the quickest relief. In others it is a symptom of serious malady, either of the stomach or a remote part, but the sympathy of the stomach with other organs is so close that vomiting is a common accompaniment of disease of the brain, kidney, and uterus.

In hysteria frequent vomiting may be naturally present, or it may be artificially produced by the patient by means of emetics or mechanical irritation of the back of the tongue or fauces.

Management.—Points to be noted are the time at which the vomiting occurs in relation to food or to the kind of food; whether the vomiting was preceded by pain, and whether the pain is relieved by vomiting; whether the vomiting occurs at a particular time of the day, as, for instance, the early morning; in suspected hysteria, whether the patient seems to induce vomiting by tickling the fauces or by efforts at eructation.

Matters Vomited.—The vomit should always be inspected and put aside to be examined by the medical attendant. In many cases it merely consists of partially digested food, and has a sour-smelling odor, due to the gastric juice. In continuous vomiting, there is often much bile mixed with the vomit, of yellow, green, or brownish color. In the persistent vomiting of intestinal obstruction, the fluid has a dark brown color, is of the consistency of gruel, and very offensive, becoming fæcal in odor in severe cases. In cancer and cases of dilatation of the stomach, the fluid is thrown up sometimes

in very large quantities, a quart or more at a time. It is apt to remain in the stomach for a long time, until fermentation and some decomposition has taken place before it is ejected, and it is frothy and mixed with gas; in such cases a glass of hot salt water often gives immediate relief after the stomach has been evacuated.

HÆMATEMESIS.—Vomiting of blood is a common symptom in ulceration of the stomach, or in congestion from disease of the liver. The vomiting is often preceded by a sense of fulness or pain in the stomach, and some faintness; on recovering the faintness, the blood is promptly vomited from half a pint to a quart or more. The appearance of the blood varies slightly; it may be dark red, black, or dark brown in color, like "coffee grounds," the dark color being due to the action of the gastric juice, and there is often some food mixed with the blood. The attack may be and is usually a single one, but it may be followed by repeated hæmorrhage, and, if profuse, is dangerous to life.

Management.—Nothing should be given by the mouth except a little ice or iced water, and in severe cases no food whatever until the stomach has had a complete rest; where there is much syncope, the head should be kept low, and an ice bag may be placed over the stomach. For some time afterward great caution should be taken in giving food by the mouth, the strength being maintained by nutrient injections. Hæmatemesis is often feigned by malingerers, or hysterical females, a small quantity of blood being ejected usually in the morning. The blood is produced from the mouth, throat, or gums by sucking or wounding the mucous membrane. It has the appearance of plum juice, and is a glairy, watery fluid mixed with saliva. In some

cases the hæmatemesis is due to bleeding at the back of the nostril, the blood being swallowed during sleep and vomited in the morning; this is more apt to occur in children. After hæmatemesis the motions should be examined for blood (see *Melæna*).

JAUNDICE.—A slight degree of jaundice accompanies several kinds of fevers, blood-diseases, and occasionally pneumonia. Intense jaundice occurs in diseases which obstruct or close the common bile duct, as in gall-stones. It is also present in varying degrees in several of the diseases of the liver and alimentary canal. In such cases, the liver should be treated actively by stimulating the natural secretions until the flow of bile is again started, the liver stimulant should be kept up for several days, or even a week, until the alterative effect is gained.

It is first noticed as a yellow tinging of the whites of the eyes and the skin of the body, and itching of the skin is often complained of. The urine is high colored, amber colored, or of various hues of dark green or dark brown, according to the degree of the jaundice, indicating that the whole system has been poisoned by the stoppage and absorbtion of the bile and other secretions that nature is trying to discharge through the pores. The sweat is yellow, and stains the linen. The motions, on the other hand, are of light clay color, drab, or almost white, constipated, and unusually offensive.

In cases of closure of the bile duct, the jaundice is intense, and the secretions correspondingly affected, with great depression of spirits, loss of appetite, nausea, and vomiting. There is emaciation, great weakness, and the itching of the skin is intolerable, and aggravated by warmth in bed.

Management.—Some relief from the itching may be obtained by tepid sponging, or with a lotion of weak carbolic acid, or equal parts of glycerine and water. In jaundice due to chill or constipation, the condition of the bowels requires *constant attention*, and in most cases the bowels are confined, and should be freely evacuated.

GASTRITIS AND GASTRIC ULCER.—Ulcer of the stomach is prone to attack young women suffering from anæmia. The patients are not uncommonly domestic servants of pale aspect, who suffer from chronic indigestion.

The Symptoms of gastric ulcer are mainly those of indigestion, but the pain is usually much more acute, with tenderness over the pit of the stomach, and intolerance of pressure. The pain is aggravated by solid food, and vomiting often relieves the pain. In some cases there is an attack of hæmatemesis, followed by melæna (see *Hœmatemesis*).

PERFORATION OF THE STOMACH is a catastrophe which occurs in a certain number of these cases, and is fatal either within a few hours from collapse and shock, or subsequently in a few days from severe peritonitis.

The patient, usually a young woman, with symptoms of gastric ulcer, or indigestion, is attacked after a meal with severe, agonizing pains in the abdomen, attended with faintness, vomiting, and collapse, the abdomen being distended and extremely tender; the pulse fails, the face becomes pinched, the eyes sunken, and the extremities cold, and copious perspiration breaks out, death occurring usually in from twelve to forty-eight hours.

Management.—The diet of a patient suffering from gastric ulcer is of the highest importance; solid food should be avoided, and cool and

easily digestible fluids only allowed. If there is severe pain, or hæmatemesis, the feeding should be carried on by nutrient injections, and nothing but a little ice allowed by the mouth. Counter-irritation to the epigastrium often gives relief, and rest in bed should be insisted on in severe cases. The vomit should be saved, and the motions inspected for blood. A heavy meal, indigestible food, or exertion may cause the ulcerated wall of the stomach to give way.

When perforation has occurred, the drug administered is either opium or morphia, to allay the pain, and soothing fomentations to the abdomen (see *Peritonitis*). An abdominal operation performed early has saved life in some cases.

Intestinal Colic.—*Symptoms.*—The pain is of a griping character, and is situated in the bowels. The common cause is constipation and flatulence, or the presence of some indigestible material in the intestines. The pain is relieved by pressure and warmth, and after an aperient and *free action of the bowels*, is removed. The temperature is not usually raised unless there is some further complication. Intestinal colic may be a symptom in obstruction of the bowels, or inflammation of the cæcum.

Management.—The safest method of acting on the bowels in all doubtful cases is to make use of a heaping tablespoonful of phosphate of soda in a cup of water as hot as it can be taken, or by an enema, if found necessary.

Hepatic or Gall-Stone Colic is due to the presence of a gall-stone in the bile duct.

Symptoms.—The agony may be intense during the attack, the sufferer lying curled up or rolling over with the pain; there is often faintness, vomiting, and profuse perspiration when the pain is at its worst. The pain extends over

the upper part of the right side of the abdomen and down to the navel. The attack may subside suddenly, and may be followed by jaundice, which usually occurs when the stone obstructs the bile duct.

Management.—The best relief in gall-stone colic is obtained by the hypodermic injection of morphia, or by opiates; hot fomentations sprinkled with laudanum, or a hot bath will assist in alleviating the pain. In case of suspected gall-stones the motions should be examined for stones, and for this purpose it may be necessary to break up the evacuations and pass them through a sieve.

The common gall-stones vary much in size, are of dark brown or black color, and are marked with facets when there are several, as is usually the case; more rarely they are single and crystalline.

PERITONITIS.—The peritoneum, or delicate membrane covering the outer surface of the bowels, is liable to inflammation, as the result of cold or an injury, or it may arise as a complication in puerperal fever, typhoid fever, or other bowel complaints, or from perforation of the stomach or bowels.

Symptoms.—Simple peritonitis is usually attended with fever, abdominal pain, vomiting, and constipation. The pain varies in severity, is more or less general over the abdomen, and is accompanied by much tenderness on pressure. Most patients recover in the simple forms, but the severe cases are dangerous, and the patient lies on the back with the knees drawn up, and apprehensive of the least pressure, even of the bed-clothes. Distension of the abdomen occurs after a time, and pain in micturition, or after any movement, is complained of. The tongue may be red, with a tendency

to dryness, and there is considerable thirst. The face looks drawn, the eyes sunken, the tongue brown, and crusts collect on the lips. Death may be preceded by delirium, and is often sudden.

Management.—Great care is required in moving patients suffering from peritonitis, the bed-pan should always be used, and getting out or sitting up in bed should be forbidden. The pressure of the bed-clothes may be kept off the abdomen by a cradle, and any applications, such as poultices, bran-bags, or fomentations, should be made as light as possible.

The vomiting may be allayed by ice, and nourishment should be given in a fluid form in small quantities. Purgatives are injurious in the majority of cases, and opium or morphia is usually administered in order to keep the bowels at rest, and to allay pain, large quantities of these drugs being well borne. Stimulants will be required in cases accompanied by much exhaustion. In women careful inquiry should be made with regard to the catamenia or vaginal discharges, as the peritonitis may be associated with disease of the reproductive organs. It is frequently found desirable to explore the abdomen by operation in peritonitis and obscure cases of internal inflammation.

Typhlitis.—Inflammation of the cæcum or vermiform appendix is often attended with local peritonitis in the right flank.

Symptoms.—Pain in the abdomen, with constipation and vomiting, are the leading symptoms, and the temperature may be raised, though it is often normal.

The bowel may be loaded, and there is pain and tenderness in the right side of the lower part of the abdomen.

Management.—The bowels are often very ob-

stinate, but no purgatives should be allowed except under the express directions of the medical attendant. Warm enemata are useful, either of oil or simple, and should be given carefully and slowly, always as warm as can be borne, the result being noted. In other respects these cases require the same management as in peritonitis (see *Peritonitis*). Perforation is sometimes a fatal complication, or an abscess may form in connection with the cæcum and burst into the bowel, matter being discharged with the evacuations.

Intestinal Obstruction.—Acute obstruction of the bowels is a most formidable and fatal malady. In addition to the strangulation of the bowel in hernia, there are other causes of obstruction inside the abdomen (see *Hernia*).

Symptoms.—As in strangulated hernia, obstinate and more or less complete constipation is present, and after a time vomiting supervenes. The abdomen becomes distended to a varying extent, and pain is often felt round the navel. The sickness increases, the vomited matter soon becomes bilious, dark brown, offensive, and afterward of fæculent odor. In a few days or more, if no relief is obtained, the patient dies from exhaustion.

Management.—The administration of enemata of various kinds is often undertaken by the surgeon himself in these cases, and the long rectal tube may have to be used. If left to the nurse, she should understand the importance of giving the enema warm and in a thorough manner (see *Enema*, &c.). The nurse should notice if the fluid is returned immediately or how long retained, and whether it is colored by fæcal matter, or if there are any hard lumps or other substances. If there is any result, the fluid should be saved for inspection. The amount of

urine is often diminished in these cases; in some to a very great extent. The temperature of the body should be ascertained, but it is commonly at or about normal. Vomiting and hiccough are very distressing symptoms, and can only be allayed by ice, small quantities of fluid only being given to allay thirst and dryness of the mouth, while rectal alimentation may have to be employed to keep up the strength. The vomiting often appears to be allayed in these cases after opium has been given, or after the amount of fluid taken has been greatly reduced, but returns again if the amount of nourishment is increased. The abdominal distension may be partially relieved by hot applications or turpentine stupes. Purgatives are usually avoided, and should not be given by the nurse except under special medical direction. In the more favorable cases, the bowels are relieved after a time, and the vomiting ceases, and the patient recovers. In others, the operation of abdominal section is performed in the hope of finding and removing the obstruction to the bowel.

Chronic Obstruction of the Bowels.—The symptoms are much the same as in the acute form, but of less immediate urgency. In some cases, due to cancer of the bowel or the pressure of tumors from without, the obstruction is not complete, and the motions are small and constipated, and perhaps contain blood or mucus. The case may extend over a considerable period, with intervals of partial or temporary improvement. In others, the amount of vomiting is not great, but the bowels cease to act, no motion being passed for a month, or even more, without any great distension of the abdomen.

Diarrhœa is a symptom of irritation or disease of the intestines, and consists in frequent

and urgent calls to relieve the bowels, the evacuations being for the most part of a liquid character, often nature's way of relieving the system during a torpid liver.

The causes of simple diarrhœa are various, the commonest being unsuitable or indigestible food, cold, and epidemic influences; constipation is also a frequent source of diarrhœa, owing to the irritation of the intestine by the hard lumps. The bowels may be merely relaxed, or there may be copious purging with griping pain and constitutional disturbance.

ENGLISH CHOLERA, OR SUMMER DIARRHŒA, may prevail during the summer and autumnal season, and is sometimes epidemic or coincident with infantile diarrhœa.

Symptoms.—It is characterized by severe pain and cramps in the abdomen, vomiting, profuse purging, and attended by collapse indicated by drawn and pinched features, sunken eyes, coldness of the extremities, feeble pulse, and altered voice. The symptoms have a close resemblance to Asiatic cholera, but are less sudden and severe, and the motions contain some bile, being often of a greenish color (see *Cholera, Infantile Diarrhœa*).

Diarrhœa is an important symptom in typhoid, dysentery, tubercular and other forms of ulceration of the bowels.

Management.—Motions.—The nurse should notice the character of the motions in all cases of diarrhœa, whether watery, or of thick fluid consistence, or if the fluid is mixed with hard lumps or "scybala"; whether frothy or yeast-like, indicating fermentation, or if containing slime or mucus as in dysenteric affections. The color and odor are also of importance.

Melæna.—Black stools may be caused by the presence of blood which has been altered in

color by the action of the gastric juices, unless the blood comes from the lower part of the large bowel, in which case it may be bright red. Melæna is often significant of ulceration of some part of the alimentary canal (see *Gastric Ulcer*). It should be remembered that some medicines, such as bismuth and iron, give a dark color to the evacuations.

Management.—Simple diarrhœa due to constipation and indigestible material may be relieved by a dose of phosphate of soda or some simple aperient, or if the diarrhœa continue after the aperient has acted some form of chalk mixture is useful. Continued or severe forms of diarrhœa, perhaps indicating typhoid or some ulcerative condition of the bowel, should not be neglected, and medical advice should be sought promptly. In the meantime, warmth may be applied to the feet and abdomen by means of fomentations and hot-water or bran-bags, and the patient should be advised to remain lying down.

Diet.—Partial or complete abstinence from foods, to give the stomach a complete rest, is essential for a time, and subsequent limitation to a simple dietary of milk, arrow-root, cornflour, biscuits, or farinaceous puddings.

In acute cases, iced water, barley water, or brandy may be administered.

Persons subject to attacks of diarrhœa should avoid partaking in hot weather of much fruit, vegetables, sweets, pastries, or indigestible material.

In chronic diarrhœa beef-tea is injurious, but meat juice, raw meat, or pounded meat can often be taken instead (see *Infantile Diarrhœa*).

THE STOOLS.—***Examination of the Stools, or***

Fæces.—The following points should be noticed:—

Consistence.—Solid and natural, small rounded masses (*scybala*), semi-solid, loose, slimy, fluid, watery.

Amount.—Scanty or copious.

Color.—Dark brown and natural, bright yellow, drab, putty color, white, greenish, black.

Odor.—If peculiar or highly offensive.

Constituents.—Undigested food, grape-skins, currant seeds, fruit-stones, &c.

Foreign Bodies accidentally swallowed.

Intestinal Worms.—(See *Worms*).

False Membranes.—Shreds, or casts of mucous membrane.

Gall-Stones and biliary secretions. Search for gall-stones should be made by breaking up the motion in water and straining through muslin.

APPENDICITIS.—*Symptoms.*—Fermentation, accumulation of gas, irritation, inflammation, putrefaction, which is usually followed by gangrene.

This malady has become so prevalent and fatal, owing to the habitual use of improper food and lack of outdoor exercise, which is the cause of the sluggish condition of the liver secretions, or complete stoppage, or the retention of the bile in the liver, together with the retention and impacting of the excrement in the bowels.

It is a comparatively easy and very simple matter to wholly avoid the above series of complications that so frequently distress the individual and poison the entire system, the cause of which is so plain and so easily prevented, but is increasing in an alarming degree, especially in large cities, where the very large majority ride to business in the morning and again home at night. If they go out in the evening,

instead of taking a brisk walk to promote health, they prefer to go to some place of amusement.

We have only to read the daily papers to see that appendicitis claims by death, even with operations, many citizens from all classes of society.

Dr. Charles E. Page, one of Boston's leading physicians, writes: "An operation for appendicitis should be called a criminal operation, and as such should be prohibited by law." What Dr. Page probably means is that proper attention to the liver and bowels, to keep the flow of secretions of the liver active, and to properly keep the bowels regular, would make such an operation wholly unnecessary. He is quite correct in saying, "It seems hardly necessary to cite the long list of deaths following these operations, and this list is truly appalling."

Where a torpid condition of the liver and stoppage of its secretions exists it may be remedied either by the use of medicine, or by a surgical operation; if by medicine, the liver can best be acted on in one of two ways, viz.: by stimulating the natural secretions, which can be done by the use of a vegetable compound, without griping or distress to the patient, or by irritating the liver, as may be done by the use of calomel, a preparation of mercury.

CHAPTER VII.

DISEASES OF THE SKIN AND KIDNEY.

Skin — Structure — Sweat Glands — Sebaceous Glands—Nails and Hair—Corns and Warts—Erythema—Nettle-Rash—Petechiæ—Psoriasis — Pigmentation — Management of Eczema — Herpes or Shingles—Nævus—Pediculli or Lice —Scabies or Itch—Tinea or Ringworm—Chloasma.

Kidney—Structure—Ureters—Bladder—Examination of the Urine—Deposits—Suppression of Urine — Symptoms and Management of Bright's Disease, Acute and Chronic—Albuminuria—Renal Colic—Diabetes—Tests for Sugar—Dietary for Diabetics.

Structure of the Skin.

THE SKIN.—The outer or superficial layer of the skin is composed of scales, which are constantly being rubbed off in the shape of fine white dust, and as constantly reproduced from the deeper layers. These scales, or *epithelium*, may be shaved off or rubbed off without causing bleeding, and it is this layer which is raised by a blister; it is called the *cuticle*.

The deeper layer, the *cutis*, or true skin, contains numerous small blood-vessels, and fine nerve fibers enclosed in connective tissue. The surface is raised into ridges, and has countless minute projections called *papillæ*, containing the nerve endings, which impart to it its delicate sense of touch; and its readiness to bleed is

owing to the very free supply of capillary blood-vessels.

The skin not only acts as a covering to the body, but it is also an organ of excretion, and contains glands which serve this purpose, namely, the sweat glands and the sebaceous glands.

The Sweat Glands consist of little tubes opening into the surface of the skin, and having their ends coiled up in the deeper parts. Water and sundry impurities are extracted from the blood and poured on to the surface of the skin in the form of sweat.

The Sebaceous Glands supply a fatty or oily fluid which lubricates the skin.

Nails and *Hair* are modifications of the superficial layer of the skin. The nails are formed of scales arranged in compact layers containing horny material to which the hardness is due. The hair arises from a root imbedded in the deeper layer of the true skin, and has a superficial scaly outside and a central pith. It contains pigment which gives the hair its special color.

Diseases of the Skin.

Corns and Warts are little tumors of the skin, and are formed by outgrowth and enlargement of its natural papillæ, with an increase and thickening of the cuticle. They may occur on almost any part of the body; a favorite situation being the hand where they are apt to grow in large numbers. They bleed easily if wounded, but are merely a disfigurement. They sometimes disappear of their own accord, or they may be destroyed by nitric or acetic acid, or some other form of caustic. Their growth is increased by dirt and occupations giving rise to irritation of the skin.

Erythema is the name given to an inflamma-

tory redness of the skin, which may be local or general. Local erythema is well exemplified in an ordinary chillblain, and in addition to the redness there is often swelling, heat, and itching. A similar condition may be produced on any part of the body by an irirtant, new flannel, acid secretions, counter-irritants, or eating some kinds of acid fruits.

General or constitutional erythema, or rose rash, may appear on the body, as the result of a chill during perspiration, or from dyspepsia, and is liable to attack persons of a rheumatic temperament.

The form of erythema common in rheumatism takes the shape of large raised oval patches, situated usually over the shin or fore-arm, which are tender to the touch. The color changes to purple or violet, and fades into a yellow tint before disappearing. This same form is frequently seen in young women associated with the catamenia.

In the local forms of erythema the source of irritation should be ascertained and removed, when the rash will probably subside; the pricking and itching may be allayed by cooling lotions. The constitutional form requires suitable treatment if due to rheumatism or any special taint. The simple affection from dyspepsia or chill may be treated by saline aperients and the warm bath. The close resemblance of the rash to scarlatina, or in some cases to measles, should be remembered.

URTICARIA, OR NETTLE-RASH.—The appearance of the rash is similar to that produced by the sting of a nettle, namely, a white wheal on a red ground. The itching is intolerable, and the rash may be local or scattered in patches over the body. There is not usually much constitutional disturbance, sore throat, or affection of

the air passages, though the rash may appear on the palate and fauces. Common causes of urticaria are: irritation of the skin, strong mental emotion, indigestible food, shell-fish, and various drugs.

The itching may be allayed by the application of equal parts of tincture of benzoin and water.

PETECHIÆ is the name given the small points of hæmorrhage under the skin, which leave a red stain not obliterated by pressure of the finger. They are common as the result of flea-bites, and in such diseases as scurvy, purpura, and rheumatism.

PSORIASIS is a scaly eruption, commonly found in its simple form about the elbows, knees, or other parts of the body. The scales are of silvery white color, heaped up on patches of reddish color on the surface of the skin, varying in size from a dime to a quarter dollar piece.

PIGMENTATION of the skin may be the result of using certain ointments or of psoriasis. It is not uncommon in catamenial disorders. In *Addison's Disease* it is a symptom of the first importance, the common situations being about the neck, axillæ, mamma, navel, thighs, bend of the knees and elbows; at the garter below the knee, and about the female genitals.

ECZEMA may be either acute or chronic. There is inflammation of the skin, and an eruption presenting a variable appearance. It may be papular, vesicular, pustular, or a combination of all, but its most characteristic appearance is that of a raw, moist surface more or less covered with crusts, and known as moist or weeping eczema. The fluid is derived from the broken vesicles, and the crusts are formed by the dried exudation, and the epidermal scales which have been shed, and adhere to the sticky discharge. In the dry form of eczema,

this moisture is absent, and there are red, dry patches covered with thin scales.

The acute form is attended with some degree of constitutional disturbance, and there is much redness and swelling of the skin, and a large area may be attacked.

Soreness and itching accompany the different forms of eczema, and other discomforts according to the part of the body attacked. It is a very common disorder in children and infants, attacking the scalp (*eczema capitis*), and causing enlarged glands in the neck; or it appears behind the ears, or in the folds of the skin about the neck, or in the creases about the thighs and genital organs.

In adults it may attack any part of the skin, but is common about the forehead, nostrils, auditory canal, scrotum, breasts, palms of the hands, and soles of the feet.

The causes of eczema are numerous, some constitutional, others local; for the latter, search should be made for some cause of irritation, common examples being dirt, friction, lice, and other parasites, and in babies the constant wetting of the unchanged napkins.

Management.—After the irritating material has been discovered and removed, the attention should be directed toward the local treatment, which should be applied in a systematic manner. It is useless to smear ointments over the thick scabs, or on the matted hair covering the raw surfaces, and expect them to heal. The following directions given by Dr. Liveing should be observed:—

1st. To remove the crusts: lubricate well with oil or apply rags thoroughly soaked in oil for an hour or two; then use a hot bread-and-water poultice. If the scabs are hard, the poultice may be left on for several hours. When the

crusts are softened, they should be removed with a piece of card or the edge of a stiff quill toothpick, and any hairs attached to them cut with sharp curved scissors. The parts affected should be then well cleaned with a weak solution of boracic acid or hand sapolio and water. It is best applied by dipping a piece of flannel in warm water, laying a portion of soap upon it, and then rubbing the part well until a good lather is formed.

2nd. Ointments should not, as a rule, be merely rubbed on the eczematous surface, but applied carefully on strips of linen rag, which should be changed at least once in every twelve hours, and kept in position by a bandage, night-cap, or strapping, and the air excluded. The stronger ointments should be simply rubbed in with the finger. A weak solution of hypozone is probably the best treatment to be found.

Lotions should generally be applied on linen rag thoroughly soaked and covered with oil-silk, and should never be allowed to get dry.

In all cases of eczema the ordinary washing with water or soap must be forbidden, especially in the later stages. Frequent dusting with starch powder and moderate friction may be substituted for washing, or fine powder of bichlorate of soda may be used with a little soft water. The friction of flannel or scratching must be avoided, and children should wear soft gloves, or have their hands tied up at night to prevent this source of irritation.

Herpes is a vesicular eruption; the vesicles appear in groups, and the contents rapidly become milky, drying up, and forming scabs. There are several forms of this complaint, the two commonest being *Herpes labialis* and *Herpes zoster*, or *Shingles*.

Herpes labialis is apt to accompany attacks

of inflammation of the lung, and occurs about the lips and sides of the nose; a little poultice and zinc ointment is all that is necessary for its local treatment.

Herpes zoster, or *Shingles*, is often preceded by severe neuralgic pain round one side of the chest, with perhaps some constitutional symptoms. After a time the vesicles of herpes appear over the painful area, and extend from the spine round the side of the chest to the sternum. It is almost always confined to one side of the chest, and a second attack is unusual. The pain may continue with considerable severity for some time after the eruption has disappeared.

During the eruption the vesicles may be painted over with flexile collodion or smeared with carbolized oil.

Nævus is the name given to the various port-wine marks, red stains, and small red tumors consisting of dilated capillaries. These small nævus tumors are very common in children, and are only of consequence from producing disfigurement in exposed situations. Surgical treatment is then called for, and is most suitable and best done when the child is young. A common practice is to pass hare-lip needles through the base, and then constrict the tumor by a thread tightly tied round, until the tumor after a time sloughs off. Dressings should be applied afterward, and care taken after the operation to avoid friction or sudden tearing off of the tumor.

Animal Parasites—Pediculi.—Lice frequent the human body, especially in the case of the unwashed, and produce an eruption of slightly raised papules accompanied by much itching. There are three varieties: one affects the hair of the head, another the hair of the pubes and

armpits, the third the body. The animals have the appearance of little crabs, and may be easily seen, if carefully searched for, by the naked eye, or a magnifying glass. In the head their existence is shown by their eggs, like small white beads sticking to the sides of the shafts of the hairs; the eggs are called *nits* and the lice *pediculi;* the latter may be found secreted under the hair, especially at the back of the head and nape of the neck.

The second form inhabits the small hairs on the body, armpits, and pubic region.

The body lice are more difficult to find; they live in the folds and creases of the under garments, where they should be searched for. The two latter forms infest mainly adults of both sexes. The head lice also attack children, and produce eruptions of varying character and severity about the scalp and neck, with scabs and enlargement of the glands.

Management.—One of the most unpleasant duties of the hospital nurse is attending to the hair of the poor and unclean. The head should always be examined, and if the nits are seen on the hairs the presence of lice is a certainty, and special ablutions will be required.

It will often be necessary first of all to remove a good deal of hair, and then after soaking and combing out with a warm solution of carbolic acid and water (1-60), the head should be washed in abundant soap and water. The clothes must also be removed and disinfected or baked.

White precipitate ointment or chloroform will kill the pediculi, but cases of children with sore heads should be treated under medical advice.

Scabies, or The Itch, is a contagious disease of the skin, due to a small parasite which burrows in the skin and sets up irritation. A

vesicle is formed, which causes great itching, with inflammation of the skin, and pustules often form and break, causing scabs.

The parts of the body most frequently attacked are between the fingers and toes, wrists, armpits, thighs, and abdomen, but it often becomes general, with the exception of the face, which usually escapes. Children are very liable to the disease, and convey it to one another by sleeping together.

Management.—The whole body should be thoroughly washed in warm soap and water, and the patient should take a warm bath, and soak in it for an hour. When thoroughly dry, the skin over the whole body, except the head and face, should be treated with sulphur ointment. The strength of the ointment must be adapted somewhat to the particular case. For adults with thick skin the pharmacopœial ointment of sulphur may be used.

For children, or individuals with delicate skins, or where there is much inflammation or eczema, a weaker ointment or one diluted with equal parts of vaseline should be first used. The ointment in all cases should be thoroughly rubbed into every part at bedtime, and a long nightdress with gloves and socks should be afterward put on, and the person should remain in bed for ten or twelve hours. A warm bath may be taken in the morning, and the same process repeated the next and following night. If the ointment has been thoroughly rubbed in, two or three applications are commonly sufficient.

Eczema may be produced by the sulphur, and in most cases some eruption remains for a time after the itch mite has been destroyed, and may be alleviated by the use of vaseline or some simple ointment. The clothes and underclothing

of those affected should be baked to a temperature of 200° F., or fumigated with sulphur, and in families the children should be carefully isolated.

Vegetable Parasites.

Tinea Tonsurans, or Ringworm, is a contagious and parasitic affection which appears in two forms: one, common in children, attacks the hairy scalp; the other attacks the skin of the body.

Ringworm of the scalp commences with faint red, circular, scurfy patches having a tendency to itch, and on close observation the hairs are noticed to be short and easily broken. The roots of the broken hairs under the microscope show the minute spores of the fungus, and the fibers of the hair are seen to split up.

Ringworm of the body takes the form of circles or fairy rings with slightly elevated, red margins, and the surface is covered with fine, dry scurf.

The patches increase in size and multiply, and are attended with itching.

Management.—This consists in destroying the parasite, and is a simple matter in ringworm of the body. The patches may be painted with acetic acid or sulphurous acid, or white precipitate ointment may be used.

Ringworm of the scalp is far more obstinate than ringworm of the body, especially in long-standing cases. The hair should first of all be cut quite close for an inch round each patch, and strong acetic acid or hypozone applied to the surface, and repeated twice daily, well rubbed in at night, and washed off with soap and water in the morning. Careful and constant applications may cure the disease in a few weeks, if taken at the commencement. In

long-standing cases, the patches may be painted with hypozone three or four times a day, and will always yield to this treatment.

In children the general health often requires attention, and they should be kept from school on account of the contagiousness of the disease.

CHLOASMA is another parasitic disease, showing itself in fawn-colored patches, covered with fine scurf, most commonly on the chest, back, or abdomen. It may be removed by vigorous friction every day with flannel, soap and water, and sponging with full-strength hypozone.

The Kidneys.

THE KIDNEYS (fig 42) are two in number, of the shape of a French bean, measuring about four inches long by two inches across, and situated one in each loin below the level of the ribs. They are of reddish-brown color, glandular in structure, and may be compared to the skin in possessing numbers of tubes like the sweat glands, surrounded by small capillary blood-vessels. The function of these tubes is to separate the constituents of the urine from the blood, in a fluid form, the fluid being collected into a special part of the kidney, into which opens a duct called the *ureter*. The ureters are long tubes which descend one from each kidney in the hinder part of the abdomen, and finally open below into the *bladder*.

The Bladder forms a bag or reservoir, and is situated in the pelvis in front of the rectum. It receives the urine drop by drop from the ureters, and when full it is emptied. If the bladder is fully distended, it forms a rounded swelling in front of the lower part of the abdomen, between the navel and the pubes.

The function of the kidneys is to purify the

blood of waste substances and water, many of which, if retained, act as poisons.

EXAMINATION OF THE URINE.—The amount and quality of the urine are the main guides to the detection of the various diseases of the kidney and bladder, and it is important for the nurse to be acquainted with the condition of the urine in health.

The quantity passed in the twenty-four hours should average from two to three pints. Most healthy adults do not as a rule pass water after going to bed at night until rising in the morning.

The urine in health should be transparent and clear when passed, but after standing there may be a faint cloud of mucus at the bottom of the vessel. The reaction should be acid.

The reaction is determined by litmus paper, red and blue. The blue paper is turned red by acid urine, and the red paper blue by alkaline urine. If the urine is neutral, neither paper changes.

The specific gravity, taken by the urinometer, varies from 1015 to 1025. The average may be taken to be 1020.

There are many deviations from the normal standard without any actual disease of the kidney being present; thus a temporary increase in the quantity of the urine, light color, and low specific gravity, may be due to excitement, cold weather, or hysteria. A temporary diminution in the amount of the urine, high color, increased specific gravity, and cloudiness after standing is common, occurring in hot weather, and in feverish conditions.

Deposits in the urine are often the result of dyspepsia, gout, and bladder troubles; or are due to disease of the urethral passages, or to

vaginal discharges in females. Common deposits are: urates, phosphates, uric acid and pus.

Urates usually form a deposit in considerable quantity of reddish-brown or brick-red color in concentrated urine on becoming cool. If placed in a test-tube and warmed, they gradually disappear and the urine becomes clear.

Phosphates may form a deposit in alkaline urine; when boiled, the turbidity or cloud is increased, but disappears on adding a few drops of acetic or nitric acid.

Uric Acid may be deposited as a fine red sand at the bottom of the glass, or may adhere to the sides, or form a ring at the surface of the urine; the urine is commonly very acid.

Mucus and Pus.—The former gives rise to a flocculent or cloudy deposit of whitish color. The latter is thick, heavy, and of whitish, greenish, or yellowish color. The urine is usually alkaline, and does not clear up on boiling or adding acid.

Hæmaturia.—Blood in small quantities gives a smoky tinge, but in larger quantities a red, scarlet, or bright red hue, or it may appear dark brown or porter-colored. When intimately mixed with the urine, the blood commonly comes from the kidneys; when passed in clots, or by itself before or after micturition, its source is probably the urethra or bladder.

Bile imparts a yellow, golden, greenish, or dark olive color to the urine, and is associated with jaundice; when spilt on the clothes, it gives a yellowish stain. The amount of bile in the urine in a case of jaundice may vary considerably in the twenty-four hours.

To Test for Pus, add a little liquor potassæ to the sediment, when, if pus be present, it becomes thick and ropy. Mucus may be distin-

guished from pus, becoming thin on the addition of liquor potassæ.

Tests for Albumen.—Cold nitric acid test.—Pour a small quantity of nitric acid into a test tube, slant the tube, and pour a few drops of urine very gently down; if albumen is present, a white ring appears where the urine joins the acid.

Heat Test for Albumen.—Fill a test tube two-thirds full of urine. Boil the upper third. If the boiled portion is cloudy, and it does not clear up with the addition of a few drops of ascetic acid, albumen is present.

Test for Blood.—Pour about a drachm of ozonic ether into a test tube, add a few drops of tincture of guaiacum, shake them together, slant the tube, and pour down very gently a few drops of urine; if blood is present, a blue ring appears where the urine joins the ether and guaiacum.

Test for Bile Pigment.—Pour a little urine onto a white plate; dip a glass pipette into strong nitric acid, and drop it on the urine; at the point of contact, if bile is present, a play of color is obtained—green, yellow, violet, blue.

Tests for Sugar.—There are many tests for sugar in the urine. The usual test is known as the Copper test, in which a blue solution of copper, on being boiled with the diabetic urine, changes to a yellow or orange-red color. There are different ways of applying the test. A small quantity of Fehling's solution is boiled in a test tube to make sure of its purity, as it is liable to decompose with keeping; it should retain its blue color on boiling; add to this a few drops of the urine, boil the mixture, when the characteristic color will appear, if sugar be present, in the form of a copious precipitate. Another method is to boil a small quantity of the urine

with an equal quantity of liquor potassæ, and then add a few drops of a dilute solution of sulphate of copper, when the reddish-yellow precipitate will appear on further boiling if sugar is present. A third method, also useful as giving an estimate of the amount of sugar contained in the urine, is known as the *Fermentation test.* It may be applied as follows:—

Fill two specimen glasses with the urine; into one put a small piece of German yeast; cover both glasses with a piece of paper coming well over the sides of the glass. Place the two glasses side by side in a warm place for twenty-four hours. At the end of that time the fermentation process is complete. The specific gravity of both specimens is now taken, that of the unfermented urine being the standard. The fermented urine will be found to have lost some degrees of specific gravity according to the amount of sugar present. The difference in the specific gravity of the two specimens, the fermented and the unfermented, will give the number of grains of sugar contained in an ounce of urine. Thus, if the *unfermented* specimen has the specific gravity 1035, and the *fermented* specimen only marks 1020, it contains about 15 grains of sugar in each ounce of urine. This method is roughly accurate, and is useful for ordinary working purposes.

Suppression of Urine is a symptom of considerable danger, and may indicate a failure on the part of the organs to excrete the urine. Suppression may occur in acute kidney disease, or in cholera and some other bowel affections, and must be distinguished from retention of urine, in which the bladder is full or contains urine, but there is some impediment to its being discharged from the bladder (see *Retention of Urine*).

Diseases of the Kidneys.

BRIGHT'S DISEASE, OR INFLAMMATION OF THE KIDNEY.—Acute Bright's disease is induced by cold, scarlatina, and other acute affections, or may occur in pregnancy.

Symptoms.—In the severer cases the onset may be sudden, with fever, marked chilliness, vomiting, headache, pain in the loins, and gastric disturbance. The urine is scanty, or may be temporarily suppressed, and what is passed is turbid or high colored, or mixed with blood. The eyelids and face are soon noticed to be puffy, also the skin about the ankles, genital organs, and the dependent parts of the body. The skin has a whitish, waxy appearance, and readily pits on pressure. The vomiting may be troublesome, and the pain in the loins severe; and in unfavorable cases complications may occur—dyspnœa from œdema of the larynx or lungs; or inflammation of various organs, the lungs, pleura, or pericardium; or coma and convulsions may set in. The onset is often mild or insidious; the condition of the urine is the most marked feature.

Albuminuria.—The urine contains albumen, and should be saved for examination in all cases where there is any suspicion of the disease, or where it is known to be likely to supervene, as after scarlatina or diphtheria (see p. 177).

Management.—In all cases of acute Bright's disease the patient should be kept in bed, and a flannel nightdress may be worn with advantage in cold weather. The condition of the bowels, skin, and the urine requires attention, and the diet is of the highest importance. Free action of the bowels is imperative, and active purging may be necessary in some cases.

Perspiration should be encouraged, and free

action of the skin promoted by warm or hot bottles, the wet pack, or preferably the vapor bath (see *Baths*). The urine should be saved, and the quantity passed in the twenty-four hours measured and recorded on a chart kept for the purpose. The patient should be directed to pass water before the bowels act, and after all the urine has been collected together and measured, a specimen may be set apart in a urine glass, or, if desired, one specimen of the day and another of the night may be arranged separately; but a specimen of what has been passed during the entire twenty-four hours is always preferable. The conical specimen glass should be used, in order that the deposit may be collected at the bottom and obtained for microscopical purposes.

Diet.—Many physicians allow only milk and bland drinks such as barley water or rice water throughout the attack, and for a considerable period afterward. If albumen appear in the urine of a patient convalescent from scarlatina, the nitrogenous food should be discontinued, and milk and farinaceous food substituted. A plentiful supply of fluids assists the action of the kidneys, and a more copious flow of urine is promoted. During convalescence there is often great pallor and debility, and care should be taken on first going out to avoid cold winds and wet. The patient seldom requires alcohol, and on resuming a more liberal diet the urine should be examined at intervals for albumen, and the state of the bowels regulated.

Chronic Bright's Disease.—There are two forms of this disease, which are very different in appearance and symptoms. The one is more liable to attack persons in the first half period of life, either commencing insidiously or following on the acute form.

The Symptoms may be said to correspond very much with those of the acute disease, but it runs a slow course, showing a special tendency to produce anæmia, dropsy, vomiting, and gastric troubles. The other is decidedly a disease of more advanced life, commencing usually over forty, and is commonly the result of overindulgence in alcohol, or overwork. The term granular or gouty kidney is sometimes applied to this form of the disease, and its symptoms are: loss of nutrition, giddiness, and headache; shortness of breath, and copious micturition, especially at night; the urine being light in color and of low specific gravity. Attacks of gout may be associated with the disease, but dropsy is not common in the early stages. Death may occur from dyspnœa, cerebral hæmorrhage, uræmic convulsions, and coma, or from exhaustion.

Management.—The same rules as in the acute form will apply to the clothing, but except dropsy is present or other serious complications the patient is not always confined to bed. The urine should be measured, and specimens saved for examination, and the effect of remedies on the amount of the urine will have to be observed and noted. The condition of the skin and the encouragement of perspiration by vapor baths is important. This latter is the most efficient means of diminishing the dropsy, and may have to be carried out by the nurse for a considerable period (see *Baths*).

Flannel should be worn from head to foot next the skin, and the feet especially should be kept warm and dry by woollen stockings. Warm baths, or Turkish baths, during convalescence, and moderate exercise help to promote the action of the skin.

The severe complications of excessive dropsy,

dyspnœa, and lung affections, or uræmic coma and convulsions, are commonly fatal (see *Dropsy, Dyspnœa, Coma, Convulsions*).

Diet.—Milk is the chief article of diet, but greater freedom has to be allowed in many cases where the milk is badly taken or does not agree. Four to eight pints may be taken in the twenty-four hours, when nothing else is allowed; or with less quantity, nutritive broths, fat meats, such as bacon or pork, fish and white meat may be substituted; rice and green vegetables are only permissible. Potatoes, eggs, and much butcher's meat should be avoided. Headache, palpitation, or indigestion are signs that the diet is unsuitable.

Renal Colic, or pain in the kidney, is usually the result of a stone in the kidney or ureter. The pain is felt in the loin of the side affected, working its way round to the abdomen and flank, and perhaps extending down the thigh and toward the genital organs. The pain varies from a dull ache to an acute almost unbearable paroxysm, during which the thigh is flexed to relax the abdominal wall; the patient is sick, or has a rigor, and becomes faint, breaking out into a profuse sweat. The urine may be retained, or there may be a constant desire to micturate, only a small quantity being passed at a time; it often contains blood, or a deposit of various crystalline forms.

Management.—During the attack, hot applications to the affected part sprinkled with laudanum help to relieve the pain and spasm, or the hot bath gradually raised to as high a temperature as can be borne is useful, the patient remaining in during the intensity of the attack. The length of the attack varies from a few to many hours, and in many cases relief is only obtained by the use of morphia given hypoder-

mically. The urine should always be carefully saved, as the presence of blood or crystalline deposit is of much assistance in determining the nature of the complaint.

DIABETES.—Although not a disease of the kidney, the urine in this complaint is altered in character by the presence in it of sugar.

When describing the assimilation of the different foodstuffs in digestion, the easy absorption of sugar by the blood, and the transformation of all starchy material into sugar by the salivary juice was mentioned. The amount of sugar passing into the general circulation in health would be very great, were it not for a special function of the liver to prevent a considerable quantity from doing so. When this function of the liver is at fault, or in some way deranged, the sugar is discharged with the blood circulating in the body, and finds an outlet through the kidney. The urine in diabetes contains sugar in varying amount, and the complaint is attended in addition with other symptoms of importance.

Symptoms.—The onset is mostly insidious, and commences with an increase in the quantity of urine, the patient having to get out of bed once or more often during the night. The appetite may be increased, but loss of weight and muscular weakness are noticed, and thirst and dryness of the skin are complained of.

Urine in Diabetes.—The quantity is much increased; from two to six quarts or more is common. The color is clear or greenish-yellow. The specific gravity often marks as high as 1030-1045, and the urine, on examination, is found to contain sugar (see p. 145).

The course of the disease is essentially chronic, more acute and fatal in young adults, but more favorable in persons over 40 years of age.

Danger is indicated by increase in the severity of the symptoms, and a large quantity of water containing much sugar. The fatal termination is in many cases preceded by drowsiness, and heavy, deep breathing, gradually passing into coma. Other complications are: carbuncle and boils, neuralgic pains, pulmonary inflammation, albuminuria, and gangrenous inflammation of the extremities.

Management.—Diet is the first and chief point to be attended to, and it is necessary to diminish or exclude saccharine and starchy material, which accentuate the symptoms and keep up the activity of the disease. Almost all kinds of animal food, flesh, fish, and fowl may be consumed by the diabetic, but the cooking should be carefully supervised, and the cook informed upon every point in the serving up of made dishes, soups, etc. Soups must not be thickened by farinaceous matter, joints basted with flour, or jellies sweetened with sugar or syrup. Many vegetables are obnoxious, potatoes in particular, but many green vegetables may be allowed. Bread is injurious, and is the most difficult article of everyday food for which to find an efficient and palatable substitute. Milk agrees well with many diabetics, but contains sugar of milk, so that large quantities may prove harmful. Owing to the great emaciation accompanying the disease, it is important that the diabetic should be well fed, and from the great restriction necessary much ingenuity is required to provide a tempting variation in the bill of fare from day to day. In some cases when there is great loathing of the restricted diet, greater latitude has to be allowed, as restriction is harmful, selecting foods most easily assimilated and least liable to aggravate the disease.

Dietary.—The following dietary is useful, containing most of the articles of food and drink that a diabetic *may partake of:*—

Poultry, game, and fish of all kinds. Beef tea, broths, and animal soups not thickened. Eggs, dressed in different ways.

Cheese, cream cheese, butter, and cream.

Substitutes for bread are: graham or gluten bread, or brown bread thoroughly toasted.

Vegetables—greens, spinach, turnip-tops, celery, endive, lettuce, water-cress, mustard and cress.

The following vegetables should only be taken in small quantities, and should be boiled in a large quantity of water:—

French beans, Brussels sprouts, cauliflower, asparagus, and vegetable marrow.

No vinegar—fruit acid instead.

Jelly, flavored, but not sweetened. Savory jelly, blanc-mange, custard without sugar.

For drink: tea, cocoa, milk, or buttermilk, Sauterne, hock, soda-water, Burton bitter ale.

The following must be avoided:—

Sugar in any form. Rice, arrowroot, cornflour, oatmeal, sago, tapioca, macaroni, vermicelli. Potatoes, carrots, parsnips, beet-root, peas. Pastry and all puddings. Fruit of all kinds, fresh and preserved. Sweet ales, porter and stout, cider, sweet wines, sparkling wines, port wine, liqueurs.

Some variations will have to be made in different instances, certain articles being apt to disagree with each individual.

The nurse will have to keep a very strict watch on patients under her charge with regard to the diet. In hospital practice, many of the patients do not understand the importance of the restrictions, and wilfully break through the rules, and even the best-intentioned will

sometimes covertly obtain forbidden food. An unexpected increase in the sugar in the urine, or an accentuation of the symptoms without due cause, should raise a suspicion that contraband articles are introduced in some way or other.

Worry, anxiety, and overwork should be avoided as far as possible, and the attention of the patient should be distracted from the disease. Exercise and fresh air should be obtained regularly, but hard travelling discouraged.

Free and regular action of the bowels is absolutely essential, and warm baths will assist the action of the skin.

Thirst may be assuaged by acid drinks, containing lemon juice, and a fair quantity of fluid must be allowed when the thirst is excessive.

The symptoms are controlled either partially or entirely after the diet has been restricted for a short time; the amount of urine diminishes, as also the quantity of sugar contained. The patient gradually regains flesh and strength, and as long as the diet is adhered to, continues to improve, or remains stationary.

The drugs which exert most influence in allaying the symptoms are: opium, codeine, or morphia; and cod-liver oil is beneficial as a food, if it can be retained and assimilated.

Dangerous or fatal complications may be preceded by an increase in the symptoms of thirst and emaciation, or by pulmonary disorders; constipation, shortness of breath, and drowsiness may indicate the approach of coma; albumen in the urine is also a grave symptom.

All accidents and acute diseases are excessively fatal in the diabetic. From the tendency to gangrene in the older patients, wounds of the extremities should be carefully attended to,

and corns should not be cut with the knife, or strong caustics applied.

Sweaty Feet.—Excessive sweating of the soles of the feet is a common affection among domestic servants. It is frequently associated with a most unpleasant odor, which is almost characteristic of the affection, and permeates all the surroundings of persons suffering from it, and even clings to the room which they have left.

Management.—It may be cured by care and attention in the following way: The old boots and shoes previously worn will be found to have an offensive odor; the insides may be well powdered with boracic acid powder, or, if much tainted with the discharge, the lining should be removed and new cork soles introduced. A solution should be prepared by adding powdered boracic acid to a quart or more of hot water until the water ceases to dissolve it, and some powder remains at the bottom. This may be allowed to cool. Several pairs of stockings should be placed with the feet in the solution, and, when soaked, should be afterward dried. The stockings are now ready for use, and should be changed several times in the day in bad cases. The feet of the stockings should be replaced in the solution after they have been worn. The cork soles may be also soaked in the solution, if they become offensive, and dried.

The patient's feet should be washed every night, and the soles anointed with zinc or salicylic ointment.

CHAPTER VIII.

ON FEVERS.

Fever — Different Forms of Fever — Infectious Fevers — Germs — Contagion and Infection — Isolation—Rules for Disinfection—Incubation and Invasion Periods.

Symptoms and Management of Chicken-Pox—Scarlatina—Small-Pox—Measles—Typhus—Typhoid Fever and Its Complications—Diphtheria—Mumps—Cholera—Rheumatic Fever—Malarial Fevers—Ague.

Different Kinds of Fever.

The word fever denotes a more or less continued elevation of temperature, and is said to be *moderate* when it does not exceed 103°; *high* when it stands at 105°; and *very high* or *hyperpyrexial* when it continues above 105°.

The course of fever has certain characteristics in different diseases; it is termed *continued* when it runs a prolonged course with but little intermission; *remittent* when it fluctuates every day, but does not regain the normal until the disease is at an end; *intermittent* when there is an interval of some duration in which the temperature remains at the normal between the periods of fever. *Hectic* denotes a remittent form of temperature common in affections associated with suppuration and abscess formation, and is usually accompanied with a pink flush on the cheeks, pallid face, and a profuse perspiration when the temperature descends.

Accompanying these varieties of feverishness there is frequently a sense of chilliness, or a rigor when the temperature ascends, and a disturbance of the bodily functions, a quick pulse, increased rapidity of respiration, headache, lassitude, and digestive derangement.

THE INFECTIOUS FEVERS form a separate class owing to the fact that they are communicable from person to person.

Terms have been used to classify fevers, such as *specific* or *zymotic*, according to the views held as to the nature of the poison. But the doctrine accepted at the present day ascribes these diseases to the agency of minute organisms called *germs*, which are exhaled from the body of the patient. These float in the air, mix with the dust, or are carried in water, milk, or food, and thus conveyed to human beings, in whom they may produce an outbreak of the same disease from which they originated.

Contagion and Infection.—Contagion implies communication by contact with the affected person, but infection is a more convenient term, and includes all methods through which the disease may be spread from person to person, whether by close intercourse, or at a distance, by the dissemination of small particles in air, water, or other media.

There is some difference among the infectious fevers in the degree of infective powers of the emanations from the different parts of the body; thus, in diphtheria, measles, and in the early period of scarlatina the breath is a ready means of infection. In small-pox, and in desquamation after scarlatina, the skin carries the poison, while in typhoid and cholera the discharge from the bowels are loaded with the germs of the disease.

Precautions to Be Adopted to Prevent the Spread of Infection.

SEPARATION AND ISOLATION OF THE SICK PERSON.—The first thing to be done in the case of infectious illness is to remove the sick person, and isolate him completely from others.

At the commencement of an epidemic or outbreak, and where the initial symptoms of illness are unpronounced, such a proceeding may not be possible until the appearance of the rash. When epidemic or infectious fever is prevalent, or when it has already attacked a household or school, measures for isolation can often be taken at the earliest onset of the disease.

A rigor or feverish symptoms may denote the onset of any fever; in measles, discharge from the eyes and nose, sneezing, or coughing in scarlatina, sore throat and pain in swallowing are early signs, and the contagious material is active from the commencement. In a school or public institution the patient should be removed to the sick house or sanatorium, where isolation is easily managed. In a private house, the most secluded region should be chosen, a room at the top of the house for the bedroom, and, if possible, the whole floor should be kept exclusively for him and for those in attendance on him. The rooms may be previously stripped of all unnecessary furniture, curtains, carpets, or woollen material likely to retain particles of contagious matter. No one else should be permitted to enter the room, and the inmates of the house should be kept from all communication. The attendants should avoid unnecessary intercourse with the household, and the needful crockery and utensils should be kept exclusively for the patient's use, and instead of being sent downstairs, they should be washed by his attendant. The food should be placed outside

the door and taken in by the nurse, the uneaten remnants being destroyed.

Disinfection has for its object the destruction of the morbid particles or germs thrown off from the sick person. Disinfection is necessary for the room, the patient, and for everything that has been in the same room with him. Some general rules have been laid down by the medical officers of health as usually applicable in all cases of infectious illness.

Rules for Disinfection.

1. The room occupied by the patient must be well ventilated, the windows kept partly open, and, when the season will permit, a fire should be kept burning in an open grate. The floor must be cleaned every day, and sprinkled with disinfectant fluid.

2. The door should be closed, and a sheet, kept constantly wet with a solution of carbolic acid (1-40), may be hung as a curtain outside, so as to cover all the crevices.

3. All bed and body linen after use and before leaving the room should be left to soak for at least an hour in the carbolic solution. These should then be boiled in water, and well exposed to the air.

4. All discharges from the patient—phlegm, vomit, urine, æces—should be received into vessels containing some disinfectant powder. After use, some more of the disinfectant should be added before carrying the vessel out of the room and emptying it into the closet. Pieces of rag used for wiping away the discharges from the patient must be burnt immediately after use (see *Bed-Pans*).

5. All crockery, knives, forks, etc., used by the patient should be placed in disinfectant solution, and subsequently washed in hot water.

6. The patient's body should be kept scrupulously clean, and the bed ventilated during the day. If scales or crusts form upon the skin, they may be smeared with ointment or oil, containing antiseptics, to prevent their dispersion.

7. Nurses or attendants should, if possible, be of mature age, or such as have already had the patient's disease; their dress should be of cotton or material that will wash easily. Before taking meals and before leaving the room, the hands should be carefully washed in carbolic solution. They should avoid, as far as possible, inhaling their patient's breath or the emanations from the skin or other discharges. They should avoid all unnecessary communication with the other members of the household. On ceasing attendance, they should observe the rules for the disinfection of their clothing, and disinfect themselves by warm baths, paying particular attention to the cleansing of the hair. The skin should be well sponged all over with a warm solution of carbolic (1-40), and then washed all over with soap and water. The nails should be cleaned with the solution, and a nail brush used.

8. If visitors have to be allowed under exceptional circumstances, they should be made to conform to the rules observed by those in attendance.

9. The patient must not be allowed to mix with others until he has received permission from the medical attendant, and until he has been disinfected by the use of warm baths, and sponging with carbolic solution. Clothes that have been exposed to infection must not be worn until they have been thoroughly disinfected.

10. *Disinfection of the Room, Clothing, and Contents.*—When the patient is convalescent

and has left the sick-room, all the articles which cannot be dealt with at home, such as bedding, drapery, curtains, and outer clothing, should be sent away to the "oven," which is usually provided in certain districts by the health authorities for purposes of disinfection, and who will remove them if applied to. There they are subjected to a heat of from 212°-250° F. for several hours.

Clothing and other materials remaining in the room should be spread out and hung upon lines fastened across the room, and all other articles exposed; the doors, chimneys, windows, and all openings must be well closed and covered by pasting brown paper over the crevices before fumigation. For fumigation, take half a pound or more of sulphur, according to the size of the room, break it into small pieces, and place it in an iron dish or pan, and then set it on fire with a few live coals. The dish should be supported over a pail of water by placing the tongs across as a precaution against fire. The attendant should at once leave the room on lighting the sulphur, and close the door. The room may be kept shut up for twenty-four hours. At the end of this time the room should be freely ventilated by opening the windows and doors, and all its contents exposed to the air. The floor should be well scrubbed, and repapering, painting, and white-washing would be extra precautions.

Sinks and closets which have been used during the illness should be well flushed with disinfectant solution, and afterward thoroughly scrubbed down and ventilated.

Infectious Fevers.

THE INFECTIOUS FEVERS are chicken-pox, scarlatina, small-pox, measles, typhus, typhoid, diphtheria, mumps, and cholera.

Incubation and Invasion Periods.—The infectious fevers have several characters in common. After the entrance of the infectious material into the body, a period of time elapses in which no symptoms of illness are apparent; this quiescent interval is called the incubation period. The length of this period varies in the different fevers, and is apt to be inconstant. At the end of incubation, the period of invasion commences with symptoms of illness of varying intensity. There is commonly chilliness, loss of appetite, lassitude, or headache. In some patients a rigor denotes the onset, or in children convulsions or vomiting. The temperature is elevated and the pulse quickened, and the other symptoms of feverishness appear.

The rash or exanthem will come out a day or more after the illness commences, the length of the invasion period being peculiar to each fever.

VARICELLA, OR CHICKEN-POCK, is most common in children, but may attack adults. The incubation period is usually from a week to a fortnight. The invasion is often so mild as to escape notice, and the rash appears in twenty-four hours. The eruption takes the form of minute papules and vesicles appearing on the chest and trunk, head and limbs. They often come out in crops, increase in size, become flattened, and the fluid inside is of milky color. They burst and dry up, forming scabs, which finally disappear, but may leave some slight scarring. The crops last four or five days each, and the course of the whole disease from a fortnight to three weeks.

Management.—The disease is a mild one, and not usually attended with severe symptoms or high fever. The patient should be separated from other children, and put on light diet. No special treatment is necessary. Children should

be prevented from scratching or picking the vesicles, which may ulcerate and cause sore places, in which case simple dressings will be required.

Scarlatina, or Scarlet Fever, is a disease which attacks children and adults in preference to older people; it is frequently epidemic, and highly infectious. The incubation period is often short, less than a week, and the rash comes out on the second day of the illness. The invasion is sudden, and usually marked by chills, vomiting, and sore throat. The rosy or red rash appears first on the chest, and is seen early on the flexor aspect of the joints. It becomes general in the course of forty-eight hours, and is fully developed on the third or fourth day. The other symptoms continue or increase during the development of the rash, and the throat presents a dusky red appearance, with swelling of the tonsils. The tongue may present the characteristic strawberry-like appearance, a white fur with red papillæ projecting. The rash begins to fade on the fourth to the sixth day of the disease, and disappears in a day or two; the other symptoms also decline, and the temperature comes down. Peeling of the skin or desquamation next commences on the chest and other parts of the body, and lastly on the limbs, and hands and feet.

In a mild epidemic of the disease the symptoms are of slight character; indeed, in some patients they escape notice, and the rash itself may be overlooked. Some desquamation may be observed afterward, and the disease in this way is easily spread.

In others the attack is severe, and in some dangerous or fatal. The rapidly fatal cases die from profound nervous complications, such as

delirium or coma, or else from extreme prostration, a few days after the onset; such cases are termed "malignant," and are usually associated with defective sanitary arrangements.

In severe cases the throat symptoms are predominant, the tonsils being much swollen or ulcerated, with sloughing patches. Complications liable to occur are rheumatism, pericarditis, inflammation of the internal ear, and empyema. During convalescence, inflammation of the kidney with albuminuria and dropsy may appear in the third or fourth week.

Management.—Immediate separation of the patient from other individuals should be insisted on, and an observance of the ordinary precautions for the management of infectious cases (see *Isolation and Disinfection*). In mild cases no particular remedies are used, and the fever will run its course. In those complicated with severe sore throat, and where there is difficulty in swallowing, pieces of ice may be given to suck, or steam inhaled, or the throat washed out with chlorine-water. Warm milk is usually well taken, and in cases where there is much depression some form of stimulant, usually a milk punch or egg-nog, is required. During convalescence in the third and fourth week a careful watch should be kept on the condition of the bowels and urine, as kidney-complications are apt to ensue. This would be indicated by the presence of blood in the urine, or by albuminuria, with perhaps some gastric disturbance, and dropsy of the eyelids, face, or feet. The urine should be examined for albumen constantly, and if this begin to appear, the medical attendant should be informed. Cold or chills should be scrupulously avoided by confinement to bed, the bowels should be *freely open*, and the diet restricted, the nitrogenous

elements, such as meat, being avoided; beef-tea, milk and eggs are preferred for nourishment.

Desquamation.—The surface of the body should be well oiled with carbolized oil to disinfect the skin before it peels. Warm baths, and the use of carbolic acid soap, are a great assistance to the peeling, which often continues for six or more weeks after the fever. In any case, the patient is not safe as long as desquamation persists, and the hands and feet should be carefully inspected before he is allowed to mix with others (see *Disinfection*).

Small-Pock, or Variola.—Before the discovery of vaccination, this disease was one of the most dreaded scourges of the country, owing to its great fatality, and from the extreme disfigurement of many who survived the attack. Nowadays, in those who have been efficiently protected by vaccination, small-pock assumes a modified form, in some of a very mild character.

The incubation period is from twelve to fourteen days. The invasion is often sudden, with rigors, vomiting, headache, and pain more or less intense in the lumbar region of the spine. On the third day the eruption appears in the form of small reddish papules on the face, neck, and wrists, and gradually spreads to the other parts of the body. The spots are hard, and feel like shot under the skin, and enlarging in two or three days become vesicular, and in six days contain pus. At this time the surrounding skin becomes inflamed and red and swollen. The pocks then subside and dry up, forming scabs.

The constitutional symptoms and fever vary greatly in intensity, but on the first appearance of the rash these all subside in a marked degree, until the sixth or seventh day, when the vesicles mature and become pustular; there is

again an increase in the fever, and the constitutional symptoms may be more severe than at the commencement, and attended with delirium and a dry tongue. The rash also appears in the throat and fauces, and may cause great soreness and pain in swallowing.

Management.—A large, airy, well-ventilated room should be procured, if possible, and the precautions for isolation rigidly adopted. The nurse selected should be one who either has had the disease, or has been thoroughly protected by vaccination.

In mild or modified cases the disease runs its course without occasioning any anxiety. In the "confluent," or severe forms, a fatal result is common in the unvaccinated, or symptoms of the gravest kind may be present.

When there is great soreness of the throat, warm bland drinks may be given, and if there is much discharge from the nostrils or fauces, some mild astringent wash may be used. The local treatment of the rash is important to prevent abscesses, and to modify the soreness of the pustules. The patient should be kept clean, and frequently sponged with tepid water. The condition of the eyes should be watched, as pustules may form on the conjunctiva. The surface of the body may be anointed over with carbolized or olive oil every day after sponging. The face may be coated with collodion or dusted with finely powdered boracic acid or zinc powder. When the scabs are hard, black, or offensive, bread poultice may be applied to loosen them and allow the matter to escape.

MEASLES.—The incubation period lasts from twelve to fourteen days. The invasion period is marked by symptoms of a cold in the head and some feverishness. There is sneezing, running at the eyes and nose of watery mucus, a patchy

redness of the mouth and fauces, and usually an irritable cough. On the fourth day the eruption begins to appear about the neck and behind the ears, and on the forehead, and then on the chest, gradually invading the rest of the body and extremities. It attains its height in from two to three days, and then gradually declines. The rash consists of small red papules which increase in size, and form crescents or irregular circles. There is some branny desquamation for a week afterward. The complications likely to occur in measles are those affecting the lungs, such as bronchitis and inflammation of the lungs. Inflammation of the ear and earache, or conjunctivitis, may supervene. Diarrhœa is an ordinary complication, and is troublesome in some cases. In the more severe cases, delirium and great prostration is present, and gangrene of the cheek or vulva in delicate, feeble children is sometimes a fatal event.

Management.—The contagion of measles is very active at an early period before the appearance of the rash when the catarrh is present. When measles is epidemic, this catarrh should create suspicion, and separation be enforced *at once.* Children should be placed in bed at once, and care taken to avoid chilling of the surface, or anything tending to aggravate the cough or produce pulmonary complications. If these occur, they will require special management (see *Bronchitis*).

Attention should be paid to complaints of ear-ache in children, and any discharge noticed. Aperients should be avoided, as the subsequent diarrhœa may prove troublesome.

During convalescence precautions against cold are very necessary, as some delicacy of lung, or general debility, is often left in children, especially in those of tubercular taint.

Bötheln, or German Measles.—The incubation period is sometimes very long, nearly three weeks. The symptoms are often less severe than true measles, and the rash is papular, not blotchy, and more rosy in tint than measles. The rash is often preceded or accompanied by swelling of the lymphatic glands behind the ears and on the nape of the neck. There is less tendency to catarrh or delicacy during convalescence.

Typhus.—Putrid fever, or gaol fever, are other names for this fever, which is occasioned mainly by overcrowding, destitution, and dirt.

The early symptoms are characterized by great dulness and mental confusion, with quick pulse and fever. After the fifth or sixth day the mulberry-colored rash of small spots appears, with petechiæ (see *Petechiæ*).

The constitutional symptoms are grave, and delirium, or coma with great prostration, may forebode a fatal result. The urine is retained, and must be drawn by the nurse, and the fæces passed unconsciously, and the patient sinks from exhaustion, bed-sores, or pneumonia. In favorable cases the symptoms abate, and the temperature subsides, perhaps suddenly, during the third week.

Management.—In addition to the ordinary observances, constant stimulation will be required in bad cases, and complete confinement to bed. Careful attention to the bladder and to the prevention of bed-sores is requisite, when there is much insensibility. A peculiar odor has been noticed in this disease, which is said to be characteristic. There is sometimes some difficulty in the early stages in distinguishing typhus from measles and hæmorrhagic small-pox. The disease is most fatal in children and old people,

but epidemics are rare now in this country, and a solitary case occurs only now and then.

Typhoid, or Enteric Fever.—This disease may occur at any period of the year, but is most common in the autumn months, and though attacking persons at all ages, is essentially a disease of early life.

The specific contagion is contained abundantly in the stools and emanations from typhoid patients, and it may be conveyed to others by use of the same drinking cup, drinking water, milk, or by the effluvia from infected drains, or from the different excretions of the patient. Epidemics of typhoid fever are common, and may often be traced to an impure water supply, or to the milk supply from an infected dairy. Direct contagion from the patient or the stools is not infrequent in the case of nurses or attendants of a youthful age.

The nature of the disease consists essentially in inflammation and ulceration of the Peyer's glands of the intestines. In the earlier period, during the first week, there is swelling of the glands, and these ulcerate during the second and third weeks, when the slough separates, leaving the bowel very thin at this part, until healing has occurred during the fourth and fifth weeks.

Symptoms.—No two cases are exactly alike, but an instance of an ordinary attack may be given by way of example:—

After a week or more of general indisposition and increasing lassitude, the patient takes to his bed. He has a heavy, dull look; his face pale, with slight flush on the cheeks. The tongue is moist, red at the tip and edges, with a light white fur in the center. The abdomen may be rather tumid and tender, and the motions are usually loose. The stools are com-

monly of light yellow color, and of the consistence of pea-soup. The temperature is elevated, being higher at night than in the morning. The pulse and respiration are quickened, and a bronchial cough is often present. About the tenth day, or between the seventh and twelfth, a rash appears in the majority of cases. The rash consists of minute papules on the abdomen, chest, or back. They are rounded, perhaps slightly elevated, of rose color, and fade on pressure, returning when the pressure is removed. Each spot lasts about two or three days, gradually fading. The general condition of the patient is characterized by weakness and prostration with stupor, and wandering at night.

Toward the end of the third, or in the fourth week, the tongue begins to clean, and the temperature gradually falls, reaching the normal about the end of the fourth week. Convalescence is gradual and slow, and commonly without serious drawbacks (fig. 43).

Relapse.—In a certain number of cases, after a week or fourteen days from the time the temperature gained the normal, the temperature again begins to ascend, and fresh rose spots appear, with a repetition of the original illness, though of shorter duration; this is called a "relapse." One or more relapses may occur, and they are usually less severe than the first attack (fig. 44).

More severe cases are indicated by a higher temperature, of 105° or 106°, or by great prostration, a dry brown tongue, or profound nervous symptoms of delirium and stupor.

In typhoid fever, whether mild or severe, certain complications are usually apt to occur at certain periods, with which the nurse should be acquainted. In the early stage, or during the

first ten days, serious complication is uncommon, there is sometimes slight bleeding from the bowel or nose.

Death in the early stage of typhoid fever is rare.

After the second week the complications are *more dangerous.*

Severe Diarrhœa, with eight or ten watery evacuations during the twenty-four hours, may cause great prostration.

Hæmorrhage from the bowel should be watched for; a few ounces need not cause alarm, but half a pint or more repeated at intervals is dangerous.

Peritonitis and Perforation.—The former is always of grave import and sometimes fatal, and the latter almost certainly fatal.

Bronchitis and Pneumonia.—Some branchitis is commonly present, and need not cause anxiety unless severe, or accompanied by lividity and difficulty in breathing. Pneumonia is apt to supervene very insidiously, and may be indicated by short, rapid breathing, pain in the side, or blood-stained sputum.

Bed-sores are very easily produced from the wasing of the tissues, lying in one position, involuntary evacuations, and other causes, and should be guarded against (see *Bed-Sores*).

Management.—A successful issue in typhoid fever depends in great measure on *careful nursing,* to a greater extent in this than in any other disease. A knowledge of the nature of the fever will assist the nurse to understand the reason of the precautions observed in managing these cases, and to be prepared for the complications which are likely to occur in the several stages.

The patient should be put to bed after receiving a warm bath, or, if too ill for a bath, he

may be sponged all over with warm water; at this time any spots should be noticed, and their position observed. It is advisable to cut the hair quite short after attending to the head. A water-bed should be used from the first. In most cases of typhoid, drug treatment is unnecessary, but *perfect rest*, *careful feeding*, and *sleep* are essential, and the complications will also require special management.

Perfect Rest.—Friends should be excluded as far as possible, and the patient must be kept absolutely quiet in bed, and lying down. During the middle and later periods of the disease, moving in the bed should be accomplished gently and gradually. *Fatal perforation* of the bowel has occurred from sitting up, or walking about during the stage of ulceration.

Diet and Feeding.—Exhaustion and emaciation are prominent features in the disease, and the patient requires constant nourishment so that a patient suffering from typhoid fever should be fed at stated intervals during the day, and also during the night, if the patient is having a fair amount of sleep. Those forms of food should be given which are digested with the greatest ease. Warm milk, that has been previously sterilized and to which a small portion of table salt has been added may be given in the twenty-four hours, diluted with water, barley water or soda water. An adult will take five or six ounces of milk every two hours, and if given regularly a quart, or even two quarts, can be taken in this way in the twenty-four hours without discomfort, to which a small amount of brandy may be added, if a stimulant should be given.

The stools of a patient on a strictly milk diet should be examined from time to time to see if the milk is entirely digested and there are no

curds present. If well taken, nothing else need be given, but if very much disliked, veal or chicken broth or beef-tea may be substituted in the place of one of the pints of milk.

If the milk is not digested, whey or peptonized milk will often agree when the plain boiled milk fails. The patient should be allowed to drink water freely when thirsty.

In great prostration, nutrient enemata of peptonized milk, egg, and brandy may be required, or a saline injection of sterilized water, salt, and brandy.

In severe cases, with prostration or stupor, or when there is great loathing of milk or fluids, and when the tongue is dry and brown, with crusts or *sordes* on the lips, feeding is difficult; but a successful result depends on the administration of nourishment. The difficulty may be diminished by first cleansing the mouth, tongue, and lips with glycerine, borax, and essence of lemons, and then the nourishment, two or three ounces, should be given in a feeder or spoon every one or two hours. Natural sleep should not be heartlessly broken for the exact hours of feeding, but a condition of *stupor* or prostration must not be mistaken for sleep, and then the patient should be aroused to be fed.

Stimulants are unnecessary in ordinary cases, and where nourishment is well taken, but in the worse cases life may depend on them, but if required by the patient the amount will be prescribed by the medical attendant.

In the fourth week, or when the patient is beginning to feel better, there is often a craving for solid food, and attempts may be made to persuade the nurse to humor him in this respect, especially by the friends, who are not aware of the danger. The walls of the bowel are very thin where the ulceration has oc-

curred, and if solids, or undigested hard bodies are swallowed, a hole may be made in the bowel and fatal peritonitis ensue. The temperature is the best guide in ordinary cases as to the administration of solid food, and it is wise to wait until the temperature has kept at or about normal for a week or *ten days* before any solid food is allowed. White fish is best in the first instance, followed after a while by chicken, sweetbread, light milk puddings, etc.

Sleep.—It is important for the nurse to be careful to distinguish between a state of stupor and natural sleep. The latter is highly beneficial, and should be undisturbed for four or five hours if the nourishment has been previously well taken. In stupor or prostration the patient must be aroused at intervals in order to take nourishment. If good sleep is difficult to obtain, a small dose of stimulant at night is often successful. In other cases, tepid sponging, especially if the temperature is high, is very comforting, and procures sleep.

Diarrhœa.—Several loose motions in the twenty-four hours are natural in typhoid fever, and require no treatment. When excessive, such as eight or nine copious fluid watery evacuations, the patient's strength becomes reduced. Enemata of starch and opium is a safe remedy, and is often prescribed, or the administration by the mouth of opium in some form. Beef-tea should be avoided while the diarrhœa continues, and care should be taken that the patient is not overfed.

Constipation is common in the mild forms of typhoid fever and during convalescence. In the early stage it is safe to clear the alimentary tract by phosphate of soda in warm water and enemata. Afterward the bowels should be left alone unless the constipation lasts more than

two days, or there is evidence of lumpy fæcal matter in the rectum, when an enema of oil in small quantity may be slowly and gently administered. *Aperients* by the mouth should never be given, except under orders from the medical attendant.

Motions.—The poison which conveys the disease is abundantly contained in the motions. It is absolutely necessary to *disinfect these immediately;* therefore, on removing the bed-pan from the patient, a strong solution of carbolic acid (1-20) or corrosive sublimate ($^1/_{1000}$) or lysol (2 per cent.) should be at once poured in before emptying and cleaning it in the usual way. The cotton tow, or rag, should be used to cleanse the patient, and this must be immediately burnt. The nurse must always wash her hands in disinfectant solution after tending the patient or touching the bedding, linen, etc.

When a motion has to be reserved for inspection, a piece of tar paper or glass, if obtainable, should be placed over the bed-pan and the handle stuffed up with lint wrung out in the disinfectant. The same applies to specimens of urine.

All bed and body linen should be put in a covered pail two-thirds full of disinfectant, and if the linen be soiled, a covered pail must be taken to the bedside to receive it.

All vessels such as feeders, cups, spoons, bed-pan, etc., to be marked and kept entirely for that patient's use. They should be sterilized with *boiling* water. Special marked towels should be kept for cleansing and drying all such vessels.

The patient's clothes and bedding should be thoroughly sterilized.

Excessive Fever.—A high temperature, or when the temperature is constantly above 102°

or 103°, is often treated by cold baths, or the ice cradle (see *Cold Baths and Ice Cradle*).

Hæmorrhage.—This may take place from the nostrils or bowel. The former is often the result of picking the nostril, and is usually insignificant. Hæmorrhage from the bowel during the first fortnight is commonly beneficial or harmless, and does not need interference. In the third week and later, if copious, half a pint or more, it is dangerous, and often fatal if repeated. The medical attendant should be at once informed in order that drugs may be ordered, and ice applied to the abdomen (see *Ice Cradle*). In these cases opium is useful, and alcohol may have to be withheld.

Peritonitis.—The onset may be insidious in cases associated with much stupor, in others the symptoms and management would be similar to cases previously described (see *Peritonitis*). The peritonitis may be due to perforation of the bowel, when there is often sudden fall of temperature to sub-normal, with symptoms of collapse, such as great pallor, cold sweats, feeble pulse, syncope, etc. (see fig. 45).

Pneumonia.—Inflammation of the lung occurs in a few cases in the course of the disease. It is often insidious, and usually dangerous, especially if associated with great prostration, dry tongue, etc. Stimulants are beneficial, and attention to the temperature and ventilation is specially required (see *Pneumonia*).

Plugged Veins.—Swelling of the leg and pain in the groin are symptoms of a clot in the vein, and are sometimes attended with rigors. The patient should be kept lying down, with the leg raised and wrapped in cotton batting, until the symptoms have subsided.

Convalescence.—The temperature should be recorded morning and night for at least a fort-

night after it has reached the normal, and longer if necessary. A relapse occurs usually from seven to ten days after the first illness, and is indicated by a fresh gradual rise of temperature, when the fluid diet must be resumed. The relapse lasts about fourteen days, and in a few cases a second relapse occurs. Slight rise of temperature of a temporary nature may be the result of excitement, or solid food, or first getting up.

Great hunger is common during convalescence, and plenty of nourishment may be allowed after a while. Mental imbecility, or deafness, may persist for a time, but recovery is usual.

DIPHTHERIA.—A highly contagious disease, in which the throat is sore and presents patches of white membrane in parts, and associated with fever and other constitutional symptoms. It affects children and adults at any season of the year, but is far more common in children. It may be epidemic, and more often attacks damp localities or insanitary houses; other cases of ordinary sore throat are apt to prevail about the same time.

The period of incubation may be very short, only a few hours, or several days.

Symptoms.—The general symptoms vary in intensity, and may be slight at the commencement. The sore throat is often first observed, and the tonsils and uvula are reddened and swollen, and a membrane of whitish or grayish color is seen on the tonsils and uvula, or some part of the pharynx. There may be some discharge from the nostrils, and the membrane may appear on wounds on the surface of the body. In moderate cases the general symptoms are well marked and accompanied by prostration and weakness. Swallowing is painful

and difficult, and the glands of the neck are swollen.

In severe diphtheria, death may occur in a few days from extreme depression and prostration of strength.

Laryngeal Diphtheria.—This is the most dreaded complication in children, and is one cause of the great fatality of the disease. Attendants on cases of diphtheria in children should be acquainted with the symptoms which indicate implication of the larynx, as these are apt to occur very suddenly, and in the night, and rapidly become urgent.

The child's voice is noticed to be rather hoarse on crying or speaking; there is a short, dry cough, difficulty in breathing, and the inspiration becomes noisy and crowing. As the difficulty in breathing increases, the child becomes restless, and the lips and face bluish, and then drowsiness supervenes.

Management.—The nurse should be prepared to carry out local treatment, if required. This consists either in painting the throat with lotions of perchloride of iron, or antiseptics, or in the use of the spray by the ball-spray apparatus. During the application of these remedies the tongue should be depressed by the spatula, or gripped in a napkin and drawn forward. Coughing and expectoration are very apt to be produced by the application, and the nurse should carefully avoid receiving the particles on her lips, as she may easily thereby contract the disease. A respirator or temporary veil may be used to cover the mouth at the time she is making the application (see *Throat Applications*).

Antitoxin Treatment.—The injection of Diphtheria Antitoxin is frequently practiced, and has shown good results in early cases. Recov-

ery has most often been observed to follow when the treatment has been begun not later than the third or fourth day, and such patients appear to be less liable to the Laryngeal form. A special glass syringe is used for the injection, similar in kind to a hypodermic syringe, but larger. It is so constructed that all parts can be rendered aseptic.

In severe cases, constant nourishment is necessary to support the general strength. In all cases it is highly important that the room should be well ventilated and supplied with plenty of fresh warm air, without draught. The temperature of the room should be about 60° F.

Children should be carefully watched at night for any indication of the symptoms of implication of the larynx, such as difficult breathing, etc., and the surgeon should be informed in case tracheotomy may be necessary (see *Tracheotomy*).

Diphtheria is very fatal in children, either from exhaustion or suffocation. In a few cases sudden death occurs unexpectedly from syncope. If there is much prostration, or a tendency to faintness, the patient should be kept in bed and not allowed to get up. The urine must be saved and examined for albumen during the disease.

Paralysis.—During convalescence, and even some months afterward, there is a liability to a peculiar form of paralysis. This may be first indicated by a return of fluids through the nose during swallowing, or a nasal character in the voice, or weakness in the muscles of the legs or back; or perhaps squinting and shortness of sight may be first noticed. The paralysis may be slight in character and limited, or it may invade a large number of the muscles of the

body. Recovery is commonly complete in a few weeks or months. Massage, warmth, and attention to the general health will assist recovery.

MUMPS.—This disease affects children and young adults at any season of the year. There is inflammation and swelling of the salivary glands, attended with some general feverishness. The swelling produces a peculiar rounded look about the face, in front of the ears, and under the chin. One side of the face is often first affected and then the other, and swallowing is usually painful. In a few cases the inflammation attacks the generative organs.

Management.—The patient should be confined to the room, and the face and neck protected by cotton-batting or soft flannel. Pain may be relieved by hot fomentations, and care taken to avoid cold or draughts. Light liquid diet should be given at first. There is often general debility and feeble health for some time afterward.

ASIATIC CHOLERA.—A disease known by vomiting and purging, and accompanied with rapid collapse of the vital powers. Asiatic cholera is rare in this country, but epidemics have been started by the importation of the disease from foreign parts.

Symptoms.—The disease comes on suddenly, or is preceded by diarrhœa; the stools are very copious, resembling rice-water. Cramps of a violent kind attack the muscles of the abdomen and extremities, and when collapse sets in the skin is cold and covered with clammy sweat; the nails turn blue, the eyes are sunk, and the features look pinched, while the pulse fails, the breathing becomes labored, and the urine is diminished in quantity or suppressed.

The symptoms are sometimes divisible into three stages.

The first stage is marked by "premonitory diarrhœa," depression, and nausea.

In the second stage, the stools become more frequent, and the fluid ceases to be bile-stained, becoming colorless, and like rice-water; vomiting ensues, with cramps in the muscles of the extremities and abdomen; there is great thirst, the voice becomes husky, and the face pinched.

From this stage, which lasts from two to fifteen hours, the patient passes gradually into the third, algid, or collapse stage, the purging and vomiting diminish or cease, the temperature becomes subnormal, the face and extremities acquire a leaden hue, the eyeballs are sunken, the face hollow, and the voice sinks to a whisper. The urinary excretion becomes scanty or suppressed, and the skin is covered with a clammy perspiration.

Death may ensue in about twenty-four hours from the commencement. A stage of reaction may precede death, or in favorable cases herald the recovery.

Management.—Rest in bed and abstinence from all food are the first directions in a case of cholera. Counter-irirtation to the pit of the stomach by a mustard-poultice helps to relieve the depression. Small quantities of ice, iced water, or lemonade may be allowed to relieve the thirst. Cramp may be alleviated by hot-water bag, gentle rubbing with the hand, or by hot bran-bag applications. In the collapse stage, hot blankets and hot bottles should be ready, brandy or champagne may be of use, or, if the diarrhœa has ceased, enemata of beef-tea or brandy may be given. Injection of fluids into the veins is sometimes practiced in this stage with good results.

During reaction small quantities of nutritious fluids may be constantly given at short inter-

vals, but if suppression of urine continues, the patient may be allowed to drink more freely.

Precautions to be observed by the Nurse in Cholera Cases.

1. To attend to her own health, by insuring regular meals, sufficient sleep, and not too long-continued attendance in the sick-room. Occasional brisk outdoor walks are helpful.

2. *To practice absolute cleanliness;* to wash and disinfect her hands after attending to the patient, before her meals, and before leaving the room; not to partake of meals or food in the sick-room.

3. *To prevent the spread of disease in the house* by self-disinfection, cleanliness, and disinfection of all discharges, excreta, utensils, and other articles from the sick-room. (See also *Rules for Disinfection*, page ——).

4. *Disinfection and disposal of excreta, etc.* For the purposes of the sick-room, such as the disinfection of soiled handkerchiefs, sheets, and the like, as well as for the swabbing of floors, carbolic solution (1-20), or preferably the perchloride of mercury solution, may be used.* The latter may usually be procured from the Sanitary Authorities.

In places provided with proper systems of excrement disposal, the excreta, after being treated in detail with the disinfecting solution in ample quantity, may be safely put into the ordinary closet, but special care as to the flushing of the drains and sewers is necessary.

* Perchloride of mercury, a cheap and efficient disinfecting fluid, is thus prepared:—Dissolve half an ounce of corrosive sublimate and five grains of commercial aniline blue in three gallons of water, and add thereto one fluid ounce of hydrochloric acid. Preserve in earthenware jars or wooden tubs. The aniline blue is intended to color the solution, which is highly poisonous.

When the only closet is one that communicates with a cesspool or privy-pit, the best arrangement that can be found practicable will have to be adopted, but advice should be immediately obtained from the Sanitary Authorities.

5. *Disinfection of the room and its contents.* After occupation by a cholera patient, the room and its contents should be disinfected by the Sanitary Authorities.

1. As Cholera is not in the ordinary sense of the term "contagious," and is rarely, if ever, communicated like small-pox or scarlet fever directly from person to person; as it is probable that those in attendance upon Cholera patients are not more liable than others to be attacked, and as it is certain that physical and moral depression favor the liability to contract the disease, apprehensions should be allayed, confidence encouraged, and that manner of living pursued which experience has proved to be conducive to the best state of health.

2. The house should be clean, dry, and well ventilated. Air-shafts, traps, and drains should be in perfect working order. Dust-bins should be frequently emptied, and no decaying matters of any kind should be permitted to remain in or near the house.

3. As water is one of the chief agents by which choleraic infection is conveyed, all water employed for personal and domestic use in the household should be scrupulously protected from contamination of every kind; and if any doubts of its purity arise, the water should be *boiled*, filtered, and consumed within twenty-four hours.

4. The dietary should consist of two or three meals daily. The food should be fresh and thoroughly cooked, the vegetables well boiled.

Simply cooked, wholesome fruit may be eaten. Milk should be *boiled* before use.

Alcoholic beverages should be taken in great moderation, and only at meal-time.

It is desirable to avoid soups, tinned or otherwise preserved provisions, raw or stale vegetables, unripe, over-ripe, or decaying fruits, pastry, cheese, nuts or other indigestible things, malt liquors turning hard, ginger beer, coarse oatmeal gruel. Too long fasts, or too frequent feeding should be avoided.

Cooking utensils should be scalded after use, and kept carefully clean.

6. Avoid the use of strong aperients, and especially of strong saline aperients. If there is obstinate constipation, take at bedtime a vegetable cathartic that will not act on the liver and kidneys, or two teaspoonfuls of phosphate of soda in a cup of hot water on arising.

7. Avoid excess and irregularities of all kinds, over-fatigue, prolonged watchings, emotional excitements, undue mental strain, and all things that exhaust the nervous system. Especially avoid the frequent use of alcoholic or other stimulants to cover sensations of sinking, malaria, or depression.

8. If, notwithstanding a careful regulation of the manner of living, looseness of the bowels should set in, send immediately for medical assistance; until this arrives, the following instructions may be followed:—Retire at once to bed in a warm but well-ventilated room, and if troubled with cramps or pains apply hot applications to the abdomen. Take two teaspoonfuls of phosphate of soda in a cup of water as hot as it can be swallowed.

Should the diarrhœa continue after the action of the bowels, relief may be obtained by taking a few doses of ordinary diarrhœa mixture, but

any further measures should be carried out under medical direction.

INFLUENZA.—Epidemics of influenza occur from time to time at varying intervals. Previous to that of 1889, there was an interval of fifty years, in which there had been no outbreak in this country.

The disease usually begins in the East, and spreads with great rapidity over the world. When it attacks a town or city, a large proportion of the inhabitants become attacked almost simultaneously, and the number of persons affected during an epidemic is greater than in any known epidemic disease.

The malady is highly infectious, and is probably in great measure conveyed along lines of human intercourse.

Symptoms.—The onset of the disease is usually sudden, and is marked by chilliness and shivering. The temperature is raised, the skin hot, and the pulse quickened.

Frontal headache with severe pain at the back of the eyeballs is common, and the eyes have often a pink appearance from increased blood pressure in small congested vessels. Pain in the limbs, back, and chest may be very severe, or present in a less degree of severity.

Catarrhal symptoms, such as those accompanying an ordinary cold, may be present or entirely absent. Prostration of strength is a characteristic common to the disease, whatever form it may take.

Gastric symptoms may be the most prominent in some patients; in others, ordinary catarrhal or bronchial affections predominate.

Pneumonia is a dangerous complication, and responsible for a number of fatal results.

Mental symptoms are not uncommon in the course of the disease.

The majority of persons attacked by influenza recover completely, though in many the convalescence is very protracted. In others, and especially in those of delicate health, the disease leaves permanent effects behind, or is the starting-point of tuberculosis or other serious maladies.

Management.—In ordinary cases, rest in bed for a few days, until the fever and other symptoms have subsided, and confinement to the house until convalescence is complete, is all-sufficient. Fluid diet during the fever, and good nourishment as soon as the patient is able to take it, are requisite, as on account of the attendant prostration any lowering treatment is not well borne.

Severe complications have often been the result in the case of persons who have not laid up in the early stages of the malady, or who have too soon exposed themselves to the risk of cold or overwork.

Non-Infectious Fevers.

NON-INFECTIOUS FEVERS.—There is no danger of the malady being communicated to others, and the precautions with regard to disinfection are unnecessary. As examples may be given: Rheumatic fever, and Malarial fevers or Ague. The latter are frequently endemic in certain low-lying districts, or in tropical regions.

RHEUMATIC FEVER, OR ACUTE RHEUMATISM, affects the joints, and is usually the effect of cold, damp, or exposure, in those who have a tendency to rheumatism.

Symptoms.—The joints, either the ankles or knees, wrists or elbows, become swollen and painful, and the patient is unable to use them; at the same time the temperature of the body is elevated, and the skin is covered with pro-

fuse perspiration of acid odor. In addition, there are other symptoms of constitutional disturbance, and the urine is loaded with thick red deposit.

The complications in rheumatic fever are: inflammation of the valves of the heart and pericardium, pleurisy and pneumonia, and excessively high temperature, or hyper-pyrexia.

Management.—The patient should be clothed in light flannel, and may lie between the blankets. Owing to the profuse perspiration, all exposure should be avoided, and the room well warmed. The joints should be moved with great care and wrapped round in cotton-batting or light flannel, and the pressure of the bedclothes taken off, if necessary. Getting out of bed must be entirely forbidden. The diet allowed is usually milk, alone or with some farinaceous food, while beef-tea and other nitrogenous diet is strictly excluded. In most cases, after the administration of salicylic acid in some form the temperature rapidly subsides, and the pain and swelling of the joints diminish, so that in a few days the disease is controlled.

Relapse is very common if this drug be left off too soon, or if unsuitable diet is resumed, or if the patient leave his bed at a too early period. It is the practice of many physicians to commence the treatment of the disease with full doses of *salicylic acid* after the bowels have freely acted; and since patients differ in their ability to tolerate this drug without unpleasant symptoms, the nurse should be familiar with the symptoms of overdose. These are: noises in the ears, deafness, giddiness, headache, stupor, delirium; further, heavy, noisy breathing, with depression of strength, and possibly blood in the urine or hæmorrhages from other regions.

The drug is generally administered until it produces some giddiness and deafness, with noises in the head, and is then gradually diminished, if the symptoms of overdose are prominent, or when the temperature falls, as it often does rapidly.

PERICARDITIS is a severe complication of rheumatic fever, and notice should be taken of any complaints of pain in the region of the heart, or of shortness of breath, lividity, etc. (see *Pericarditis*).

HIGH TEMPERATURE, OR HYPER-PYREXIA, is an occasional complication of great urgency. In a case of rheumatic fever, the nurse should take the temperature constantly, every four hours, or oftener if required. Should the temperature continue to ascend and rise above 105°, with nervous symptoms, such as stupor and drowsiness, reaching perhaps 106°, 107°, or up to 110° with coma, the patient will die unless the temperature soon be reduced. The cold bath treatment is the most rapid and efficient method, and it will have to be given under the superintendence of the medical attendant (see *Baths*).

Convalescence is sometimes rapid; in others there is lasting debility, or heart-disease, or stiffness of the joints. In all there is a tendency to recurrence, and flannel garments or Jaeger's underclothing should always be worn next the skin.

MALARIA, AGUE, OR INTERMITTENT FEVERS.—Individuals living in marshy districts in this country, or who have resided abroad where these fevers are common, are liable to this affection, which may continue to attack them many years after they have left the region in which they contracted the fever.

Symptoms.—In the common form of this fever there are three stages—the cold, the hot,

and the sweating stage—the whole attack lasting some hours. Between the attacks there is an intermission of a varying duration of good health. The patient is usually attacked suddenly with a sense of chilliness and increasing feeling of cold. The teeth chatter, and there is general trembling of the limbs. The extremities become blue and the face pinched, and the urine is copious. If the temperature is taken, it is found to be above the normal, and going up rapidly. After this the hot stage commences, and the sense of chilliness diminishes. The warmth increases until the heat becomes intense, the face flushed, and the skin dry and pungent. This stage may last several hours, and is succeeded by the sweating stage, in which the skin becomes bathed with profuse sweat, the temperature falls, and the other symptoms of discomfort disappear.

Management.—The nurse may apply warmth during the cold stage by different methods—warm blankets, hot bottles, packing, etc.; during the hot stage, tepid sponging and light clothing, and if there is much thirst fluids may be administered. When drugs, such as quinine, opium, or antipyretics, are ordered, the temperature should be taken regularly at short intervals before and after the drug is administered; the observations being noted on the chart in order that the effect of the remedies on the temperature may be ascertained.

Individuals suffering from ague should be warned not to go out at night or in the early morning in malarial regions, but should choose the middle of the day. They should also occupy a bedroom in the upper part of the house.

CHAPTER IX.

DISEASE IN CHILDREN.

Observation of Children—The Cry—Attitude in Bed—Complexion—History of Illness—Disorders of Infancy—Wasting—Feeding—Artificial Food—Teething—Convulsions.

Symptoms and Management of Rickets—Laryngismus—Thrush—Sore Throat—Gastric Catarrh—Constipation—Obstruction—Diarrhœa—Infantile Cholera—Chronic Diarrhœa—Typhoid Fever—Worms—Tubercular Meningitis—Water on the Brain.

Introduction: Observation of Children.

Information concerning children's symptoms or previous ailments has to be gathered from the mother or nurse, who only are constantly in contact with them both in health and in disease, and are thoroughly familiar with their methods of expressing their wants and feelings.

Observation of Children.—In the case of infants, or children under two years old, it is not always an easy matter to comprehend the signs of suffering, or to refer them to their real cause, but a great deal may be discovered by careful attention. An infant makes known its wants, and gives expression to its feelings of distress chiefly by crying.

The Cry, as described by Dr. Eustace Smith, in his work on Children's Diseases, is often characteristic. "A hungry infant in most cases

clenches his hands and flexes his limbs as he utters his complaints, and continues until satisfied. If tortured by colicky pain, the cry is violent, paroxysmal, and accompanied by uneasy movements of the body. A shrill scream uttered at intervals, the child lying in a drowsy state with closed eyes, is suggestive of tubercular meningitis. A constant unappeasable screaming is often the consequence of ear-ache, and the child frequently presses the side of the head against the mother's breast. The pain of pleurisy will also cause violent crying. Any alteration in the quality of the cry must be noted. It may be hoarse in a young infant from inherited syphilis; and in an older child from laryngitis." Absence of crying is often indicative of exhaustion or serious disease.

Attitude in Bed.—The child's position in its cot should be carefully observed. Healthy children usually lie partially on the side, with the cheek on the pillow. In exhaustion or serious disease, the infant often lies on its back, with closed eyes and face directed upward. Lying on the side, with the head partially retracted or thrown back on the shoulders, is suggestive of brain affection, or, if associated with difficult breathing, of laryngeal mischief. Lying on the belly with the face pressed into the pillow, or the thighs and legs flexed on the abdomen, may indicate abdominal discomfort.

The Complexion of the healthy infant should be clear and fresh, and any alteration, such as sallowness, pallor, lividity, or a muddy color, suggests derangement. A haggard expression, contracted brow, or sunken hollow eyes are also the result of disease.

The frequency of the pulse and respiration, and the temperature should be noted; the latter often rises with very slight reason to a height

which, in an adult, would probably be associated with severe disorder.

The state of the skin should also be noticed as an indication of how the child has been cared for, whether dirty, or covered with scabs, parasites, or eruptions.

History of Illness.—In hospital practice, when the nurse receives a sick child from the mother or relatives, she should make a point of ascertaining the following particulars before they leave:—

Name—Age—Birth: Premature or full-time—nursed or hand-fed—child's previous ailments: specific fevers, eruptions, etc.—History and symptoms of present illness, giving dates:—Family history: Father, mother, residence, number of children alive—miscarriages, still-born children, and ailments of living children—children who have died, and cause of death.

Information of this kind, and other particulars relating to the cause or circumstances of the illness are of great value, and cannot be obtained in many cases except by the nurse, who has the opportunity of seeing the child's relatives.

For the convenience of the physician on his visit the child may be stripped naked in a warm room, wrapped up in a blanket, and then placed in the nurse's lap, if a complete examination is desired, and the child is not too ill.

Disorders of Infancy.—Owing to the extreme excitability of the nervous system in children, slight functional disorders are apt to give rise to signs of considerable general distress. For instance, stomach derangement, or indigestible food, may cause high fever, rapid breathing and cough, or perhaps a convulsive seizure. In feeble children some functional disturbance, apart from any actual disease, may be very

serious or even fatal. In long-continued or exhausting diseases there is often loss of this nervous susceptibility. Sudden death is common in infancy, especially associated with exhaustion from diarrhœa and vomiting, or from laryngismus or convulsions.

Wasting, Inanition, and Bad Feeding.—Among the poorer classes a large number of infants, apart from actual disease, remain small, thin, pale, and instead of increasing in size become more and more emaciated. Want of air, unhealthy houses, and deficient clothing are among the common causes, but bad feeding is the most common of all.

Feeding.—A healthy infant should be nursed by the mother, if she is in good health, for the first seven or eight months, and requires no other food. During the first month or six weeks it may receive the breast every two hours during the day and less often at night. Afterward it should wait for longer intervals. At seven months one or two meals a day may be added, consisting of Chapman's, Mellin's, or Ridge's food, or Robb's biscuits, mixed with milk.

At ten months it may be weaned, and a little broth, beef-tea, or milk added to its meals. On no account should the baby be kept at the breast after ten months, a custom with some mothers, but injurious both to the baby and to herself.

At eighteen months pounded meat and light puddings may be given, but a milk diet is usually preferable and gives all the nourishment required.

If the mother's milk fail, or is not available, the infant will have to be brought up by hand.

Artificial Feeding.—The milk should be obtained from a good dairy, or Van Camp's evapo-

rated milk reduced to the proper strength with barley-water or lime-water is an excellent substitute for much of the fresh milk on the market. The mixed milk of several cows is often better than the milk from *one special cow*. *First month*—The bottle should be given every two hours, from 5 a.m. to 11 p.m.; each feed should consist of three teaspoonfuls of milk (or two teaspoonfuls of milk and one teaspoonful of cream) and six teaspoonfuls of water. Increase the milk and water by one teaspoonful each week of this month. *Second month*—Feed every two and one-half hours, increasing the amount to two tablespoonfuls of milk and two of water. *End of third month*—Feed every three hours with equal parts of milk and water—three to four tablespoonfuls of each. Warm each feed to 95° F. One or two teaspoonfuls of lime-water may be added, or barley-water may be used instead of water. Boil the milk and water, or use a sterilizer.

The best bottle is boat-shaped, with a simple india-rubber teat on the end. Wash the bottle and teat in hot water and soda after each feed, and then rinse out in clean cold water.

With the exception of the artificially prepared foods mentioned above, farinaceous food should not be given to children under six months of age. It is a mistake to feed babies too often, or whenever they cry for it, just to stop their crying; or when they grow older to allow them the same diet as adults because they enjoy it.

Emaciated children, otherwise healthy, will commonly improve after their diet has been carefully regulated, and if one form of diet does not agree with them some other should be substituted. An emulsion of cod-liver oil in small quantities, twenty drops or so, is an excellent food, and agrees well with many infants.

WARMTH.—Infants are very susceptible to cold, and a low temperature may produce in them a variety of disorders. The room they occupy should be well ventilated, warmed, and kept at an equable temperature. Their clothing should be of flannel, light, and not too tightly applied. The legs and arms should be covered and protected from exposure out of doors. When indoors, they may, with advantage, be allowed to kick about and exercise their limbs, sometimes on a heavy rug or a blanket spread on the floor.

TEETHING DERANGEMENTS.—The first dentition, or cutting the milk teeth, commences usually at the seventh month and terminates at the end of the second year.

The teeth should appear in the following order:—Lower central incisors, upper central incisors, upper lateral incisors, lower lateral incisors, fist molars, canines, back molars. At twelve months the infant should have cut eight teeth. The order given above is not, however, constantly followed in all healthy children, and the time may be anticipated or delayed. Infants are liable to be feverish during dentition, and there is a tendency to irritability and restlessness; chills are more easily taken, and the food is more likely to disagree, giving rise to pulmonary troubles, gastric derangement, or convulsions. Greater care is therefore necessary at this period to avoid cold, or sudden change of diet. If the gums are swollen and painful, they may be gently rubbed with the finger moistened with lemon juice, but in a few cases it may be necessary to use the lancet.

CONVULSIONS.—Apart from disease of the brain and epilepsy, convulsive seizures are common in infants under two years old. Rickety children, or the offspring of nervous parents,

are more liable to suffer. The exciting cause is usually some distant irritation which should be sought for. Commonly some gastric irritation in the form of curdled milk, or undigested food, constipation, or intestinal worms, will account for it. Irritation of the ear from wax or other foreign bodies, or the cutting of a tooth, are often causes of fits. In a few instances a convulsion denotes the onset of a specific fever, and corresponds to a rigor in the adult; fits are also common in whooping-cough.

A convulsive seizure is usually sudden, though sometimes preceded by restless excitability, accompanied by starting and twitching during sleep; the eyes have a staring look and are directed upward, and the thumbs are turned toward the palms of the hands. When the fit begins the child becomes stiff, the head is thrown back, the limbs straightened and fixed, and the breathing ceases. Soon afterward the face becomes flushed, the eyeballs move from side to side, and the muscles of the face and body constantly twitch. There is loss of consciousness during the fit which lasts commonly for several minutes, and may recur. The face becomes pale and moist with sweat, the infant falls asleep, and on awaking seems to have recovered and to be in its usual health.

Management.—For the convulsive attack a warm bath and the application of cold to the head is frequently ordered.

An infant may be immersed in a bath of the temperature of 90° F., cold sponges being placed on the head, and constantly changed. Ten to twenty minutes, according to the age of the child, is a sufficient length of time to continue the bath, unless there has been previously great exhaustion, when five minutes or less is sufficient. Afterward the room should not be too

hot, and the child should lie lightly covered in the cot. An enema of sweet oil or soap and water may be given if the bowels have been confined.

In children who are liable to convulsions, or who have previously been attacked, the symptoms before the onset should be noticed, and care taken to avoid those sources of irritation which seem to induce an attack. The bowels should be kept open, the food carefully chosen, chills avoided, and during dentition extra precautions in these various ways should be taken. The majority of infants survive an ordinary convulsion, but in some cases the fit terminates fatally, especially if there is a succession of them.

Diseases of Children.

RICKETS.—This disease essentially one which attacks infants belonging to the poorer classes in large towns, though it occasionally appears among the well-to-do. Bad feeding and a defective supply of fresh air are the two main causes of rickets.

Symptoms.—It is unusual for these to appear before the sixth month or after the second year, but once begun, they may continue in one form or another for several years. The time of weaning seems to determine the commencement in many infants, and symptoms of digestive derangement appear and continue. The motions are more frequent, offensive from undigested food, and pasty looking, or of greenish color. The child is irritable and fretful, and dislikes to be handled on account of tenderness of the body and limbs; the color of the skin is sallow and unhealthy-looking, the cheeks pinched, and there is a tendency to copious perspiration about the head at night. The

coverings of the bed are thrown off, and the infant may be found asleep resting on its elbows and knees, on account of flatulent disturbance and pain in the belly. The head is enlarged and the abdomen distended; the teeth are late in appearing, and the fontanelle is wide open after the second year, the time at which it should have closed. The bones too are found to be misshapen, especially the extremities of the wrists and lower leg bones, which appear swollen; and small rounded swellings are liable to occur in the ribs near to the breastbone. As the child grows older, these deformities may increase, and the shape of the chest be distorted, especially if the infant is attacked by pulmonary disorders, to which they are unusually liable, causing the condition known as pidgeon-breast. The shape of the long bones of the legs is influenced by standing and walking, and the bones being weak are bent and curved in various ways by the weight of the body.

TETANY is a not uncommon complication of rickets. It is due to a spasm of the muscles of the extremities, by which a peculiar position of the hands and feet is produced. The thumb is drawn into the palm, and the back of the hand is arched; the top of the foot is also arched, and the extremities become swollen and painful. This condition may last for some days.

Rickets is not usually fatal in itself, but death may occur from complications, such as pulmonary complaints, convulsions, water on the brain, laryngismus or spasm of the glottis, or gastric derangements and diarrhœa.

Management.—It is necessary first to inquire how the infant has been fed, the kind of food, and the number of meals given at the present

date. The clothing should be noticed, and inquiries made about the ventilation of the room, and whether the child is ever taken out of doors. Among a large number of the poor and working classes, attention to these particulars is not possible, nevertheless a good deal may be done in many instances toward improvement in the manner of feeding. On inquiring, it will often be found that the mother is keeping the infant at the breast up to two years old or longer, or else has been feeding the infant on cheese, beer, spirits, or anything that she may be having herself, saying that the child craves for it and is not satisfied. When the diet has been corrected and arranged (see *Feeding*), and directions given for cleanliness and fresh air, the state of the stomach and bowels should be ascertained, whether there is sickness, flatulence, or diarrhœa.

It is a good plan to apply a warm flannel binder round the abdomen, which is often sufficient to remedy the intestinal derangement, but in long-standing or obstinate cases drugs will be required. When the bowels are brought to a natural state, great improvement in the general condition will follow, and an emulsion of cod-liver oil may be given with advantage. From ten to twenty drops to half a teaspoonful is sufficient, according to the age.

When the child arrives at the age for standing or walking, it should not be allowed to bear its full weight on the legs, as the bones, being weak, will become bent and curved, producing deformity of a more or less permanent kind.

The pulmonary complications of rickets require the ordinary measures and precautions necessary in these cases (see *Bronchitis*).

Congenital Syphilis may show itself in the child in various ways. Among the common

manifestations are the following: red or coppery-colored rashes on the body and buttocks, "snuffles," fissures about the mouth or anus, a hoarse cry, enlargements of the bones, an old-wizened look, and a tendency to wasting.

LARYNGISMUS, OR FALSE CROUP, is a spasmodic attack of difficult breathing, and is fatal in some instances. It may be preceded by a crowing sound with breathing, and then suddenly the breathing ceases, and the infant becomes stiff, and the face dark and livid; this lasts for a few seconds, and then the spasm relaxes and the breath is drawn in with a crowing noise; vomiting, perhaps, occurs afterward. The attack may produce or be associated with a convulsion, or the attack of laryngismus may be repeated.

Management.—When there is time, a hot sponge should be placed against the outside of the throat, or the back of the fauces may be tickled with the finger to produce vomiting. In some instances the attack may be controlled by holding a bottle of smelling-salts to the child's nose. The return of the paroxysm may be prevented by regular cold bathing three times a day, the body being rapidly and thoroughly sponged with cold water.

DISORDERS OF THE ALIMENTARY CANAL.—*Apthæ Thrush.*—Infants and young children are liable to disorders of the mucous membrane of the mouth, especially when teething, or when there is some digestive disturbance. White patches of thrush are apt to form on the inner surface of the lips, gums, and palate, or else small vesicles form and break, leaving circular, shallow ulcers, with a whitish surface on the mucous membrane. In either case, they are associated with stomach derangement, and are of no great consequence in strong children, but in

those who are suffering from chronic diseases, or exhaustion, they are of serious import.

Management.—The most suitable local treatment is to cleanse the affected part with warm water, afterward applying a solution, consisting of half a drachm of pulverized borax to an ounce of glycerine, with a camel's-hair brush.

GANGRENOUS INFLAMMATION. — More serious forms of ulceration and gangrenous inflammation of the cheek or mouth occur sometimes in children after specific fevers, or in those of unhealthy or debilitated constitution.

Management.—In these cases nourishment and stimulants have to be freely given, and the surgeon may find it necessary to destroy the gangrenous parts with caustics. The local after-treatment, consisting mainly in the constant application of antiseptic solutions, may have to be carried out by the nurse.

SORE THROAT—ENLARGED TONSILS—ADENOID GROWTHS.—Children of all ages are liable to affections of the throat, and complaints of pain, soreness, or difficulty in swallowing should be attended to. The throat may be inspected by gently pinching the nostrils together while the mouth is held open and a deep breath drawn in. Redness of the fauces, tonsils, and uvula should be noticed, and it should be observed whether there is a patch of white membrane, as in diphtheria, or if the tonsils are red, swollen, or project unusually into the throat, as in quinsy. A red mottling of the throat is sometimes seen early in scarlatina.

Management.—Throat affections should be seen early by the medical attendant, and in any case it is advisable that the child be immediately separated from other children until his

visit, in case the throat should betoken the onset of an infectious fever.

In chronic enlargement of the tonsils, and when the back of the nostrils is blocked up by adenoid growths, the breathing is apt to be heavy and labored, snoring at night is common, and some deafness is likely to supervene as the child grows older. In young children, if the enlargement is great, deformity of the chest may be induced by the difficulty in breathing. The surgeon usually removes the enlarged tonsils and scrapes away the adenoid growths at a suitable time.

Gastric Catarrh.—*Symptoms.*—This ailment has been mentioned in connection with infants, but it also affects older children as the result of a chill, an error in diet, or a scrofulous habit. The onset may be sudden, with feverishness, cough, and rapid breathing, the tongue is coated with white fur, and there may be sickness and constipation. There is sometimes a watery discharge from the eyes and nose, and the fauces may be reddened. In some children there is slight delirium at night. The urine is usually turbid and high-colored, and there may be slight jaundice of the skin. The temperature may rise to 104° or 105° in the evenings, but descends in the morning. These attacks may occur without fever or with only slight febrile symptoms, and they have a tendency to recur. The febrile form bears a close resemblance to enteric fever in young children.

Management.—Children who suffer from this disorder, and show a tendency to recurrence, should wear a broad flannel bandage, extending from the arm-pits to the hips, and applied firmly as a protection from cold, but it should be taken off at bedtime. During the attack the character of the excretions should be noticed,

and whether there is a tendency to acidity of the stomach or sour-smelling breath.

Diet.—The diet is all-important; sweets and starches in any quantity should be avoided, also fruits, cakes, potatoes; while freshly made broths, milk and lime-water, and unsweetened barley-water should be allowed. Purgatives are best avoided, and the action of the bowels regulated by mild aperients, such as liquorice powder or castor oil. During convalescence, fish, fowl, and mutton may be taken, and farinaceous food only in small quantity. Cold bathing in the morning will strengthen the system against recurrence.

Constipation is a common trouble in children and infants of all ages. In young infants it is natural for the bowel to be relieved several times in the twenty-four hours, so that one motion a day would indicate constipation. In older children the bowel may not act more than once every two days without any symptoms of further disorder; but evidence of headache, languor, loss of appetite, and sallow complexion would indicate that the constipation was harmful, and should always be relieved by the use of a mild aperient.

Flatulence and *colic* are often associated with constipation in infants, as shown by constant crying and flexing the thighs on the abdomen; the motions are hard and lumpy, and voided with pain. In many cases the child restrains efforts at evacuation on account of the pain produced by the passage of the lumps. In some the hard fæcal matter irritates the bowel and causes partial diarrhœa, which is only relieved by remedying the constipation and irritation; obstruction of the bowel may result from long-continued constipation, which should never be permitted.

Management.—The child should be trained at an early period to go punctually to the stool every morning, and regularity enforced until a habit is formed; when the bowels cannot be evacuated naturally, an enema of sweet-oil soap and water may be used.

In younger children and infants the diet, consisting in a large degree of farinaceous food, has a tendency to produce dry fæcal matter. The amount of this food will have to be lessened where constipation exists. Extract of malt, one or two teaspoonfuls a day, added to the food, are useful. Friction of the abdomen with the hand is found to be effective in some cases. When accumulation is present, a small enema, or a dose of castor oil, may be given, or a small teaspoonful of glycerine may be introduced into the rectum with a syringe.

Nurses should not take upon themselves the responsibility of constantly dosing children with aperients without medical sanction, as much harm may be done to weakly infants by aperients injudiciously administered.

Obstruction of the Bowel in infants may be caused by "intussusception" or by a rupture.

Symptoms.—In the former, the symptoms may commence with sudden pain in the abdomen, screaming, vomiting more or less persistent, and obstinate constipation, though there may be some action of the bowels at first. After a while there is commonly a discharge of blood and mucus from the bowel, with much straining, and the other symptoms continue. The infant appears exhausted and the countenance pinched and haggard, and there may be a protrusion of the bowel from the anus. Coldness of the extremities and collapse supervenes, and the child dies if the bowel is not relieved.

Management.—Unless these cases are recog-

nized in the early stage, there is not much chance of recovery, and the nurse should immediately summon medical aid instead of waiting, perhaps, until after the mother has given frequent aperients, and collapse is imminent.

The treatment will have to be carried out by the surgeon, and consists in endeavoring to replace the bowel by giving enemata, or injecting air into the bowel.

For rupture, see *Hernia.*

Diarrhœa.—The mortality from severe diorrhœa in infants is very large, but slight attacks are frequently prevalent.

Symptoms.—In its simplest form, resulting from improper feeding, teething, or a chill in a healthy child, it is a mild disorder, and ceases when the exciting cause has been removed. It is attended with griping pains, restlessness, vomiting, and slight fever. The motions are at first loose and lumpy, with undigested material, of sour odor, and perhaps frothy from fermentation; subsequently they become thinner, watery, and mixed with greenish mucus.

Management.—The child should be kept warm, and at the commencement, especially if the motions contain undigested material and there is griping pain, a small dose of castor oil should be given.

Diet.—In a hand-fed baby the milk should be well diluted with barley-water or lime-water, and starchy material or other unsuitable food withheld for a time.

Summer Diarrhœa and Infantile Cholera.—Acute and severe forms of diarrhœa are apt to attack infants and young children residing in large towns, and these may be especially fatal and dangerous during the late summer and early autumn months, so that the term summer or autumnal diarrhœa has been applied to

them. The exciting causes may be similar to those inducing the simpler forms of diarrhœa, such as indigestible food, or chills; but there would seem in many instances to be some epidemic influence from soil or sewer drainage. Epidemics occur more often after or during hot, dry summer weather, and an immense number of cases of simpler and milder forms of diarrhœa may precede the epidemic. Infants and children of the poor classes are more liable to be attacked than others.

Symptoms.—The early symptoms resemble in the main those of simple diarrhœa, but soon become intensified; the vomiting is more constant, or sour and acid fluid. The purging is more violent, the stools numbering from six or seven to fifteen or twenty in the twenty-four hours. Their color varies, but is often dark-colored, or green, frothy, and very offensive, and there may be some slimy mucus tinged with blood. The general symptoms are severe; there is rapid wasting, and the face changes its aspect, the eyes become hollow, the skin pale and wrinkled, and there is great depression of strength. The temperature may be elevated to 102° or 103°. If the disease continue, the tongue becomes dry and brown; the pallor and pinched look about the face increase, and the eyelids droop but remain partially open during sleep; the fontanelle is found to be depressed, and the extremities cold. The infant may die either suddenly from syncope, or gradually from exhaustion.

Older children are better able to withstand the exhausting effects of the vomiting and purging, and there is less danger. The young infants or weakly children are very soon brought into a critical state by the exhausting effects of purging.

Management.—When an epidemic of autumnal diarrhœa prevails in the neighborhood, some extra care should be exercised in the management of infants and young children, and attention paid at once to symptoms of gastric disorders or looseness of the bowels. Aperients or purgatives should be given with great care. Purity of air in the nurseries should be insured, excitement should be avoided, and early hours insisted on.

Diet.—In infants at the breast and hand-fed babies, the diarrhœa is apt to be increased or kept up by the use of milk, and it will have to be diminished, or altogether suspended for a time. Barley-water, or whey, in equal parts, or weak chicken broth, given cold, will have to be substituted. Koumiss has been found to agree in some instances, and when given to young children the gas should be first got rid of. When the exhaustion is great, or if collapse seem to be imminent, four or five drops of brandy may be given at once, or two or three drops every three or four hours according to the age. In older children the diet should consist of plain whey, barley-water, weak veal or chicken-broth, or if necessary brandy and milk with yolk of egg. When milk is given, it should be boiled and mixed with lime-water or barley-water. In all cases the abdomen should be kept warm with flannel, and hot applications placed on the extremities if necessary.

In chronic diarrhœa the symptoms are less urgent, but there may be very great wasting and weakness. In addition to the general rules with regard to diet in diarrhœa previously given, the milk and starchy foods must be restricted, and their place taken by stronger meat-essences, broths, or meat-juice in some

form. In older children, raw meat specially prepared is of great service (see *Chapter XVII*).

TYPHOID FEVER AND ULCERATION OF THE BOWELS.—Typhoid fever is less common in infants and young children than in adults, and it has a tendency to run a milder course.

Symptoms.—The early symptoms are vague, but there is usually headache, listlessness, and loss of appetite, with some fever. In the second week there is usually some tenderness and distension of the abdomen, and the bowels may be relaxed. The fever increases, and there is thirst and nocturnal delirium, with some drowsiness. The spots characteristic of typhoid may appear in crops, or may be entirely absent. The course of the fever differs from that in the adult, chiefly in its milder character, a rather shorter course, and fequent absence of spots. Bed-sores are less common than in the adult, but boils and abscesses may occur, and debility and mental weakness may persist for some time after the fever.

Management.—The same careful nursing and feeding as described under typhoid fever in adults is requisite (see *Typhoid Fever*).

Diet.—For young children milk, broths, and water may be allowed in fair quantities when there is great thirst. In giving drink to thirsty children, not only in typhoid, but in any other case, the nurse should be particular to put the whole amount intended for them to drink at one time into the glass, and allow them to drink it all. Young children do not understand that they must not have more than a certain amount, and if a full glass is given, and they are only permitted a few sips, they cry at once for more.

In typhoid and other cases of ulceration of the bowels, tubercular or dysenteric, a flannel

bandage may be worn with advantage round the abdomen. The motions should, in all cases, be examined and saved for inspection if there is anything unusual.

Intestinal Worms.—These parasites are very common in children, and are caused by drinking impure water, or eating imperfectly cooked or spoiled food.

There are three common forms: thread worms, round worms, and tape worms.

Thread Worms.—These small white worms are like fine threads; they measure from a sixth to half an inch long, and reside in the large bowel just inside the external orifice, where they cause great irritation and itching. They may be observed in the motions.

Management.—The most effective method of removing thread worms is by the use of enemata. The bowel should be first cleared by a copious injection of warm water, and afterward five or six ounces of a solution of common table salt, in the proportion of one teaspoonful to four ounces of water, should be injected and retained for a few minutes; or the same quantity of an infusion of quassia may be employed instead. Great cleanliness of the parts should be insisted upon, especially after action of the bowel, warm soap and water being used if necessary. An ointment, composed of one drachm of powdered camphor to an ounce of lard, is useful to allay the itching inside the orifice.

Round Worms.—These long worms resemble in shape and appearance an earth worm, only they are white or yellowish-white, instead of red in color. They inhabit the stomach or small bowel, and are a common source of symptoms of gastric irritation in children. The child seems never satisfied after food, and is fidgety, picking the nose and rubbing its eyes; the

tongue and mucous membranes look red, and the nutrition of the body suffers. In some cases severe symptoms of nervous disturbance, or bowel derangement, may be created in infants and young children by the presence of these worms. They may be solitary, or many in number, and may be passed spontaneously by the bowel, or be vomited from the stomach, or they may crawl out of the mouth or nose while the child is asleep.

TAPE WORMS.—Segments or joints of white, flat tape-like appearance, of about half an inch in length, and a quarter of an inch across, are sometimes voided with the motions. These are portions of the tape worm, which is many feet in length when complete (fig. 46).

The segments are broader at the center, and become smaller and finer as they approach the head, which is globular in form and of the size of a pin's head, so that it commonly escapes detection. The worm gives rise to intestinal derangement and diarrhœa, but produces no very special symptoms, and can only be detected by the presence of the segments in the stools.

Management.—The nurse should make herself acquainted with the common forms of worms that infest the alimentary canal, in order that she may recognize them. Specimens of the round worm, or ascaris, and of the tape worm, or tænia, may be found on the shelves of most museums. Once known, they are unmistakable, but otherwise an error might be made in confusing quite different substances with them. Casts of white membrane are sometimes shed from the bowel in large quantities, of irregular shape, which might be mistaken for worms by the inexperienced.

Worm powders of various kinds are prescribed, usually consisting of santonin, for the

expulsion of worms. To be effective, it is necessary that these remedies should be given on an empty stomach; they are best taken in the early morning, and should be followed by a brisk aperient; the remedy being repeated in a day or two if not successful. If the last meal is taken early, they may be given at bed-time, an aperient being taken in the morning. The excreta should be carefully examined afterward to see if the worm or worms have been passed.

TUBERCULAR MENINGITIS.—Infants and children of all ages suffer from this very fatal disease, and the offspring of delicate or consumptive patients are especially liable to be attacked.

Symptoms.—The premonitory symptoms in children may be of some duration, consisting of listlessness, languor, loss of flesh, pallor, and alteration in temper and manner. The onset may be gradual or sudden, with headache, vomiting, feverishness, flushed face, constipation, drowsiness, and irritability when awake. The headache is usually constant, with paroxysms of great severity, causing the child to shriek or cry out suddenly; the senses are very acute, strong light or loud noises causing distress. After a varying period, the so-called second stage sets in. The headache is more severe, and the brows are contracted; there is great irritation on being disturbed, but there is increasing drowsiness and stupor, and delirium is frequent; the pupils may be dilated, or a squint may be noticed. The urine is often retained, or there is incontinence. The face is pale with a tendency to flush, and the pulse and temperature descend. The third stage supervenes with increasing stupor or complete coma, and in addition there may be twitching of the limbs, or a general convulsion. The temperature may rise considerably before death, which occurs

usually under a fortnight from the onset, thought the length of the illness is very variable. In a few cases there is a return of consciousness, more or less complete, shortly preceding the fatal termination, but coma again returns. There are few diseases which may present so variable a course and uncertain symptoms as tubercular meningitis, but constant severe headache, vomiting, and constipation are prominent symptoms which should rouse suspicion of head mischief. Other acute brain affections in children, such as abscess, or simple meningitis, present symptoms of the same character as tubercular meningitis, but the chance of recovery is rather more favorable.

Management.—The nurse may be able to do a great deal toward the alleviation of the sufferings of the child; and although a fatal termination is almost a certainty in an undoubted case of tubercular meningitis, there are many others in which the exact nature of the affection must remain uncertain, and in which an unexpected improvement in the symptoms changes the aspect, and a favorable termination ensues.

On receiving a child in hospital suffering from head symptoms, the nurse will do well to inquire for any strumous or consumptive taint in the parents, family, or other children. Blows on the head, discharge from the ear, overpressure at school are also points concerning which information may be obtained. The child should be placed in a quiet room, cool and well ventilated; the light must be shaded by a dark curtain, the hair may be cut short or shaved, if ordered, and cool applications kept in contact with the scalp. The feet should be warmed, and the bowels relieved by an aperient or enema. Liquid food in small quantities should be

given at intervals, and ice if there is vomiting. Nursing or moving the child about should be avoided, tending to increase the headache and liability to sickness. When coma supervenes, the usual precautions as to the excretions will have to be taken.

WATER ON THE BRAIN—HYDROCEPHALUS.—This chronic affection is due to an accumulation of the natural fluid in the interior of the cavities of the brain, and shows itself soon after infancy. The infant's head is noticed to be larger than usual, and continues to enlarge; the forehead and sides seem especially prominent, and the fontanelles show no sign of closing in, so that soft places are felt extending along the top and sides of the skull. The face appears unnaturally small in size, and the eyes look prominent and staring; nervous symptoms are usually present. The majority of children thus affected die during infancy or quite young, and those who live are defective in intelligence and terminate their lives in a lunatic asylum.

CHAPTER X.

WOUNDS AND THEIR COMPLICATIONS.—ULCERS, BURNS, AND SCALDS.

Incised and Lacerated Wounds—Healing by first Intention, by Granulation—Dressings—Scalp and Face Wounds — Cut Throat — Hæmorrhage: Capillary, Venous, and Arterial—Arrest of Bleeding—Inflammation and Abscess—Pus or Matter.

Symptoms and Management of Cellulitis—Erysipelas—Poisoned Wounds—Pyæmia or Blood-Poisoning—Tetanus—Ulcers and Ulceration—Burns and Scalds.

Introduction: Different kinds of Wounds.

WOUNDS may occur from various causes, and present endless variety of shape and position. They may conveniently be divided into Incised, Contused, and Lacerated Wounds.

INCISED WOUNDS.—Simple cuts of superficial extent are of slight consequence if properly attended to, and will often heal readily of themselves. Any dirt should be washed off, a strip of plaster applied to bring the edges of the wound together, a pad of lint bandaged over, and the wound will usually heal quickly and without trouble.

HEALING BY FIRST INTENTION.—In these cases the edges of the wound are rapidly glued together, and there is a very slight scar or cica-

trix left. This method of healing is called union by *first intention*, and is the quickest and most favorable that can be desired.

Extensive and deeply incised wounds are accompanied with severe hæmorrhage (see *Hæmorrhage*). After the bleeding has been stopped, the surgeon often has to insert some stitches or sutures of wire or silk to keep the edges in position, and to enable the wound to heal, as far as possible, by the first intention.

CONTUSED AND LACERATED WOUNDS are accompanied by some damage to the skin and soft parts, and the skin may be partially destroyed, and the tissues bruised and torn. These wounds are usually produced by blows or blunt instruments, or by gunshot accidents or explosions. They sometimes contain a considerable quantity of dirt or foreign bodies of various kinds.

HEALING BY GRANULATION.—There is little chance of their healing by the first intention, as new skin has to be formed where the skin has been destroyed, and the deeper parts of the wound must first unite together before the surface heals over. In cases where wounds do not heal by first intention there is more inflammatory action, and matter is formed on the surface of the wounded parts. After a time small red spots appear in the deeper parts of the wound which bleed easily, and are called *granulations;* these sprout up and gradually fill the gaps, while the edges of the wound uniting by degrees the skin grows over the surface and the wound is healed. This method of healing is much slower than union by first intention, and the cicatrix is more distinct and permanent.

The Management and Dressing of wounds, either the result of accidents or after operations, has frequently to be undertaken by the nurse. In severe cases the wound is treated by

the surgeon, and usually dressed antiseptically; the after-dressing is often handed over to a nurse to continue the antiseptic treatment. It is usual to treat all wounds antiseptically (see *Antiseptic Method*), but where this cannot be carried out the nurse should observe the following details:—

In the case of incised wounds of small extent, a piece of strapping of sufficient size to cover the whole wound should be applied, the part having been previously dried, and the edges of the wound brought neatly together, and bandaged if further support is necessary. The wound will frequently heal perfectly by the first intention and no further dressing be required; in fact, the less disturbed it is the better, unless there is evidence of inflammation. If the plaster is well heated by wetting in boiling water, it will remain secure until the wound is healed.

If the wound is of considerable length, the plaster is best applied in strips, about one inch broad, and of sufficient length to extend some distance on either side of the wound. In applying each strip, one end should be first fixed down, and then the edges of the wound drawn together by the thumb and finger of the other hand, the plaster can be then brought over the wound and finally fixed on the other side; a small space should be left between the several strips of plaster, and a bandage may be advantageously used to assist in keeping the parts together.

In dressing lacerated wounds, discharging wounds, or those containing dirt, it is of the greatest importance to cleanse them thoroughly first. This is best done by directing a stream of warm water either with a syringe, or by other means, into the wound until all particles

of dirt and discharge have been removed. Instead of simple water, a lotion composed of one part of carbolic acid to sixty of water, or a weak solution of Condy's fluid, may be employed. If dirt or gravel or other material still remain fixed in the wound, a hot bread or linseed-meal poultice may be used for three or four hours before the dressings are applied. If the surgeon does not advise some particular dressing, strips of lint covered with eucalyptus vaseline, or carbolized oil, may be laid over the wound, a pad of cotton-batting over this, and then a bandage used to secure the dressings in position.

In dressing or re-dressing wounds, the nurse should endeavor to give as little pain as possible. The dressings required should all be prepared beforehand, and in addition, scissors, dressing forceps, syringe, basins and dishes, and boiling water should be in readiness.

In removing strapping, it should be done gently, the two ends being unfixed and raised toward the wound, and the edges kept together by the thumb and the finger while the plaster is being peeled off. If it adheres to the hairs, the process is painful and the hairs should be cut, but it is better to shave the spot before applying the plaster.

In re-dressing extensive wounds, the old plaster should not all be removed until the new strips have replaced some of the old ones, thus preventing any undue strain on the wound.

Where sutures have been applied, the nurse should be careful not to pull on them, and to notice especially whether there is much redness or inflammation round them, which is frequently the case if they have been in too long, and should report to the surgeon. In severe wounds of the extremities, a splint is required

to keep the parts completely at rest. The padding in the neighborhood of the wound should be covered with oiled silk or some other protective, to prevent the necessity of changing the padding every time, which would otherwise become soaked with the discharges from the wound.

WOUNDS OF THE SCALP are of very common occurrence, as the result of a blow or a fall on the head. Owing to the looseness with which the scalp is attached to the parts beneath, large flaps are sometimes separated and torn, so that a very extensive wound is produced, and the consequent hæmorrhage is often severe.

Management.—After the wound has been thoroughly cleansed, the flaps should be replaced in position, and the hair cut short or shaved for a considerable extent round the wound. A pad of dry lint can be retained in position by a capeline bandage, handkerchief, or calico cap. In many cases the wound heals readily, but in persons addicted to intemperance, inflammatory action often sets in with suppuration, and perhaps erysilepas. The parts around a scalp wound should be carefully examined at the time of dressing, and the nurse should notice if there is any swelling or bagging under the adjacent parts, indicating the formation of matter, or if there is any flush or redness about the part, and should report at once to the surgeon.

IN WOUNDS OF THE FACE, the edges should be very carefully adjusted in order to promote healing by first intention and secure as slight a scar as possible. If they are extensive, the surgeon will probably insert sutures, which have to be removed after about forty-eight hours if wire has been used. They heal very readily, but occasionally erysipelas supervenes.

Cut Throats.—In desperate cases, the hæmorrhage from the large vessels in the throat may be so severe as to destroy life rapidly. In some patients there is the danger of suffocation if the windpipe has been laid open; the blood flowing into the opening blocks up the passage. If there is evidence of this, the patient should be placed on his side or face, and the wound should on no account be covered up.

After the immediate dangers have been passed the position of the patient in bed is important. The shoulders should be raised by pillows, and the head bent forward, and, if necessary, in unruly cases, a bandage should be carried round the forehead, and the ends brought from the temples down to a waistband in front.

There is risk of inflammation of the lungs from the access of cold air through the wound in the windpipe, which may be obviated by the application of hot, moist flannels, laid lightly over the wound. If the epiglottis or the œsophagus be wounded, there may be difficulty in feeding the patient, and the administration of food or stimulants by the rectum rendered necessary for a time.

Wounds of the Trunk which penetrate the cavities of the chest or abdomen are dangerous according to their extent, and to the complications which may ensue from damage to the organs contained within them. They require early attention by the surgeon. In severe cases death may be immediate from shock or internal hæmorrhage.

Complications of Wounds.

The complications of wounds are Hæmorrhage, Inflammation and Abscess, Cellulitis, Erysipelas, Blood-Poisoning, and Tetanus.

Hæmorrhage, or Bleeding.—Loss of blood

may occur from a wound of an artery, of a vein, or of capillaries. It is important to be able to distinguish them, as bleeding from a large artery is rapidly fatal if not controlled. In bleeding from wounded capillaries, the blood is of bright color, oozes into the wound and flows over, perhaps very briskly. When the blood flows in a steady stream, and wells up in the wound, of a dark or blue-black color, it comes from a wounded vein. But when an artery is wounded the blood is spirted out in jets with great force to a considerable distance, and is of a bright red color, so that the amount of blood lost from a large vessel in a short time is very great.

In the majority of wounds in which the capillaries are cut across, and even in some accidents where the artery is damaged by violent crushing or tearing, nature arrests the bleeding. In the case of wounded capillaries, the blood forms a clot, which blocks up the open channels, and no further bleeding occurs. Where an artery is torn across or lacerated, the muscular and elastic coats will often contract and diminish the size of the orifice. The flow of blood is thus lessened or stopped, and this gives time for a clot to be formed which closes up the mouth of the artery sufficiently for the time, and if left undisturbed changes take place which permanently seal the wounds in the vessel.

Methods of Arresting Hæmorrhage.—If nature does not arrest the bleeding, it is necessary to check it artificially. The means which a nurse can best employ in an emergency is pressure applied in various ways; at the same time attention must be given to the position of the wounded limb.

Bleeding from Capillaries.—In a wound where

there is free bleeding from capillaries, which does not cease when exposed to the air or after bathing with cold water, pressure may be applied in the form of a pad of several folds of lint, soaked in cold water, and firmly bandaged over. If the wound is on an extremity, the limb should be raised on a pillow and not allowed to hang down.

Bleeding from a Vein, as for instance a wounded varicose vein in the leg, may be arrested by a pad placed on the bleeding-spot, and tied on by a handkerchief or bandage, and the patient placed on a sofa with the leg well raised. If this is not sufficient, a bandage should be applied firmly round the limb on the side of the wound away from the heart.

Bleeding from Arteries.—To arrest arterial bleeding the finger or a pad should be applied to the bleeding spot, and pressure kept up until assistance can be obtained. The exact source of the bleeding may sometimes be ascertained by sponging away the blood out of the wound, and watching for the point where the jet of blood issues. If this fail, and the wound is of a limb, the extremity should be well raised up and a bandage firmly applied for some distance above the wound; and if the wound is near a joint, a pad may be placed in the flexure of the joint next above the wound, and the joint firmly bent.

If the bleeding continue, pressure should be applied in the course of the main artery of the limb, but this is only possible for the nurse if she is acquainted with its situation, and the spot at which pressure can be applied with effect. The finger or thumb may be used for this purpose, or some form of extempore tourniquet, such as a handkerchief with a knot or some solid substance tied in; the knot being

applied over the artery and the ends tied tightly round. If the position of the vessel is not known, a handkerchief may be tied round the limb above the wound, and a stick inserted and then twisted round until sufficiently tight to stop the bleeding (fig. 47). An elastic bandage or india-rubber tube tightly wound round the limb is often effectual (fig. 48).

In wounds of the arteries of the upper extremity the main artery may be pressed upon in the groove on the inner side of the upper side of the sleeve of a man's coat; pressure must of course be made above the wound.

In bleeding from an artery in the lower extremity, pressure may be applied to the main vessel, the femoral artery. The spot chosen should be in the middle of the groin at the top of the thigh (fig. 49).

After the bleeding has ceased, care should be taken, if the patient has to be moved to any distance, to keep the limb steady and raised on a pillow, but it should not be covered up, so that if the bleeding occurs it may at once be visible.

Constitutional Symptoms.—Considerable loss of blood usually produces faintness, indicated by pallor and temporary loss of consciousness, accompanied by a feeble pulse. The mere fright caused by the sight of blood is sufficient to produce faintness in some people, but the condition is one favorable to the arrest of hæmorrhage, because it reduces the power of the heart, and consequently diminishes the force of the blood stream. Immediate resort to stimulants is therefore unnecessary, or even harmful, and all that is requisite is to put the head low.

If the faintness proceed from the actual amount of blood lost, the pallor increases until

the face is blanched, the breathing is sighing, and there is much restlessness; the pupils dilate, and the extremities feel cold, a profuse perspiration breaks out, and the patient may be in danger of dying from syncope. The head should be kept lower than the body, and the extremities raised and kept warm. Stimulants should be given (30 drops of aromatic spirits of ammonia in a wineglass of water), and it may be necessary to inject stimulants, or even to use tranfusion, a method by which fluid of a suitable kind can be introduced into a vein, thus supplying the place of the blood which has been lost (see Transfusion).

After the immediate effects of the hæmorrhage or shock have passed away, the patient sometimes becomes hot and flushed, with a quicker and stronger pulse,—a condition to which the term "reaction" is applied, and this stage will probably be intensified if much brandy has been given during the former period.

Inflammation and Abscess.—Some wounds, especially if much lacerated and contused, or from the presence of some foreign bodies, or from other causes, do not heal readily; the edges become red and swollen, the wound feels hot and painful, and these signs increase and spread into the surrounding parts.

These four signs—*redness*, *swelling*, *heat*, and *pain*—denote inflammation, and they are present in a greater or less degree in inflammation, wherever occurring, either in the external tissues or in the internal organs.

Constitutional Disturbance.—In addition to the local signs in the wound there are often symptoms of affection of the general health. The patient complains of a sense of chilliness, headache, and pain in the limbs. The tempera-

ture is raised, the pulse quick, the skin dry, and the tongue coated. There is loss of appetite, thirst, turbid urine, and constipation; in short, there is feverishness. After a time the constitutional disturbance subsides, and the appearance of the wound alters, the redness, swelling, and discomfort decrease, the inflammation terminates in "resolution," and the wound heals or becomes healthy; or the inflammation increases, giving rise to the further process of suppuration or the formation of pus or matter in the wound. The swelling and redness then increase, and the wound throbs and is very painful, and the constitutional symptoms may be considerable. The pus formation and discharge of matter is often accompanied by cessation of the acute pain, and the swelling diminishes. When matter is pent up in a wound or in the tissues, it causes very great suffering from the swelling and tension of the parts, and this is apt to occur in deep wounds which heal at the surface by first intention, while inflammation and suppuration are going on in the deeper parts. The matter is unable to find its way out, and collects in the interior, great pain being experienced until the wound is re-opened, and the matter allowed to escape. Deep wounds should be made to heal *from the bottom* upward.

Abscess.—When a collection of matter, or pus, forms in the tissues or organs, either as the result of wounds or spontaneously, it is called an abscess. This gives rise to the usual signs and symptoms of inflammation. The abscess may point or protrude at one spot, and then break through the tissues, or it may require to be opened by the surgeon; the symptoms are commonly relieved as the matter is discharged.

The character of pus or matter from an ab-

scess or from an inflamed wound should be noticed by the nurse. Healthy or *laudable* pus is of yellowish color and of a sweet, faint odor, and may contain streaks of bright blood from the healthy granulations, which easily bleed. The discharge from an unhealthy wound or abscess is greenish yellow or green, or dark brown or red, from decomposing blood, and the smell is unpleasant, offensive, or even putrid.

Management.—A nurse should make herself familiar with the appearance of a wound which is becoming inflamed, or not doing well, and report to the surgeon. Such wounds require constant dressing and attention, treating with an antiseptic, and care must be taken to prevent the matter being confined by too close strapping. "A bread or linseed-meal poultice will often suffice to relieve the tension and allow the matter to escape. The discharge should be carefully washed from the wound, and drainage secured by various means, such as insertion of strips of gutta-percha tissue, oiled silk, or drainage tubes."

"Antiseptic dressings may be required, and Iodoform powder sprinkled over the wound is often very effective. Strips of lint soaked in carbolic lotion, or some other antiseptic solution, may be laid over the wound, and the parts kept at rest." Moderate diet and aperients will help to control the feverishness.

Cellulitis is a form of inflammation which may attack the cellular tissue in the neighborhood of a wound, and extends for some distance into the surrounding parts. The tissues affected become swollen and red, and the wound has generally an unhealthy appearance. The temperature usually ascends above the normal, accompanied by the customary symptoms of feverishness.

ERYSIPELAS occurs in two forms. In each case there is an excess of uric acid in the system, and this must be eliminated as speedily as possible, which will assist greatly in treatment of the malady. There is a superficial kind which only attacks the skin; a rash of bright red color appears around or near the wound, having a distinct margin. It spreads rapidly, and there is usually some swelling underneath. There is no limit to the extension of the rash, and it may disappear, and reappear suddenly in another part. Its natural term is generally eight or ten days.

The other form of erysipelas is more severe; it attacks the deeper parts as well as the skin, and is closely allied to cellulitis. There is more swelling and pain, and vesicles or blisters often appear on the skin containing clear fluid which soon becomes turbid. In erysipelas the constitutional symptoms are usually well marked. There is often a chill or rigor, with rise of temperature and fever symptoms. The condition of the wound probably changes, and an unhealthy appearance is visible before the attack, or a blush may be seen at or round the edges of the wound, and the discharges cease or change color.

Management.—The nurse should be on the lookout for rigors or rise of temperature, and watch the wound carefully, especially if the patient is in the wards of a hospital, in order that the first sign of erysipelas may be detected, as the disease is *highly contagious* to others suffering from open wounds.

It is usual to remove cases of erysipelas and cellulitis at once into separate wards to prevent the spread of the disease.

Good ventilation and absolute cleanliness are essential.

In cases of a low type, nourishing diet and stimulants—milk punch or egg-nog—are required.

There are many applications in ordinary use; among the best being the application of collodion, or dredging the parts with flour. The greater number of cases get well, but among the intemperate, those of feeble constitution, or those suffering from kidney disease, the malady often proves formidable. Delirium, inability to take food, and a brown tongue, joined with great feebleness, are bad symptoms, and forebode a fatal termination.

The disease is sometimes epidemic at certain seasons of the year, but it may break out in a ward and spread without any apparent reason. The nurse should notice if it makes its appearance first at any particular spot, or clings to any part of the building, since dirt, bad drains or decomposing materials are common causes of an outbreak. She should also remember its infectious qualities, and be careful to destroy dressings from these wounds, and not to employ splints or instruments for other patients which have been used in these cases. On the termination of the illness, all instruments should be thoroughly boiled and disinfected in strong carbolic solution, and the bed and bedding sent away to be disinfected (see *Disinfection*).

Poisoned Wounds.—Slight cuts, abrasions, or wounds of any kind may become poisoned by the introduction of decomposing matter, or by the decomposition or foulness of their own discharges.

A common instance is an ordinary "*whitlow*." The poisonous material enters at a small crack, or hang-nail, on the finger and inflammation is set up in the deeper parts. Matter

forms and perhaps can be seen as a yellowish-white speck deep under the skin. The affection is very painful, and unless the matter escapes or is relieved by an incision, the inflammation may spread and affect the nail and the bone, destroying part of the finger.

INFLAMED LYMPHATICS.—As a result of whitlow or other poisoned wounds, inflammation of the lymphatic vessels and glands in the neighborhood or above the wound is always to be suspected. The first sign of this is a faint blush running up the limb in the course of the vessels, with a feeling of pain and stiffness, and usually some constitutional disturbance. In the case of a whitlow the flush will be visible on the front of the fore-arm to the elbow, and along the inner side of the upper arm to the arm-pit. Here there is often some tenderness and pain, and the lymphatic glands may perhaps be felt to be swollen, or the glands may be tender without any preceding blush.

Management.—If the nurse is in charge of poisoned wounds of the extremities, she should be on her guard against inflammation of the neighboring lymphatics, and report at once to the surgeon. She should also be very careful of her own fingers, and touch the wound and discharges as little as possible, washing her hands in carbolic or some antiseptic afterward. These precautions may prevent her suffering herself.

BLOOD-POISONING — PYÆMIA.—In pyæmia the morbid material in the wound not only affects the lymphatics, but also enters the blood, producing a serious and often fatal disorder.

Symptoms.—The onset is marked by a sudden and severe rigor, often lasting some time. The patient's teeth chatter, the bed shakes, and he becomes blue. His temperature is found to be above normal, and rapidly rises to 104°, 106°, or

higher. After the shivering, profuse perspiration sets in, lasting some time, and the temperature subsides. These rigors are a great feature in the disease, and usually recur at intervals, often of twenty-four hours. The general condition of the patient rapidly becomes worse, and he gets pale and thin. During this time, or perhaps before, the wound has become unhealthy and offensive, and abscesses may appear in different parts of the body, either in the external tissues, in the joints, or in the internal organs. In acute cases, death occurs in from two or three days to a fortnight. The more chronic last from two to six weeks or longer, and there is greater chance of recovery.

Management.—The main predisposing causes to pyæmia are overcrowding, dirt, bad ventilation, and insecure drainage, some of which may be guarded against by the nurse; and especial attention to these points is necessary in a ward where there are many discharging wounds. The nurse should comprehend the importance of a rigor, and take the temperature, administering some warm drink, and applying additional coveings. Later on her attention should be directed to complaint of pain in any region as perhaps indicating the appearance of an abscess. In chronic cases, a water-bed is very desirable. The freest possible ventilation should always be secured.

Tetanus, or Lockjaw.—This formidable malady is liable to attack patiens suffering from wounds of any description, the slightest or the most severe, though it is perhaps more common after lacerated wounds. It is characterized by spasm and cramp in the muscles of the body of a most painful kind.

Symptoms.—The early symptoms are impor-

tant, and often slight in character. The first complaint is usually of a feeling of stiffness about the jaws and throat, so that eating is difficult, and the patients finds he is unable to open his mouth. Other muscles become affected, and a spasm comes on, in which the muscles, often the muscles of the trunk, become firmly contracted, and the face is drawn into a grinning expression. As the spasms increase, a larger number of muscles become affected, the head is bent back, the body arched with the abdomen forward, and if the spasm continue the breathing ceases, and the countenance becomes livid. If the spasm does not relax, the patient may die of suffocation. In acute cases the spasms increase in severity and the intervals become less frequent, and death takes place by suffocation or exhaustion; but the more chronic and less severe cases sometimes recover.

Management.—Recovery in cases of tetanus is obtained by very careful supervision, nursing, and feeding. It is important that the disease should be recognized at an early stage, and it is highly probable that the nurse will be the first to hear of the early symptoms. Sometimes gastric derangement and constipation precede the first stiffness about the muscles of the jaw, or the drawn expression of the mouth may be the first indication. The bowels should be *thoroughly acted on* with a reliable purgative, the patient should at once be isolated and kept perfectly quiet, as the spasms are frequently started by the least noise, or even by a draught of air, touching the bed. *Feeding* is of next importance, and should be carried on between the spasms frequently and gently. It is sometimes difficult on account of the closure of the mouth, but the fluid must be introduced through gaps between the teeth, or by enema, if feeding

by the mouth is not possible. Sleep should be encouraged as much as possible.

Ulcers and Ulceration.—An open sore is sometimes left as the result of injury, or inflammation of the skin or mucous membranes, or the loss of vitality in the affected part is due to some constitutional or local weakness. The sore or ulcer presents various appearances, and discharge of matter usually occurs from the surface.

A healthy or healing ulcer is covered with small, red granulations, discharging yellowish pus, and is surrounded by healthy skin, presenting a bluish line at the circumference. The size of the ulcer diminishes day by day as the skin heals over.

No further treatment than rest and simple dressing is required.

Unhealthy ulcers are accompanied by a discharge of unhealthy pus, the skin round the margin appears inflamed, and the base is occupied by swollen granulations, or covered by a slough; and the ulceration invades the surrounding parts.

Special treatment is required for these ulcers, and under medical advice.

Cold or callous ulcers are characterized by slow healing, and the margin is hard and white, and the surrounding skin brawny; the granulations are pale and flabby, and there is but little secretion from the surface. Stimulating applications are necessary, and attention to the general health.

In the management of all ulcers, support by strapping and bandaging is required, and when the ulcer is situated in the lower extremity, a few days' rest in bed will often produce marked benefit; if in the lower limbs, that part should be raised above the level of the body.

Malignant ulcers are of a cancerous nature, such as epithelioma, and rodent ulcers of the face. These attack persons in the more advanced periods of life, and can only be dealt with by operation.

BURNS AND SCALDS.—Destruction of the skin and soft parts of the body is caused by dry heat in burns, and by moist heat in scalds. The extent of this destruction indicates the severity of the burn, and in severe cases there is great nervous shock, with depression of the vital powers. The face is pale and drawn, the skin cold and clammy, the pulse fails, and there is immediate danger to life.

Management.—When the patient is suffering from shock, the treatment must be directed to this before the local injury is attended to. He should be wrapped in warm blankets and placed near the fire, or covered up in bed, and hot bottles applied to the feet and surface of the body. Stimulants, hot beef-tea, or hot fluid of some kind should be administered. In the meantime a warm bath should be prepared, of sufficient size to enable the patient to be completely immersed. The water should be of a temperature comfortable to his sensations, and he may remain continuously in the bath until all severe symptoms have passed away (see *Baths*).

In the local treatment, after the charred remains of clothing have been gently removed, the burns may be dressed. One limb or part of the body should be dealt with first, the rest being covered up. If there are vesicles or blisters of large extent, they should be snipped, and the fluid evacuated or soaked up with absorbent cotton, but the skin should not be removed; small vesicles may remain uncut and be protected with absorbent cotton. The burnt sur-

face may then be freely painted over with the flexile collodion of the Pharmacopœia, two or three times, or Carron oil (equal parts of lime-water and linseed oil) may be applied on lint.

If these applications are not at hand, the surface may be freely dusted over with bicarbonate of soda or pulverized borax, or if these cannot be had quickly, by wheat flour, and enveloped in a thick layer of absorbent cotton, retained in position by a flannel bandage.

In slighter cases, simple dressings of zinc ointment or lead lotion will suffice, and since the removal of dressings is always attended with severe suffering, they should be changed as seldom as possible. In the case of children or others of sensitive disposition, it is no uncommon practice for *the surgeon* to administer chloroform during the removal of the dressings.

The scars left from burns are very disfiguring, and great contraction of the skin is apt to follow, producing various deformities. Long after-treatment is required, and extension by means of splints of different kinds.

Scalds of the Throat in children require especial notice, as they are not infrequent among the children of the poor. They are commonly produced by attempting to drink boiling water from the spout of the tea-kettle. A scald of the mouth, fauces, and larynx results, giving rise to dangerous symptoms of difficulty of breathing from injury to the larynx.

Management.—The child should be placed in a warm, moist atmosphere, by means of a covered cot, or surgical cradle, with a steam kettle near by, as for tracheotomy cases. In severe cases, when the dyspnœa is urgent, tracheotomy may be required (see *Tracheotomy*).

CHAPTER XI.

FRACTURES.

Fracture by Direct and Indirect Violence—Simple, Compound, and Comminuted Fractures—Signs of Fracture—Union of Bone—Setting Fractures—First Aid in Fracture.

Management of Fractured Skull — Concussion and Compression of the Brain — Fractured Lower Jaw — Spine — Pelvis — Collar-Bone — Splints for Fractured Arm—Colles' Fracture —Thigh Bone—Bones of Leg—Patella—Plaster of Paris Case—Crutches—Compound Fractures—Sprains and Strains—Dislocations.

Nature and Signs of Fracture.

A bone may be broken by *direct* violence, as when the blow falls directly on the bone and fractures it at that point; or by *indirect* violence, in which case it gives way at some spot in between, the force being applied at one end, while the other is fixed. An example of the latter would be a fracture of the clavicle or collar-bone by a fall on the shoulder.

A less common method of fracture is by *muscular action*, a powerful and sudden contraction of a muscle causing the bone into which it is inserted to break; for instance, a not uncommon example is fracture of the patella or knee-pan, by sudden contraction of the powerful muscles in front of the thigh bone.

When a bone is broken by indirect violence, it commonly gives way at the thinnest and weak-

est part. In jumping from a height, the tibia is usually fractured at its weakest part, a point a few inches above the ankle joint.

There are three kinds of fractures: Simple, Compound, and Comminuted.

SIMPLE.—When the bone only is broken, and in one place.

COMPOUND.—When the bone is broken, and there is in addition a wound of the skin and soft parts communicating with the fracture. The wound may be caused by the same violence that produced the fracture, or the sharp end of the broken bone may be subsequently forced through the skin by the movements of the patient, or by the careless handling of those who endeavor to assist him.

COMMINUTED.—Where the bone is broken in more than one place.

SIGNS OF FRACTURE.—These are:—

Loss of power in the limb.

Distortion and swelling.

Pain; tenderness, and increased mobility when handled.

Inequality in length between the injured and the sound limb when their measurements are taken.

The hand placed on the bone at the injured part may detect some irregularity, and perhaps feel a grating sensation (crepitus), caused by the rubbing together of the fractured ends.

UNION OF BONE.—A fractured bone is mended by nature on the same principles as an ordinary wound of the soft parts is healed, only the time required is considerably longer. To favor this process, the ends of the bone must be brought close together and kept at rest. The blood which has been effused about the ends of the bones is gradually absorbed, and after about

a week a soft material is formed around and between the ends of the broken fragments, which holds them together like splints, while the ends become glued together by the same material. This soft material is called "*callus*," and after the third or fourth week is hardened by the formation in it of bony substance, so that by the sixth or eighth week the fracture is united by bone and becomes solid. The time required for firm union varies according to the thickness of the bone, the larger bones taking longer than the slighter. Lumps of hard "callus" may often be felt about the seat of fracture when union is going on; these are removed or smoothed down after a variable time, when the bones are united in a good position.

SETTING A FRACTURE.—In the treatment of fracture, the surgeon's first endeavor is to bring the ends of the bone as nearly as possible into their natural position, and then by means of splints and other mechanism to keep them so, and perfectly quiet. This having been done, nothing remains than to wait and let nature complete the cure. In the greater number of cases, after union has taken place, the bone gradually regains its strength, so that finally it is as strong as before. In some few, especially debilitated subjects, the bones do not unite, and an "*ununited*" fracture is the result. This may also occur when the ends of the bone have not been brought sufficiently close together, or kept at rest; but in these cases the bones more commonly unite at an angle, or in some other bad position, and deformity is the result, with impaired power of movement.

First Aid in Fractures.

A person with a fracture, especially of the lower extremity, should remain, if possible,

where he is until medical assistance can be obtained, the limb meanwhile being kept at rest. If it is necessary for him to be moved, the greatest gentleness and care should be exercised, and the fractured limb kept from further injury by firm support. If the upper limb be injured, it should be well supported by a sling in a comfortable position, and the patient should walk or be moved home.

In the case of fracture of the lower extremity, some form of extemporized splint should be used to prevent movement of the broken ends and the possibility of a simple fracture becoming a compound fracture. For this purpose a stick, umbrella, or thin firm board tied on to the side of the leg by pocket-handkerchiefs will suffice. The injured and sound limb may then be tied together, and the patient removed on a stretcher or shutter.

Management.—In cases of fracture of the lower extremities, the bed should be specially prepared for the patient, four or five deal boards about a foot wide being placed across the bed under the mattress, in order to prevent it from sinking in the middle.

A soft mattress or feather bed must not be used, but one of good, firm horse-hair or well-stretched sacking.

It will be necessary for the nurse to undress the patient, and she should be practically acquainted with the right method.

The boots must be removed with great care, and while withdrawing the boot with one hand, the other should be employed to steady the limb at the ankle. If there is any difficulty, the boot should be cut down one side. Before removing stockings, the garters must be loosened; braces should be unbuttoned in front and behind.

If there is any difficulty in removing the

trousers, or if the thigh bone is fractured, it is better to cut down the outside seam, which can be easily repaired.

On taking off the coat, it is better to remove the sleeve from the sound limb first.

The patient may be undressed either on the bed or on the stretcher on which he was carried; before placing him in bed, the bed-clothes should be well turned down, and then he should be lifted on, a person standing on either side of the bed to do so. If it is necessary to wait any time for the setting of a fracture, the leg may be supported at the sides by sand-bags or some substitute, the bed-clothes being kept off by a cradle.

Special Fractures.

Fracture of the Skull.—A blow or fall on the head may fracture the roof of the skull by direct, or the base by indirect, violence. If the roof is fractured, the scalp will probably be wounded and the fracture be compound. The fracture may take the form of a slit or fissure, or the bone may be forced in, causing a depression.

In fracture of the base of the skull, there may be merely signs of a blow on some part of the head.

Symptoms—Concussion of the Brain.—In some cases of severe blows on the head, whether the skull be fractured or not, there is evidence of concussion of the brain. This may be slight, and is accompanied by pallor of the face and feeble breathing. There is more or less unconsciousness, but the patient will often answer questions, though with difficulty and in monosyllables. The symptoms are immediate; vomiting is very common, and there is confusion of thought for some time after, with perhaps loss

of memory for events occurring at the time of the accident. Headache is usually severe and persistent, and there is often subsequent drowsiness. After a good sleep the patient frequently awakes much better.

Management.—Absolute quiet and rest in bed for some time. The feet and legs should be kept warm, and cold may be applied to the head. Afterward the diet should be light and unstimulating, and the bowels relieved by aperients.

Fracture of the Base of the Skull.—The symptoms of compression are usually present, and in addition there may be bleeding from the mouth, nose, or ears, or a discharge of watery fluid from the ear.

Compression and Injury of the Brain.—When the roof of the skull is broken in and depressed, the brain and membranes underneath are injured and the symptoms are more severe, or blood may be effused within the skull, causing pressure on the brain.

Symptoms.—The symptoms are those of compression, of which the following are the most important. There is complete loss of consciousness, the breathing is slow and labored and perhaps stertorous, the pulse is slow, the bladder paralyzed, the pupils dilated or unequal,—in short, a condition of "*coma.*" These symptoms may come on at the time of the accident, or may supervene after an interval of consciousness. In any case, they are of very grave import. When the bone is depressed, an operation is performed by the surgeon to raise the bone and remove the fragments, which may be pressing on and irritating the brain, or "*trepanning*" may be necessary, a process by which a hole is made through the roof of the skull to facilitate the operation.

Management.—The patient should be put in a darkened room and kept quiet; if unconscious, all the attention required in such cases will be necessary (see *Coma*). The nurse should be watchful for anything in the form of a convulsive seizure, for returning consciousness, or for any evidence of local paralysis. When fracture of the base is suspected, the pillow should be examined for evidence of discharge from the ears. If any operation has to be performed, the head will probably require shaving.

After the immediate effects have passed off, the temperature should be noticed, or if there is other signs of fever, indicating the onset of meningitis (see *Meningitis*).

Fracture of the Lower Jaw.—The person will have difficulty in opening his mouth and speaking. There may be bleeding in the gums, or looseness of the teeth, near the fracture.

Management.—A special form of bandage is convenient for this fracture, and the nurse should be able to make it. It is called the four-tail chin bandage, and consists of a yard and a half of calico three or four inches wide, with the ends slit down the middle to within three inches of the center. A hole or slit should be made in the center about an inch from the border, just large enough to receive the chin. To apply the bandage, the chin is first placed in the central slit with the narrower side in front, the two upper tails are carried back and fastened round the neck, while the lower ones are tied on the top of the head (fig. 50).

Fluid nourishment should be given for some time after fractured jaw, as mastication is difficult.

Fracture of the Spine.—The symptoms of fracture of the vertebræ, with displacement, depend on the amount of injury to the spinal

cord. Injury to the cord high up in the neck is often immediately fatal; if lower down, the symptoms are those of *paraplegia*, and the complications and management will be similar (see *Paraplegia*).

When the vertebræ in the neck are fractured, the greatest care should be exercised to keep the head from any sudden movement; it is advisable to place the patient at once on a water-bed.

Fracture of the Ribs.—Pain is felt at the seat of the fracture, especially on movement or taking a deep breath, and coughing or sneezing are particularly painful. Great relief is experienced from firm pressure, which helps to control the movements of respiration.

Management.—A flannel roller eight or ten inches wide should be firmly bound round the chest once or twice, and then stitched, or a broad piece of strapping may be first applied half round the chest on the injured side.

Complications.—Injury to the pleura and lung by the broken ends of the bone may occur, causing difficult and rapid breathing, with much pain, owing to inflammation of the pleura. Pneumonia or inflammation of the lung may set in, in which case there is troublesome cough with expectoration, often of blood-stained phlegm, rapid breathing, and general signs of fever (see *Pneumonia*).

Fractured Pelvis is usually the result of very severe violence or crushing, so that the internal organs often suffer damage, especially the bladder. The nurse should be careful to notice if any urine is passed after the accident, and should save it in order that it may be examined to see if it contains any blood.

Fractured Collar-Bone is a common accident from falls on the shoulder. The patient is

usually inclined to support the elbow of the injured side with the other hand, and bends the head to the injured side.

Management.—There are many methods for setting a broken collar-bone but the nurse should prepare the following apparatus: A wedge-shaped pad of some firm material, of moderate size, to place in the arm-pit. Bandages to confine the arm to the side, and a sling to support the fore-arm. The bandages may be best kept in position by stitching them together.

Fractures of the Upper Extremity

Fractured Humerus.—Short splints or well-padded Gooch splints are sometimes used, or a short external with an angular internal splint may be applied so as to fix the fore-arm, the arm being put in a sling.

Fractured Ulna and Radius.—Two side splints of sufficient length to extend from the elbow to the fingers are required; the inner one should be shortened so as not to press at the bend of the elbow when the limb is flexed.

Colles' Fracture, or a fracture of the lower end of the radius, is very common, and may be treated with two side splints, or by a special internal splint, of the pistol-shape, or one provided with a hand-piece.

Management.—In attending to fractures of the upper extremity, the nurse should be careful to notice if there is any undue swelling or blueness of the hand, or if great pain and numbness is complained of by the patient, as the bandages may require loosening. If unable to consult the surgeon at the time, it would be better to loosen or cut up part of the bandage than risk *gangrene* from tight pressure.

Strapping or bandages underneath the splints are to be avoided, as liable to create undue pres-

ure and interference with the circulation, or pressure of the splint at the bend of the elbow may cause the same discomfort.

The time required for a fracture to remain in splints varies from three to six or more weeks, according to the size of the bone or the severity of the accident. It is often necessary to remove the splints during the treatment, and gently move the joints in order to prevent stiffness. In many cases of fracture, if this precaution is not taken, and the splints are kept applied for a long time, a troublesomely *stiff joint* ensues, which may take as long to remedy as the fracture itself. In fracture of the clavicle or injury to the upper arm, the shoulder joint, and in fractures of the arm the elbow and wrist joints, require to be moved. After removal of splints, it is safer to keep some support on the limb, and the arm should still be kept in a sling; gentle and gradual movement being practiced until the bone is firmly consolidated and strength restored.

Fractures of the Lower Extremity.

Fracture of the Thigh-Bone.—From the action or contraction of the powerful muscles of the thigh there is often considerable shortening of the limb in this fracture, and in addition to splints an apparatus for pulling down the lower fragment is useful. This is managed by hanging a weight on to the lower leg, to which method the term "*extension*" is applied.

Apparatus Required.—A long, padded splint, Liston's or other, of sufficient length to extend from the arm-pit to a few inches below the foot. There should be a hole cut for the outer ankle, and the splint should be provided with a cross foot-piece. Strapping, broad bandages, flannel, and calico, a broad binder to fix the splint to

the body, and several pads of different sizes are necessary.

The extension apparatus is fixed on the leg by means of a "*stirrup*." This consists of a flat piece of wood, two to three inches square, with a hole bored through the center, and a strong piece of strapping one and a half inches wide, and about a yard long. The wood is placed in the middle of the strapping, which is fixed to it by another strip of plaster bound round it, and a hole is bored through the middle. A piece of card is passed through the hole, and to this a weight of several pounds is attached (fig. 51).

The fracture is put up as follows:—The strapping is heated and applied on either side of the leg as high as the knee, avoiding the ankle, around which some wadding may be wrapped. A flannel bandage is then carried up from the foot, over the strapping, to the knee. Firm, steady traction is then used to draw down the lower fragment into position, and while this is kept up by an assistant, the surgeon applies the long splint to the outer side of the leg. The cord can then be passed through the hole in the stirrup, and as heavy a weight as necessary fixed on, and hung over a pulley or bar at the foot of the bed. Extension is by this means constantly kept up on the lower fragment, and the bones maintained in position.

Another method of extension, but not so commonly used now, as being far less comfortable, is by means of the "*perineal band*." The upper end of the long splint is provided with two holes. A soft handkerchief or padded band of lint, the perineal band, is passed between the thighs, and the two ends passed through the holes in the top of the splint. After the splint has been bandaged to the leg, extension is put on the lower fragment, and at the same time

the perineal band is tightened, and firmly tied at the top of the splint. It is advisable to cover the perineal band with oiled silk, as it is liable to get soiled with the excretions. The splint may be kept straight by sand-bags, and a cradle should be placed over the broken bone.

In the treatment of fractured thigh-bone in children, it is often necessary to put the sound limb in a long splint also, to prevent them rolling over and moving about; they may also require to be tied up to the head of the bed by a band round the waist, to prevent their slipping down toward the foot, and so removing the extension.

Fracture of the Leg.—Either one or both bones may be broken, the most important being the tibia, the larger of the two. When the bone is broken just above the ankle-joint there may be considerable displacement of the foot to one or other side.

Splints.—Fractures of the leg-bones may be put up in a back-splint and two side-splints. The back-splint should extend from above the knee to the foot, where there should be a foot-piece. The leg is first bandaged into the back-splint, with a good pad under the Tendo Achillis above the heel, to keep pressure off the heel. The foot is bandaged to the foot-piece, and the bandage carried all the way up, or a space may be left free at the seat of fracture. The two side-splints may be fixed on by a band and buckle above and below, the whole leg being suspended by straps or bandages to a cradle and allowed to swing, in which position it is most comfortable (fig. 52).

Management.—Great discomfort is felt by the patient when the heel rests on the splint; the constant pressure interferes with the circulation, and an ulcer or sore place frequently

forms which interferes with the treatment; the same trouble may be produced by too great pressure on the prominent ankle bones. This is avoided by careful adjustment of pads in suitable positions.

After applying neatly to the lower limbs bandages which have to remain on for some time, it is a good plan to starch them over and let them dry, by which means they are kept tidy and in position. The leg is usually kept in splints from four to six weeks.

Fractured Patedda.—The knee-pan is often broken by the sudden contraction of the powerful muscles in front of the thigh. This accident is generally accompanied by swelling and effusion into the knee-joint at the time, or soon after, and it is often necessary to wait for a while, and apply cold lotions to reduce the swelling, before the bandages can be applied.

Management.—The patient may be propped up in bed with the leg raised on pillows or a rest, in order to relax the front muscles.

There are many methods of treating this fracture. In many instances the surgeon performs an operation immediately, by wiring the two fragments together. The older method was to apply a back-splint, with two pieces of strapping or an elastic bandage above and below the fragments, to bring them together. After remaining on the splint for six or more weeks, the limb has to be encased in some firm support before the fracture is sufficiently united to bear any strain, and resist stretching.

After-treatment of fractures of the lower extremity. It is a common and convenient practice to remove the splints in cases of fracture before the bone is actually consolidated, and to put them up in some firm support, so that the

patient can go about with crutches or sticks until the cure is complete.

The substances in common use are starch, gum and chalk, and plaster of Paris. The latter has many advantages, and may be applied as follows:

Plaster of Paris Bandage.—The plaster should be the fine white powder used by modellers; the bandages of very loosely woven lint. The dry powder should be rubbed into the meshes of the bandage on both sides, with the palm of the hand, and the bandage rolled up. The limb may be first evenly bandaged with a flannel bandage. The plaster bandages should be placed in a basin of water containing some of the powder for a few minutes before using, and when thoroughly wetted may be applied over the flannel bandage evenly, as far as possible without "reversed turns," each fold overlapping the one below. Some of the wet powder may be rubbed in between each layer, and two or three or more layers of bandage may be used, according to the desired strength and thickness of the case.

The plaster will have set in five or ten minutes, and should then be allowed to dry.

The plaster bandage can be removed when desired by unwinding the bandages, or if too thick for this, the dilute hydrochloric acid may be rubbed along one side for a few minutes, after which the bandage may be cut down by scissors.

Crutches.—After a fracture of the lower extremity, on first getting up the patient is too weak to move about, and in his first attempts to walk he will require the use of crutches, or two sticks. The leg should be supported in a sling passing under the foot and round the neck, the crutches being only just of sufficient length

to enable the patient, standing on the sound leg, to raise the injured one off the ground. The cross-bar for the arm-pit should be well padded with soft material, to prevent undue pressure on the nerves of the arm. The end is then covered with a cap of leather or cloth, to prevent it from slipping on the ground, and the person should be warned against using them on a slippery floor. Great care should be exercised when a patient in a weak condition first uses crutches.

Compound Fractures.

Compound Fractures.—It is very important that these should be converted into simple fractures as soon as possible by the rapid healing of the wound. If the wound is slight, a piece of lint, soaked in carbolic oil, or covered with collodion, is a good application.

Where there is more damage and much effusion of blood into the tissues, a water-dressing or poultice should be applied, or the wound may be dressed antiseptically (see *Antiseptic Dressings*). Where the wound heals readily, the fracture will unite as well as simple fractures.

Splints.—The surface wound often prevents the use of ordinary splints, and an *interrupted* splint is useful. In splints of this kind a gap is left at the part required, the place of the wood being taken by a curved piece of iron. The interruption can be made at any place, and the wound can then be dressed without disturbing the splints.

In very severe accidents, where there is so much damage to the limb that there is no chance of saving it, and gangrene would be likely to supervene, amputation is necessary (see *Amputations*).

Sprains and Dislocations.

SPRAINS AND STRAINS are the result of the forcible overstretching of the muscular and ligamentous tissues. This very commonly occurs in the neighborhood of a joint such as the ankle or wrist, from the effect of a wrench or a twist. Acute pain is then felt at the moment, sufficient to produce temporary faintness or sickness, and the part becomes rapidly swollen, and hot. In a few days the swelling gradually subsides, and usually some discoloration appears under the skin, due to effusion of blood from the rupture of small blood-vessels, the color changing after a time from red to various shades of greenish blue and black. In many cases of strains and sprains in which the immediate swelling and pain soon subside, a long time elapses before the patient is able to move the parts freely.

Management.—Injuries to joints should be examined as soon as possible by the surgeon, in order that he may determine whether there is any further damage than a strain of the soft parts, since the subsequent swelling makes it difficult to be certain in some cases as to the extent of the injury.

In severe cases a splint may be applied with advantage, and in any case perfect rest is necessary for a time.

Hot fomentation, or bathing with hot water, may be employed, or cold applications and evaporating lotions may allay the pain. A bandage exercising moderate pressure will sometimes prevent excessive swelling, and the parts may be subsequently rubbed with liniment, or douched with cold water, with advantage.

A bandage should be worn for some time after the patient has begun to use the joint.

DISLOCATIONS occur as the result of violence

by which there is a displacement of the bones at a joint: they are usually accompanied by some tearing of the ligaments or muscles which surround the joint.

There is more or less deformity, and the movements of the joint are impossible, or much interfered with, and are accompanied by great pain.

Dislocation may occur at almost any of the joints, but some are more easily displaced than others, owing to the shape of the articular surfaces.

A considerable amount of technical knowledge is required to recognize the nature of these injuries, and they should be seen by the surgeon as soon as possible, in order that they may be rectified or "*reduced*" at an early stage. Swelling commonly succeeds these accidents, and after reduction it is necessary to keep the parts at rest by bandages and splints.

Management.—The nurse should be prepared with splints, and may have ready in addition, for the operation of reduction, bandages, jack-towel, and starch powder to dust over the part where pressure will have to be applied.

In dislocation of the hip, or old dislocations, or other cases where there is difficulty in reduction, it is usual to administer some anæsthetic to relax the muscles and prevent pain.

CHAPTER XII.

OPERATIONS AND SPECIAL SURGICAL CASES.

Preparing Patient for Operation—Aseptic Preparations—Operation Room and Table—Management of Patient after Operation—Hæmorrhage after Operation.

Management of Hare-Lip—Cleft Palate—Tracheotomy Cases—Gangrene—Amputations—Retention of Urine—Catheters—Stone in the Bladder—Lithotrity—Lithotomy—Fistula—Piles—Hernia—Strangulated Hernia—Ovariotomy.

Operations.

PREPARING PATIENT FOR OPERATION.—Before operation, the urine of the patient should be saved in order that it may be examined, and in the morning a free evacuation of the bowels should be obtained, if necessary by an enema, and an aperient given over night. The nurse should see that the patient's clothes are properly arranged beforehand, and he should be dressed as lightly and loosely as possible, with due regard to warmth. The patient must not be allowed to get cold, and should wear a flannel dressing-gown over the night shirt, and a pair of warm stockings and slippers. The loose garments can then be easily turned back from the part to be operated on, which may be surrounded with carbolized towels, and a mackintosh arranged to prevent the blood soaking through and soiling the clothes, or a sheet of rubber will be found preferable.

ASEPTIC PREPARATIONS.—In preparing a patient for operation, the parts round the seat of operation require very thorough cleansing before they are made aseptic. All hair about it must be carefully shaved; the skin over and around it should be scrubbed with a clean nail brush and soap, or hand sapolio, and the parts rubbed well with ether or alcohol to remove grease, as the antiseptics will not soak into a greasy surface. The cleansed parts should be covered with a sterilized towel, which has been soaking for 24 hours in carbolic lotion, 1 in 20. This should be bandaged on 12 hours at least before the operation. A nurse cannot be too particular about cleaning her hands. She should turn up her sleeves to the elbow, cut her nails as short as possible, take a clean nail-brush, with hand sapolio, or soap and water, and scrub all the visible dirt away, then rub them with alcohol or ether. She must also remember that, having thoroughly disinfected her hands, she must not touch anything that has not been made aseptic without disinfecting them again.

When chloroform or ether has to b administered, it is important that the patient should not take any solid food for at least four hours beforehand. The last meal should be a light one of meat-soup or beef-tea, with a little stimulant if necessary. A full stomach at the time of receiving the anæsthetic is a *source of danger* to the patient, and will result in troublesome vomiting and discomfort. False teeth must be removed prior to operation.

OPERATION-ROOM AND OPERATION-TABLE.—The temperature of the room should be from 65° to 70°; there should be a fire and a large kettle containing boiling water. The operation-table should have a folded blanket upon it, and a pillow or two; a mackintosh-sheet of rubber being

placed over the part of the table at which the hæmorrhage will occur, and a moist towel on the ground to catch the blood (see *Operation in Private Houses*).

The nurse should have the following requisites always in readiness:—

1. Extra blankets and mackintosh-sheets.
2. Towels.
3. Hot and cold water.
4. Bandages and strapping plaster.
5. Lint and absorbent cotton.
6. Oiled silk.
7. Basins, large and small.
8. Bucket.
9. Sponges or mops.
10. Oil and vaseline.
11. Scissors and dressing-forceps.
12. Pins and safety-pins.
13. Syringe.
14. Brandy and aromatic spirits of ammonia.
15. Dressings.

The duties of the nurse in the operation theater are various; she may be single-handed, but more often there are others assisting, and to each is allotted her special task. In any case, she must be attentively on the lookout to be ready with anything that may possibly be required. She should arrange the patient on the operating table in such a manner as to make everything as easy as possible for the surgeon. She should remove the compress, and the part to be operated on should again be cleansed with soap and water, alcohol, or ether. Sterilized towels must then be arranged around the site of operation, and the patient will be ready.

The nurse should have ready a plentiful supply of swabs of different sizes, which are burnt after use. If sponges are used, each sponge should be washed in warm carbolic solution,

and wrung very dry before it is handed to the surgeon, or the wound becomes filled with water. The nurse should have sterilized dressings and suitable bandages ready at hand. A basin and towel should be kept in readiness in case the patient is sick on beginning to revive from the anæsthetic.

Before the dressings are applied, the nurse should be prepared with clean warm carbolic lotion, and a fresh sponge, to wipe away the blood, clean the surrounding parts which have been soiled, and then dry them. In sponging, the wound is covered over and the parts round sponged. While the operation is being performed, the patient's bed must be prepared, and if he should have to remain there some time a "draw-sheet" must be placed over the ordinary sheet where the pelvis will lie. Another draw-sheet and a mackintosh-sheet must be placed ready for the patient, so that they may rest beneath the wound and soak up all discharges. In cold weather the bed must be warmed with a hot bottle.

Sterilizing of Instruments and Dressings. —If the preparation of the surgeon's instruments falls to the care of the nurse, she should see that they are all thoroughly washed, and afterward boiled in a sterilizing apparatus, which consists of a tray of wire network with wooden handles, in which the instruments are placed. This tray is then put into a receiver containing boiling water and bicarbonate of soda. The receiver has a spirit lamp or gas burner underneath, and the instruments are boiled from three to five minutes. The trays containing the instruments are then placed in carbolic lotion and they are ready for use.

The dressings, swabs and bandages are sterilized by the dry method.

The dressings of gauze are cut up into a convenient size and packed carefully into a tin box.

The swabs, which are used instead of sponges, are made of pledgets of absorbent cotton, covered with gauze, which is tied over the cotton. These are also packed into a tin box.

These boxes are then put into the sterilizer with the lids off (the lids are also sterilized), and kept there for half an hour at a temperature of 260° F.

The lids are put on by the nurse, who wears sterilized gloves.

Management of the Patient after Operation.—In moving the patient from the operation-table, especially if not quite recovered from the anæsthetic, he should not be suddenly raised into a sitting posture, lest faintness be induced. He should be carried out in a horizontal position and placed in bed, and it is then the nurse's duty to watch him carefully, and see that he has plenty of fresh air; if he is sick, the head and body should be slightly raised or turned on one side. If there is unusual depression, faintness, or difficulty in breathing, the attention of the surgeon should be requested.

When the immediate effects of the operation have passed off, the patient should be kept as quiet as possible, and as a rule nothing should be given by the mouth except one or two teaspoonfuls of hot water for some hours; after that, if there is no nausea or sickness, a small quantity of milk or beef-tea may be administered. If there is troublesome sickness, only a very small quantity of fluid should be given at one time, either iced soda-water, effervescing drink, or iced champagne; a mustard plaster may be applied to the pit of the stomach. Ice should be given in moderation, not too frequent-

ly, nor for too long a time. When there has been much hæmorrhage, or when the operation is followed by great faintness or collapse, the nurse should ask for instructions as to the administration of stimulants.

Hæmorrhage after Operation.—*Intermediate or Reactionary* hæmorrhage is that occurring soon after an operation. Small vessels which did not bleed at the time of the operation sometimes begin to do so when the patient becomes warm in bed, and as he recovers from the depressing effects of the chloroform or the operation. In order that the nurse may watch the part that has been operated on, it should be left partially uncovered, or if this is not possible, the dressings and parts around should be examined every now and then. After the amputation of a limb, a cradle should be placed over the stump, and the bed-clothes partially turned aside.

The nurse should learn to distinguish the oozing of blood-stained discharges soaking through the dressings and bandages from fresh blood.

In the former, the discharge is thin, and dull in color, and extending beyond this is a margin of a still fainter tint.

Fresh blood is bright red and extends more quickly, and the stain is throughout of a brilliant color. This reactionary hæmorrhage may come on soon after the operation, but perhaps not for some hours, or during the night. The patient may become aware of the hæmorrhage by feeling something warm trickling down, or he may notice that the bed is getting wet, or he may suddenly feel faint. Patients who have just been operated on must be very carefully attended during the night, and if there is any suspicion of bleeding, the dressings, grooves of

the splint, and the surrounding parts should be examined, and left exposed or very lightly covered. If there is bleeding, the surgeon should be summoned, and if this becomes alarming before his arrival, the part should be well raised and exposed to the air.

If this is insufficient, pressure must be applied with the fingers or thumbs to the main vessel until help arrives, or other means for arresting hæmorrhage must be adopted (see *Hæmorrhage*).

Secondary or Recurrent hæmorrhage is the term applied when bleeding occurs subsequently to the separation of the ligature that has been used to secure a vessel, or it may be due to sloughing of the wound and consequent opening up of vessels. In such cases the bleeding may be very rapid and severe, and place the patient's life in jeopardy. Tourniquets, pressure on the bleeding spot, or any of the means described under "Hæmorrhage," must be used until assistance can be obtained (see *Hæmorrhage*).

In cases where secondary hæmorrhage is expected, it is a useful precaution for the surgeon to mark with ink the spot at which pressure should be applied, and the nurse should receive directions as to the best means of applying it.

A tourniquet may be kept loosely adjusted, which can be tightened up at once if necessary.

Special Surgical Cases.

Hare-Lip and Cleft Palate.—These deformities date from birth, and may exist separately or together. In simple hare-lip there is a cleft in the upper lip on one side of the middle line. When double, there is a fissure on each side of the middle line, and one often extends into the nostril. Cleft palate may be associated with

hare-lip or exist independently. On looking into the mouth, a fissure or cleft is seen in the palate at the back part, so that the cavity of the nose and mouth are placed in communication.

The operation for hare-lip is usually performed during infancy or in childhood, the edges of the cleft being united and held together with a pin; a piece of strapping, broad at either end and narrow in the middle, is next adjusted, while the cheeks are pinched together with the thumb and finger, so that the broad part adheres to either cheek and the narrow portion covers the upper lip. The object is to prevent traction on the wound, and allow the edges to heal. The baby should be fed with the spoon for a time. At the end of two or three days the pin will be removed and the strapping re-applied.

The operation for cleft palate is performed at a later date. It is difficult to obtain a favorable result, and the patient requires great care afterward. No speaking should be allowed, the mouth being kept shut as far as possible, and fluid nourishment administered for a time.

TRACHEOTOMY, or the operation of opening the windpipe and inserting a tube, is performed when there is obstruction to the passage of air through the larynx, and when the patient is in danger of suffocation.

Management of the patient after tracheotomy is usually intrusted to a thoroughly experienced and trustworthy nurse, and a favorable result can only be obtained when this after-treatment is well carried out, particularly in the case of children, in whom the operation is far more often required.

There are three main points in the after-treatment which require special notice:—

(1) To keep the tube clear.

(2) To prevent the access of cold air.
(3) To feed carefully.

1. *To Keep the Tube Clear.*—The nurse should be familiar with the ordinary form of tracheotomy tube in use—the silver double tube. The outer tube (*a*) is provided with a slit on each side of the guard, through which a piece of tape is passed long enough to go twice round the neck. The outer tube is thus secured in the wound, the inner tube (*b*) being taken out and cleaned as often as is necessary (fig. 53).

When removing the inner tube, the finger and thumb of the other hand should hold the outer tube by the guard and gently press it toward the wound; the surfaces of the inner tube may be oiled with advantage.

In case of diphtheria, the sticky mucus, or portions of membrane, are apt to block up the tube, and constant cleaning is required or the patient will suffocate. The process of cleaning may be managed by means of a feather dipped in solution of bicarbonate of soda (fifteen grains to the ounce), the feather being turned round as it is withdrawn. If this is insufficient, the inner tube must be removed and soaked in the solution, or in boiling water, until the tenacious material is got rid of.

If there is any difficulty, and the breathing does not seem to be satisfactory, the surgeon should be immediately summoned. If pieces of membrane be detruded, they should be saved for inspection.

2. *To Prevent the Access of Cold Air.*—A good method is to make a tent outside the bed with curtains, enclosing its three sides. The open side may face the fire, and a bronchitis kettle should be kept boiling on the stove or gas jet.

The temperature inside the cot must be regis-

tered by a thermometer, and not allowed to become unduly heated. Failing this arrangement, flannels wrung out in hot water should be applied over the tube, and constantly changed.

3. *The Feeding* of young children who have had tracheotomy performed for diphtheria requires great care and attention. Their powers are much exhausted by the disease, and it is difficult to persuade them to take nourishment, as swallowing is often painful; or the amount taken at a time is so small that they have to be constantly disturbed in order that they may receive sufficient food to keep up their strength. An infant's power of swallowing is generally interfered with by the tracheotomy tube, and the milk sometimes finds it way down the trachea into the lung, and sets up pneumonia.

In cases where there is great exhaustion, and sufficient nourishment cannot be administered by the mouth, feeding may be managed through the nose. For this purpose a soft india-rubber catheter, No. 4 or No. 6, should be passed through the nostril, and on to the back of the pharynx; it should then be pushed on and will find its way into the gullet without much difficulty. The milk or fluid can be administered by a syringe or funnel through the tube. By this means four to six ounces can be given at a time, and the child allowed to sleep longer without disturbance.

GANGRENE, or mortification of a part, may supervene as the result of inflammation, or may be produced by cold, as in frost-bite, or by the effect of pressure and consequent stopping of the circulation in the part, as is the case in bed-sores.

There are two forms: the *moist* gangrene, and the *senile* or *dry* gangrene.

Moist Gangrine.—After severe accidents, in

which the damage to the soft parts is extensive, the inflammation may be violent and result in moist gangrene. The appearance of the inflamed part alters, the red color becomes livid, mottled, or greenish black; the skin blisters, and a thin, discolored, watery discharge exudes, and a fœtid odor is perceptible. The sense of pain and touch becomes lost when the part is dead or mortified. Under favorable circumstances the mortification or gangrenous inflammation ceases to spread, and the dead part becomes marked off from the living by a line of healthy inflammation called the line of demarcation. The dead part subsequently separates itself naturally from the living, or is removed by the surgeon.

During the process of gangrene the patient exhibits general symptoms of constitutional disturbance, and in severe and unfavorable cases loses appetite and strength; the tongue becomes dry and brown, and the features shrunken and pale. He wanders at night, and does not sleep, or he becomes unconscious, and gradually sinks from the effects of exhaustion.

Senile, or *Dry Gangrene*, attacks old people in whom the blood-vessels have become diseased, so that the blood-supply is impaired. It is more liable to occur in parts that are far removed from the heart and where the circulation is sluggish, as in the feet, fingers, or ears. One of the toes is the part most commonly affected; it becomes numb, cold, pale, and shrunken, and then gradually turns black, dies, and shrivels. The process is often very painful, and the powers of the patient may be unable to withstand the accompanying exhaustion.

Management.—The nurse should direct her attention to the dressing or local treatment of the gangrenous part, and maintain the powers of

the patient by giving nourishment or stimulants constantly, as directed by the medical attendant. In the moist form of gangrene, where there is much sloughing and consequently great fœtor, poultices or hot moist applications are best avoided, and some antiseptic, such as carbolic lotions or lint, used, or iodoform, or powdered charcoal may be dusted on, and the part swathed in oakum or absorbent cotton.

In senile or dry gangrene, a small poultice, charcoal or yeast, may be applied, or an opiate lotion used, or the part painted over with balsam of Peru, and the limb well surrounded with absorbent cotton. In all cases the temperature of the limb should be kept up during the process of separation and afterward.

The enfeebled condition of many of the sufferers from gangrene, and the exhaustion from the pain and sloughing, require the frequent administration of nourishment and stimulants, which are best given in a fluid form, especially when the tongue and mouth are dry. Opium is often given to soothe the pain and promote sleep, and if it is well borne, and does not disturb the stomach and head, greatly adds to the comfort of the patient.

AMPUTATIONS.—A limb may be removed by the surgeon when it is useless to the patient, or where the presence of disease renders it necessary for the prservation of his health or life. The severity of the operation is increased the higher up in the limb the amputation has to be performed; thus, amputation in the thigh is a far more severe operation than amputation of the foot.

In addition to the usual necessaries of the operation-theater, a small padded splint is requisite on which to bandage the stump; also broad pieces of strapping, for keeping the flaps

together, should be cut beforehand, and the particular dressings required should be ascertained and prepared.

When the patient is placed in bed the stump should be slightly raised on a pillow and left exposed for a time (see *Hæmorrhage*). When covered, a cradle must be used to keep off the pressure of the bed-clothes. If there is sudden starting in the stump, it must be confined on the pillow by a bandage passed round or across the bed.

When dressing the stump, the nurse should not take hold of it by the end, but should gently insinuate her fingers between the part above the pillow on which it rests, the back of the hand being toward the bed, and then sliding both hands down toward the end she should raise it from the pillow and support it steadily the whole time it is being dressed.

Retention of Urine.—Inability to pass water in the female may be due to hysteria, or nervous conditions after operations on the rectum or neighboring parts. There is no obstruction to the urethral passage, and the application of a hot fomentation to the pubic region in these cases is often sufficient. When the bladder is much distended, forming a swelling at the lower part of the abdomen, or if there is obstruction to the passage of urine through the urethra, or for other reasons, it will be necessary to use the catheter. Every qualified nurse should be able to pass a catheter in the female.

Passing Catheter for Female Patients.—The patient may lie on her back with her knees drawn slightly up. The nurse should stand on the right of the patient, and passing the left hand between the thighs place the forefinger between the labia at the orifice of the vagina.

The catheter after being oiled should be introduced with the right hand and made to glide over the forefinger of the left until it slips into the orifice of the urethra; it should then be passed upward and backward till it enters the bladder. The forefinger of the right hand should close the orifice of the catheter before it reaches the bladder, and the left hand disengaged carry the bowl to receive the urine. In withdrawing the instrument, the orifice of the catheter should again be closed to prevent wetting the bed.

The best instrument is a flexible elastic catheter (No. 8), such as is used for the male sex, but the silver female catheter may be used for ordinary cases.

Retention of urine in the male is very common as the result of stricture of the urethra, enlarged prostate, and other causes, and the use of instruments of various kinds and sizes is employed by the surgeon.

Management.—The nurse must know that serious consequences may result from retention if left too long, such as rupture of the urethra, and extravasation or escape of urine, or overdistension of the bladder, and assistance should be summoned as soon as possible. She should also be acquainted with the various kinds of instruments, the silver, the gum elastic, the French "catheter à boule," and the soft india-rubber catheters, all of which are numbered, according to their different sizes. The female catheter may be of glass, which can be boiled after using. She should have in readiness oil, vaseline, bowls, and hot water.

Catheter Fever, or constitutional disturbance following the introduction of a catheter, occurs in some cases. The patient is seized with chilliness and a rigor, and his temperature rapidly rises. This may subside with a profuse sweat,

or prolonged feverishness may ensue. A mild attack quickly yields to brandy and water, or a dose of opium. When there is any sign of disturbance after the passage of a catheter, or in any case where a catheter is tied into the urethra and left, the nurse should watch the temperature, and report if there is any fever.

Washing Catheters.—Inflammation of the bladder may be produced by the use of instruments that are dirty, and the nurse will be expected to see that they are clean.

The catheter should be allowed to remain in a solution of Mercury Bichloride (1-4000), having been previously scrubbed with soft soap and syringed with Mercury solution (1-2000).

Stone in the Bladder produces a variety of symptoms, among which are: pain on passing the urine, a constant desire to pass urine, with perhaps some changes in the urine, such as a sediment or blood. Children suffering from stone are apt to wet the bed at night, and pull themselves about, owing to pain in the penis. The urine should always be saved in case of suspected stone or bladder disorder.

Lithotomy and Lithotrity.—The operation of cutting into the bladder for stone is called *Lithotomy*, and that of crushing the stone by an instrument passed into the bladder, *Lithotrity*.

Management.—For Lithotomy cases the bowel should be carefully emptied by an enema early in the morning of the operation, and the patient should be directed not to pass water for some hours before the operation, as it is convenient that the bladder should be partially distended. Some surgeons prefer the bladder emptied and then injected with boracic solution, with a syringe to measure the amount.

The bed should be arranged with a drawsheet and mackintosh or rubber sheet under-

neath, and will require much attention, as the water is constantly dribbling through the wound in the perinæum. The patient must be kept warm and dry, and the back should be bathed and dried. The nurse must be on the watch for hæmorrhage, especially in children, and she should keep herself informed whether the water is passed through the wound, or whether any is passed naturally, and if it contain blood or clots. When the supra-pubic operation is performed, a catheter is usually tied into the wound and connected with a long tube with a bowl of boracic lotion under the bed. The nurse has to see that the tube does not get blocked.

After the operation of lithotrity everything passed from the bladder should be scrupulously saved, in order that any crushed remains of the calculus may be inspected.

Vesico-Vaginal Fistula.—After difficult confinements or other causes, a communication may be formed between the bladder and vagina called a "fistula," through which urine is able to pass from the bladder into the vagina, and incontinence of urine is the result. To remedy this miserable condition, an operation is devised for uniting together the edges of the fistula. A successful result is difficult to obtain, and much depends on careful after-treatment and management.

Management.—Before the operation, the bowels must be thoroughly opened with a vegetable compound cathartic at night and a liberal dose of phosphate of soda in warm water in the morning. It is essential that after the operation no urine should find its way through the wound and irritate the edges, and so prevent the fistula healing.

To secure this, a catheter is introduced into

the bladder at the time of the operation, and tied in. This may be worn constantly until the wound has healed, being only removed occasionally for cleaning purposes.

Rectal Cases.—*Fistula* of the bowel is often caused by an abscess forming near the rectum, and opening both externally close to the orifice and internally into the bowel. A tract is thus made and kept open by the fæcal matter passing through. There is often a discharge of matter and blood, and pain may be intense when the bowels act.

An operation is usually required to cure the fistula.

Piles or Hæmorrhoids are small tumors formed by dilated veins at the verge of the rectum. They may arise within the bowel, internal, or just without, external.

They may be caused by constipation, congestion of the liver, straining at stool, pregnancy, or other causes, and they have often a tendency to bleed. When inflamed, they give rise to great pain, especially when the bowels act. A bread poultice may give much relief when they are inflamed; a low diet, without stimulant and an aperient or enema to unload the bowels, are advisable.

Removal of the piles with the ecraseur or clamp is often necessary.

Management.—Previous to operation in cases of disease of the rectum of any kind, the nurse should make sure that the bowel is empty. A vegetable compound cathartic given at night and a dose of phosphate of soda in the morning. The latter should be administered quite early, so that there is plenty of time for a thorough evacuation before the operation, as nothing is more annoying to the surgeon than to have the bowels acting at the time of the operation.

The nurse should prepare beforehand the dressings, and also the T-bandage, which is required in all operations on the rectum or perinæum where dressings are used (see *T-bandage*).

It is comfortable for the patient after the operation that the bowels should not act for some days, and a light diet is advisable. There is sometimes difficulty in passing urine after these operations, especially in females, and if not relieved by the application of a hot fomentation the catheter may be required.

HERNIA.—A rupture is formed by a protrusion of some portion of the bowels through the wall of the abdomen. The protrusion occurs usually in one of three situations:—at the navel, in the groin, or at the upper part of the thigh, and the hernia is termed accordingly either an *umbilical hernia*, an *inguinal hernia*, or a *femoral hernia*. In all three instances the bowel finds its way through an opening or canal which naturally should be sufficiently closed to prevent it; but it remains covered by the integuments and the soft parts, forming a soft, doughy swelling in the region of the canal which it has passed through. In the majority of cases the hernia is what is called "*reducible*," and the bowel can be returned inside the abdominal cavity by pressure, or it returns of its own accord when the individual lies down. When he gets up, or makes any exertion or coughs, it again protrudes.

It is important that a person suffering from hernia should wear a "truss" to keep the bowel from coming down. The truss has to be adapted to the particular form of hernia, and it is essential that it should be efficient in keeping the bowel back without exercising any undue pressure or other discomfort (fig. 54).

UMBILICAL HERNIA is not uncommon in young babies. The protrusion is at the navel, and when the child cries it is often much increased in size, and causes pain. A firm pad can be easily adapted after the bowel has been pressed back through the canal, and then a broad flannel binder rolled twice or three times round the abdomen will keep it in position, and support the walls. The canal usually closes up as the child grows older, and the rupture ceases to come through if the pad is well and constantly applied.

INGUINAL HERNIA is more common in men than women, and may protrude, forming a swelling in the groin, or the rupture may travel on down the canal into the scrotum, forming a swelling perhaps of considerable size. There may be a rupture on both sides.

FEMORAL HERNIA is more common in women than men, and gives rise to a swelling, often of small size, in the upper part of the thigh, at the inner side just below the groin.

In any form of reducible hernia a truss should be fitted by the surgical instrument maker, and if there is any doubt as to its efficiency, the surgeon should be consulted.

STRANGULATED HERNIA.—Sometimes there is difficulty in returning the hernia, and the swelling becomes painful, the bowels do not act, and gas is not passed, and after a time other symptoms of obstruction set in, such as vomiting. This condition is due to obstruction of the passage of the bowel in the hernia, by the constriction of the ring through which it has passed, and the bowel is said to be "*strangulated.*" If this condition is not relieved, fatal consequences will ensue. The surgeon should be immediately informed, so that he may endeavor at once to reduce the hernia by a process

called "*taxis*," or manipulation with the fingers. Failing this or the use of the warm bath, the patient will be placed under an anæsthetic, and if then the bowel cannot be returned, an operation has to be performed.

Management.—In watching a case of strangulated hernia before operation, the nurse should only administer a teaspoonful or two of hot water or a very small quantity of fluid; she must be careful to save everything vomited, and the temperature and pulse should be taken.

After the operation a pad is applied by a spica bandage to the wound. The patient should not be allowed to move; if sickness, coughing, or retching occur, the wound may be supported by gentle pressure with the hand, to prevent strain. The diet allowed is only small quantities of milk or fluid of some kind. No aperient should be given, but opium is frequently prescribed. Any complaint of pain in the abdomen should be attended to, and the temperature carefully noted.

Recovery is usual after operation for strangulated hernia, unless the strangulation has been allowed to remain unrelieved too long, and the bowel has suffered damage.

A suitable truss should be worn afterward.

Ovariotomy.—In ovariotomy and other abdominal operations, each surgeon has his own particular plans for nursing, and usually prefers to employ nurses specially trained under him, that they may be acquainted with his methods, and pay attention to those details in the after-treatment which he considers of the greatest importance. It is only necessary, therefore, to mention the more general points in the management and after treatment of ovariotomy, those in fact which a nurse who has received an ordinary training would be expected

to know, should she be called upon to take charge of a case of this kind. At the same time, for the successful management of all abdominal cases, the extreme importance of practical acquaintance with small details cannot be too strongly insisted on.

Before Operation.—In addition to the ordinary rules to be observed, the catheter may be passed for a few days previously, and the bladder must always be emptied just before the operation. The bowels should act freely in the morning, and an enema be given about four hours before the operation. In patients suffering from debility, two or three ounces of brandy may be injected by the rectum shortly before the anæsthetic is given.

The cleanliness of the body must be secured by a bath, and the abdomen should be well sponged over with carbolic solution.

The patient must be warmly clad, and should wear a flannel dressing-gown and warm stockings.

The room in which the operation is to be performed must be previously scrubbed and cleaned, and kept at a temperature of about 70° Fahrenheit.

The ordinary requisites for the operation-room must be prepared, and in addition two or three empty buckets, sponges, and sponge holders, flannel bandage, antiseptic dressings, long glass drainage tubes (fig. 55), and a special mackintosh sheet, or rubber sheet.

The buckets are required to hold the fluid which is contained inside the ovarian tumor or cyst, often in considerable quantities.

The sponges must be of medium size, soft, absolutely clean or new, and well wrung out in warm antiseptic solution. There should be a dozen or more, and the number in use at the

time of the operation should be *counted* and noted down, in order that it may be ascertained before the wound is closed that all the sponges have been removed from the interior of the abdomen.

The flannel bandage must be of sufficient width to reach from the lower end of the breast-bone to the pubes, and the "many-tailed bandage" is the form in common use (see *Many-tailed Bandage*). The mackintosh sheet is previously prepared by cutting out a portion in the center to form an oval aperture, the length of the proposed incision in the abdomen. The sheet round the aperture is covered with a broad band of adhesive plaster to fix it down to the abdomen.

After Operation.—The room in which the patient is placed after the operation should be kept at about 65° to 70° Fahrenheit.

The bed may be made with a new or fresh mattress, and should be arranged with a mackintosh under the draw-sheet. The upper bedclothes may be folded so as to open in the middle and facilitate passing the catheter, or dressing the abdomen; and a pillow may be placed as a support underneath the knees. Warm bottles should be placed in the bed before the patient leaves the operation-table. The patient must lie on her back, no movement being allowed, and the urine should be drawn off with the catheter every four or six hours.

COMPLICATIONS AFTER OVARIOTOMY.—Secondary hæmorrhage may occur from the giving way of a vessel internally, and might arise soon or several hours after the operation. The main indications would be faintness, blanching of the face, sighing, with perhaps pain in the abdomen, and low temperature.

Peritonitis is the usual cause of death in the

unsuccessful cases, and may supervene at almost any time during the earlier periods. A careful watch should always be kept on the pulse and temperature, and if there be access of abdominal pain, with vomiting, shivering, associated with fever, the onset of peritonitis should be suspected (see *Peritonitis*).

The nurse will receive definite instructions from the surgeon as to the management and diet of each particular case, also whether opium or aperients have to be given.

During convalescence, the abdomen will require some support, either a broad flannel binder, or a well-fitting flannel belt, strengthened, and furnished with buckles.

SKIN-GRAFTING.—In the case of large wounds with much loss of tissue, extensive ulcers, and severe burns, this method is often employed by the surgeon. The graft is implanted directly on to the raw surface, which may have previously to be scraped, and is then purified with antiseptic lotion, covered with a sheet of protective, and bound firmly up until the bleeding has ceased. The graft is then cut with a sharp razor from the thigh or some other suitable spot, and transferred to the raw surface and dressed antiseptically. The thigh will also require dressing.

CHAPTER XIII.

THE MANAGEMENT OF CHILD-BED.

Before Labor—Lying-in Room—Preparation of the Bed—Precautions against Infectious Diseases — Indications of Commencing Labor — Pains—Stages of Labor—Management of Natural Labor — Antiseptic Rules for Monthly Nurses—Management after Labor—Lochia—Lactation—Prevention of Puerperal Fever—Antiseptic Solutions.

Management of the Infant—Separation—Washing and Dressing—Rashes—Navel—Eyes—Rupture—Snuffles.

Preliminary Arrangements.

There are certain preliminaries before the onset of labor concerning which the nurse has usually an opportunity of informing her charge, and this is especially desirable in first labors or primiparous women toward the termination of pregnancy.

If the health be tolerably good, moderate exercise should be recommended, and invalid habits discouraged. It is often possible during the last weeks of pregnancy for walking exercise to be taken easily, when previously accompanied by much discomfort. The diet should be generous and sufficient, but not stimulating. The state of the bowels should be carefully regulated by laxatives if necessary, and at the approach of labor the large bowel should be emptied by the administration of an enema. A

tedious labor may be the result of neglect in this particular.

THE LYING-IN ROOM.—The temperature should average from 60° to 65° F., and the room should be well ventilated. In warm weather the windows may be opened, and the patient protected from draughts by a screen. In winter a fire should be kept burning in the grate, and the windows opened according to the state of the weather. The room should not contain an unnecessary amount of furniture, and curtain hangings about the bed are undesirable. Absolute cleanliness in every respect is imperative.

The wash-hand stand must be prepared when labor commences, and should contain three basins, one for washing with soap and water, and the other two for antiseptic solutions. One of these may be used for the hands and the other kept for cleaning the different instruments.

PREPARATION OF THE BED.—After the bed has been made in the ordinary way, a mackintosh is placed upon the lower sheet, of sufficient width to tuck in on either side, and deep enough to extend from the small of the patient's back to the knees; over this a draw-sheet should be doubled and placed crossways to the bed, so as to overlap the mackintosh a few inches in each direction. A sanitary sheet may with advantage be placed immediately beneath the patient during labor. The bed can thus be kept constantly dry, and the draw-sheet changed by rolling up, and moving the patient while another is substituted (see *Draw-Sheet*).

Special Precautions.

INFECTIOUS DISEASES.—The lyingin- patient is very susceptible to diseases of an infectious nature, and the nurse should be careful to avoid contact with any one suffering from fever of

any kind, or the neighborhood of any infectious malady. Such diseases as erysipelas, small-pox, scarlatina, and especially puerperal or child-bed fever, are dangerous. A nurse who is aware that she has been exposed to infectious illness should, before undertaking a monthly case, inform the medical attendant, and ascertain if she is justified in doing so after the adoption of the proper precautions for disinfection (see *Disinfection*).

Management of Natural Labor.

The indications of commencing labor are the presence of uterine pains, and a discharge of mucus tinged with blood.

THE PAINS felt at an early period of labor are situated over the front of the lower part of the abdomen, and are tolerably regular, cutting in character, reaching a certain pitch of intensity, and gradually subsiding; there may be intervals during which the pains are absent for several hours.

False pains are due to flatulence, or some bowel disturbance, and do not accelerate labor; they are short and irregular in character.

THE STAGES OF LABOR are three, during which certain events take place:—

In the first stage, the orifice of the womb is dilated to permit of the passage of the child, and the membranes covering the child are ruptured. The pains which occur during the first stage, are such as have been described above, and are caused by the dilatation of the neck of the womb by the bag of membranes. Several hours, to a day or more, are occupied by the process, and it is often accompanied by a sense of nausea, vomiting, or attacks of shivering.

When, at the end of this stage, the mem-

branes have ruptured and the waters have escaped, the next stage follows.

In the second stage of labor, the pains increase in intensity, and are felt in the sacrum or lower part of the back; they gradually become more violent and expulsive in character until the child is born. Toward the termination of the first stage and the commencement of the second, the patient feels constant desire to pass water.

The third stage is occupied by the expulsion of the placenta or after-birth, and there is usually an interval of fifteen to thirty minutes after the second stage before the pains succeed which expel the after-birth.

Management. — In first labors the early stages are apt to be of long duration, and considerably exceed those of women who have borne children. False hopes should never be held out that the labor will be a quick one, or that it will soon be all over, as the patient rapidly loses confidence when she finds that she is disappointed.

When the first stage is protracted, the patient should be advised to occupy herself and keep about as far as possible during the daytime, and sleep when she feels inclined. The feeding should not be neglected, and milk, beef-tea, soups, or other nourishment may be given regularly; exhaustion renders the pains less effective, and often prolongs the final stages. Stimulants are unnecessary when food is well taken. An enema may often prove of advantage in slow cases during the first stage.

During the second stage the patient should lie on the bed, and may aid the expulsive pains by holding her breath, and bearing down or straining, unless they are too violent. Great relief is often given by the nurse supporting the lower

part of the back by firm pressure with the hand. As soon as the child is born, the cord should be noticed in case it be twisted tightly round the child's neck, and, if so, it should be gently drawn down, and slipped over the head (see *Child, Separation of*).

The mother should remain perfectly quiet after the birth of the child. A short time elapses before the after-birth is expelled by a few sharp pains, a process which may be assisted by the patient coughing a few times. Traction or pulling on the cord should not be practiced, being not without danger. It is at this period that *flooding* is apt to occur, and the nurse should be on the watch for excessive hæmorrhage. After the third stage of labor, the binder may be applied (see *Binder*).

VAGINAL EXAMINATIONS.—To place a patient in the so-called obstetric position for an examination, the clothes around the waist should be unloosened, so that the abdomen can also be examined, and the diaper or pad removed. The patient must be turned well on to the left side, with the head low on a pillow placed at the left side of the bed, and the trunk lying right across the bed. The buttocks should overlap the edge on the right-hand side, the legs should be drawn up so that the thighs form a sharp angle with the trunk, and the knees should be as close as possible to the chin. It is a good plan to turn the upper sheet over the counterpane on the right-hand side of the bed, and secure it there with nursing pins. A napkin folded diagonally should always be at hand to guard the doctor's arm during the examination.

ANTISEPTIC RULES FOR MONTHLY NURSES.—Every nurse should practice systematically the following rules unless otherwise directed, or modified by the medical attendant:—

1. The hands must be kept clean, and the nails cut short, the nail-brush being constantly in use with soap and water.

2. During and after labor, a small basin containing an antiseptic solution must always stand by the bedside of the patient, and the nurse must thoroughly rinse her hands in it every time she touches the patient in the neighborhood of the genital organs for any purpose whatever, either of douching, washing, etc.

3. Vaginal pipes, enema tubes, catheters, sponges, etc., should be kept permanently in the antiseptic solution, except when in use, and cleaned in a similar solution before and after using.

The surfaces of slippers and bed-pans should also be sponged with it.

4. Vaginal pipes, tubes, etc., should be smeared with carbolized vaseline before use.

5. Unless express directions are given to the contrary, the vagina should be douched night and morning with antiseptic solution. The hot douche, if ordered, should be given at a temperature of 115°. Care must be taken to have the pipe and tube filled with the solution, and devoid of air-bubbles before insertion, and sufficient should be allowed to pass through to warm the apparatus. During the administration of the douche, pressure may be maintained on the womb by the hand placed on the abdomen.

6. All soiled linen, diapers, etc., should be immediately removed from the bed-room; soiled pads should be burnt. All bed-pans, urine-boats, and bed-baths should also be removed as soon as possible, and after they have been emptied, they should be washed and disinfected.

7. The nurse is recommended to wear a light-

colored dress of washing material, with apron and sleeves, which easily show the dirt, and the skirts should be sufficient short to escape sweeping the floor.

Application of the Binder.—This should consist of huckaback towelling, thirty-six inches wide, and one and a quarter yards long, doubled lengthways. Its lower edge should reach four inches below the top of the thigh-bone. The free end of the binder should be uppermost on the right side. Starting from the left flank, the binder should pass over the abdomen, ending on the right flank, where, after it has been tightened, and all creases smoothed out, it should be securely fastened by four strong pins. The patient's skin should be guarded by the left hand beneath, while the pins are inserted. Straight pins, two inches long, are the best.*

Management After Labor.

For the first three days after labor the horizontal position must be maintained, and exertion and sudden movements should be avoided. After this the head may be raised by a pillow, and the patient propped up to take food, but she should not be allowed to sit upright in bed. On the eighth or tenth day, if doing well, most patients may be allowed to be outside the bedclothes, in a dressing-gown, and in a day or two more they may sit in a chair, or lie on the sofa for an hour at a time. The progress varies greatly in different cases, some requiring much longer rest than others. In delicate persons, or where there is much anæmia, or debility after flooding, the horizontal position has to be enforced for a much longer period, and

* A more convenient form of binder is made by shaping the towelling to the body and fastening with buckles and straps.

the erect position should not be assumed quickly or suddenly.

If the lochia become red or free, or there be marked rise of temperature when the patient begins to get up or to move about, she should be kept quiet on the sofa.

Temperature.—After delivery, the temperature should be taken at regular times twice a day, or more often if desired. If there is a sense of chilliness, the temperature should be ascertained, and if a rigor occurs, the temperature should be taken every half hour, and a hot bottle applied to the feet, while warm milk or beef-tea should be given.

Constant feverishness, rigor, or sudden high temperature should always be reported as early as possible.

Lochia.—Three points should be noted: the amount, the color, and whether offensive or not. If any clots or shreds are passed, they must be removed and kept for inspection. At first, the lochia should be of pure blood and fairly free, being increased by relief of the bladder or bowels, and during the presence of after-pains. In a few days the quantity of the flow diminishes, and the color becomes lighter and less tinged, and then turns to a greenish color before ceasing in two or three weeks' time.

Suppression of the lochia at an early period, associated with other signs, or an offensive odor, any decomposing clots or shreds, are bad symptoms, and should be immediately reported.

Bowels.—It is a good plan to administer a dose of aperient medicine on the morning of the third day, and an enema may be given the same evening.

Bladder.—Unless otherwise ordered, the urine should be passed in the knee-and-elbow position, with the assistance of the nurse, and

the bladder should be emptied two or three times in the twenty-four hours without straining. If there is any difficulty, this may be remedied by the application of a warm fomentation to the vulva, or, if necessary, by the use of the catheter. The latter should be preceded and followed by antiseptic ablutions. The urine may be required for examination a few days after delivery, and in that case will have to be drawn off with the catheter.

AFTER-PAINS.—These are most common in women who have had several children, and may continue for three or four days, preventing sleep, if severe. There may be no cause apparent, or else they may be attended by the passage of clots. The douche may remove these and the pains subside, or they may require some opiate medicine.

LACTATION.—There is not, usually, sufficient milk secreted by the breasts for the infant before the third or fourth day, and this incident may be attended with some feverishness and slight constitutional disturbance, called milk fever.

The child should be put to the breast for a few minutes only, three times in the first twenty-four hours, until the milk is established, and after that for ten minutes regularly every two or three hours unless it be asleep, to one breast only at each meal. The breasts should be used alternately.

If the nipple does not stand out well, or the child has difficulty in sucking, it should be drawn out with a shield, this being carefully cleansed. The nipples before the first confinement should be hardened with spirit, or *eau-de-Cologne*, and, if necessary, drawn out. After the child is taken from the breast, the nipples must be washed and carefully dried with

a soft napkin. If the nipples are carefully attended to, they rarely become sore, but if this happens they may be moistened with glycerine of borax. If the breasts become hard and painful from the flow of milk, they may be rubbed with the hand lubricated with oil in a direction from the circumference to the nipple. If the breasts hang down and feel heavy, relief may be obtained by the support of a folded napkin passing under each and round the opposite shoulder.

If it is necessary to apply camphorated oil to the breasts to dry up the milk, it is very important to avoid the nipple. The application should be smeared on lint and covered with protective; the latter should overlap the lint an inch in every direction, and a hole should be cut in both for the nipple, the hole in the lint being considerably larger than the one in the protective. The whole should be then covered with a pad of absorbent cotton and kept in place by a napkin. The cotton may be replaced when it has been saturated by the milk. While the milk is being dried up, the supply of liquid food to the patient should be diminished. On no account must the child be put to the breast after the camphorated oil has been applied, but if the secretion is too copious, the excess of milk may be drawn off with the breast pump. The flow will commonly subside without the application, if the breast is rubbed well with the hand lubricated with camphorated oil.

The mother should not be allowed to sleep while the child is taking the breast.

Nipple-shields may be employed if the nipple is too sore to allow the child to suck directly.

Lacerations of Perinæum.—Tearing of some or other part of the external genitals occurs most commonly in first labors, and in some cases

the parts have to be sutured. The patient should be kept on her side with the knees bound together, and it is important that the lacerated surface should be wetted as little as possible. It may be kept dry and clean by the absorbent cotton. In cases of lacerated perinæum, the catheter may be used, or else the patient should be directed to pass water in the hand-and-knee position before using the bed-pan, or before the douche is given. Straining should also be scrupulously avoided.

Inflammatory Disorders and Puerperal Fever.—Inflammation connected with some part of the womb or its appendages may supervene after delivery, accompanied with feverishness and local pain in the abdomen.

Inflammation of any kind is a symptom of importance after delivery, and should be immediately reported. A hot fomentation may be applied to the abdomen, which commonly gives relief (see *Peritonitis*).

Puerperal fever is the most dreaded after-complication of child-bed, and is often marked at its onset by one or more severe rigors with speedy elevation of temperature; the face becomes flushed, and there are other constitutional symptoms of greater or less severity. The special symptoms connected with it are: suppression or offensiveness of the lochia, failure of the milk supply, abdominal pain and distension, with tenderness over the uterus. In fatal or severe cases, the course taken by the fever is similar to cases of septicæmia or blood-poisoning.

Prevention.—The prevention of this very fatal disease is in great measure in the hands of the nurse. By the most careful and absolute cleanliness on her own part, by close attention to the hygienic condition of the lying-in cham-

ber, and to the details of antiseptic midwifery, the number of cases will be reduced to a minimum, and the nurse will feel that she has exercised every precaution in her power. If such a case should occur under her charge, she should make every effort to ascertain whether it might be due to any preventible cause.

The condition of the lavatory, or closet, any defect in the drainage, or unsanitary surroundings which may have been previously overlooked, should be searched for, and the presence in the house of any one carrying infection from the outside should also be the subject of inquiry.

Antiseptic Solutions.

ANTISEPTIC SOLUTIONS for use in the lying-in room are:—

Perchloride of Mercury—Corrosive Sublimate.—A standard solution should be kept ready of the strength of 1 in 200, and diluted for use to 1 in 2000 by adding 9 parts of water to 1 part of the standard solution. The antiseptic properties of the solution are destroyed by soap; in consequence of this, it is necessary to thoroughly rinse the hands of soap before they are soaked in the antiseptic solution.

Carbolic Acid.—A standard concentrated solution of 1 in 20 should be kept ready, and corresponds in strength to a 1 in 1000 solution of perchloride of mercury.

Condy's Fluid—Permanganate of Potash.—This should be employed in solution of the strength of one teaspoonful to a pint of water. It is useful in indicating the presence of septic matter in the part to which it is applied, by a change of color from purple to brown, and its use must be continued until the color remains unchanged. An objection to Condy's Fluid is the stain that is left on the linen. It should

not be used with soap, carbolic acid, oil, or glycerine, all of which decompose it.

Management of the New-Born Infant.

SEPARATING THE CHILD.—Immediately the child is born, the eyes, nose, mouth, and throat should be carefully wiped with a clean napkin dipped in boracic lotion. The ligatures and scissors should be placed ready before delivery. The ligatures consist of five or six strands of floss silk, or silk twist, eight inches long, knotted together at either end and rendered antiseptic; the scissors should have rounded ends. When pulsation has ceased in the cord, it should be tied in two places—one at least two and a half inches from the navel, and the other an inch farther off. The first knot should be firmly and tightly pulled until the resistance of the cord is felt to give way, before being secured with a reef-knot. When both ligatures have been applied, the intervening cord may be divided midway with the scissors. The navel should not be dragged upon when the knots are being tied or the cord divided. The end of the cord attached to the child should be examined after it has been wiped dry to ascertain that there is no oozing of blood, and that the ligature is secure, otherwise it will be necessary to make it so by a second ligature. The baby may be placed in a flannel receiver, and removed.

WASHING AND DRESSING THE BABY.—After labor, the nurse must not leave the mother to attend to the baby until everything has been done for her that is required; the baby in the meantime being placed in a warm and safe position. Everything should be prepared ready beforehand for washing and dressing the infant.

Infants must be bathed at a temperature of

96°, quickly dried, powdered, and dressed in front of a fire, and not unnecessarily exposed to the cold air. The eyes, mouth, nose, and ears must be first attended to, and washed at least once a day with boracic lotion, using a camel's-hair brush for the nose. All creases and folds of the skin must be thoroughly dried and well powdered.

In the first washing the cheesy material often found coating the child may be removed by the application of sweet oil, or vaseline. The child should be well lathered all over with soap and soft flannel, and then dipped in the bath, and the soap well rinsed off. When the child is in the bath, the nurse can, by placing the left hand under its back, and at the same time supporting its neck with the fore-arm, gain a sufficiently firm hold on the child, the head being prevented from falling back into the water, while her right hand is left at liberty.

Before dressing the child, care must be taken to see that the cord has been efficiently tied, and that no oozing is taking place from the stump. Having been carefully dried, the navel-string must be wrapped up in antiseptic gauze or lint. A hole is cut for the cord in the center of a piece of this material about six inches square, and after freely dusting the cord with toilet powder, the four sides are folded round it. The cord and its dressings ought to be kept firmly in place by a flannel roller, five inches wide and twenty-four inches long. This must be firmly applied, and the end over-sewn. If the child is bathed every day, the dressings will have to be renewed, but if washed without immersing in the bath care must be taken to avoid wetting the dressing. The further dressing of the child varies. In the hospital, the child is first turned over on its belly, the shirt put on,

a napkin folded diagonally being laid over the back, and a flannel petticoat placed on it. The child is then turned over, the napkin folded, and the shirt and flannel petticoat brought round the chest and also folded. These are fastened in position by a white binder four inches wide and three-quarters of a yard long, rolled round like the flannel, and also oversewn. In dressing a child, no pins should be used. The flannel band is put on like the napkin, but the lower corner, instead of being brought up between the thighs, should be left loose. The long flannel petticoat also folded over the feet, either toward the front or back, and fastened with two or three stitches, keeps the band in place. The child's night-dress can then be slipped up from below over the legs, the arms placed in the sleeves, and the garment fastened behind. The head flannel thrown loosely over the head and shoulders completes the dressing. In many private houses the swath has fallen into disuse, and a fine woollen vest is used instead of a linen shirt. All the garments may be made to fasten behind, and so be stitched together, and all put on at the same time.

Rashes.—Infants are frequently affected with rashes, a common one consisting of red elevated pimples, being called the "red-gum" (strophylus). It may be produced by gastric disturbance, or by the child being too closely covered up. The head flannel must never be worn in bed.

Micturition.—Inability to pass water may often be relieved by placing the child in a warm bath. If unrelieved, or there is pain, the fact should be reported to the medical attendant. If the fore-skin is too long, or if there is straining on passing urine, circumcision may be necessary.

THE NAVEL.—The cord usually separates on the fifth or sixth day. It should always be kept clean, dry, and powdered. The odor should be noticed, whether offensive or not. After separation, the surface should be examined, whether bleeding, discharging, inflamed, or otherwise unhealthy. Starting of the navel or unusual prominence on crying should be reported, as it may be necessary to apply a compress. A pad of absorbent cotton should be adapted and kept on for a month, and the flannel binder worn for several months.

BREASTS.—The breasts in children of both sexes are apt to swell in the first few days after birth, and even to secrete milk. No treatment is generally required. They should be protected from being rubbed or irritated by a pad of absorbent cotton.

EYES.—Attention to the eyes is a point of the very greatest importance, and in which neglect may be followed by impairment or complete loss of eyesight. Any weakness of the eyes should be noticed and at once reported to the medical attendant. The application of a little sweet-oil or vaseline to the margin of the lids, with a camel's-hair pencil, after they have been bathed with warm water, prevents them from sticking together, and causing further damage by the action of pent-up matter. If there is discharge, it should be constantly removed, and the eyes bathed. The matter is infectious, and care should be taken not to infect the sound eye by using sponges or lint which have been applied to remove the matter from the inflamed eye. All should therefore be burnt, and the nurse's hands carefully disinfected.

SWELLING IN THE GROIN.—A swelling in the groin may be due to various causes, especially in males. A soft swelling which increases in

size when the child cries, but decreases or disappears at other times, is in all probability a hernia. All such cases should be reported to the medical attendant.

SNUFFLES.—Apparent cold in the nose, when persisting, is a strong indication of syphilis. It may often be relieved by applying camphorated vaseline to the bridge of the nose.

BUTTOCKS.—The buttocks must be kept as clean and dry as possible, especially if the motions are green and liable to irritate; consequently, in cases of diarrhœa and thrush, scrupulous attention is required. Napkins should be washed with pure yellow soap, and soda should never be used, as it is apt to produce soreness of the buttocks; the same remarks apply to napkins which, having been soiled, are dried, and again put on the child unwashed—such a practice is *objectionable* and cannot be too strongly *condemned*. A little vaseline or zinc ointment rubbed on the buttocks after they have been washed protects the skin to a certain extent from irritating discharges.

If the buttocks become sore, the fact must be mentioned. Spots limited to the buttocks which break at the summit and leave minute holes are probably of a syphilitic nature, and this is rendered still more probable if the soreness has appeared in the absence of green stools. All sore spots on the buttocks may be touched with an iodoform pencil each time the napkin is changed, as if these minute ulcers increase in size, and run together, they produce a very raw surface.

A syphilitic child generally snuffles and has a hoarse cry; is frequently small, ill-nourished, and weakly, with an aged look and wizen face, and is liable to various eruptions.

CHAPTER XIV.

APPLIANCES.

Baths:—Vapor-Bath—Wet Pack—Half Pack—Tepid Sponging—Enemata, Aperient and Nutrient—Douche—Vaginal Injections—Nasal Douche—Ice Bags—Poultices—Mustard Leaves—Fomentations and Stupes—Counter-Irritation—Blisters—Leeches—Cupping, Wet and Dry—Ointments—Suppositories—Eye-Drops—Collyria—Ear Syringing—Throat Applications—Gargles—Sprays—Inhalations—Bronchitis Kettle.

Various Kinds of Baths.

BATHS, HOT AND WARM.—In ordinary cases, a hot bath should be from 100 to 108 or 110 degrees Fahrenheit, the patient remaining in from ten to fifteen minutes. The temperature of a warm bath ranges from 90 to 100 degrees, and of a tepid bath from 80 to 90 degrees, in all cases regulated by a thermometer.

The nurse should prepare the bath for an invalid of a low temperature, adding hot water to prevent the water cooling or to increase the temperature. The patient may be immersed from half to one hour. In cold weather the bath should be given in a warm room and a warm blanket kept ready for the patient afterward. The patient's body should be wholly immersed except in cases of respiratory difficulty, when the chest should be left out of water covered with a blanket. Invalids are liable to

fainting attacks when taking a hot bath, so that the attendant should not leave them alone for fear of their passing into an unconscious state. Exposure to draught should be avoided when drying, and the patient should go to bed without delay.

In giving a child a bath for fits, the child should be seated in the hot bath, and a sponge full of cold water squeezed over the head.

Continuous Bath.—In the case of a patient suffering from extensive burns, it may be desirable to keep him constantly in the bath. The bath should be kept at a temperature which he feels comfortable, and he may be slung in it with a support for the head, the nurse remaining by his side.

In preparing hot baths for the irresponsible and children, accidents may be saved by putting some cold water into the bath before the hot tap is turned on, so that if the child should enter before the bath is ready there is no chance of its being scalded.

Cold Bath.—For those in fair health this is best taken before breakfast, and should be followed by a sensation of glow and warmth. The body need only be immersed or sponged for a minute or two, and then rapidly dried with a coarse towel. If the cold bath is ordered for those in delicate health, it may be taken two or three hours after breakfast. Children may be allowed to stand in hot water, and be then rapidly sponged over with cold water.

Graduated Cold Bath.—When the bodily heat exceeds 105 degrees, and is attended with the first symptoms of coma and an increasing rise of temperature, the cold bath may be necessary. It is given under medical superintendence, not being free from risk. A bath of sufficient size to immerse the patient is required.

The patient, after being stripped, should have a large towel spread over him, and then be lowered by means of a sheet or blanket into the bath, which should be of a temperature of about 90 degrees F. The water is then cooled down by adding cold water, or if necessary ice, until the temperature gradually reaches 70 or 65 degrees, or until the patient's temperature, ascertained by a thermometer placed in the mouth or rectum, is sufficient lowered. The patient can be removed by several strong hands, or else be lifted out by means of the blanket or sheet in which he was lowered, the water being drained off as far as possible.

The bath may have to be repeated several times, if the temperature again ascends; and if followed by shivering, or great lividity, the patient should be placed between the blankets, and hot-water bottles applied to the extremities, warm beef-tea or brandy being administered by the rectum.

In cases of emergency where a cold bath cannot be given, a sponge bath may be used, the cold wet pack, or ice cradle.

Hip-Baths.—These are useful in disease of the pelvic organs, when it is not desirable to immerse the whole body. Care should be taken not to fill them too full so that the water runs over when the patient sits down, and the upper part of the patient should be covered with a blanket.

Foot-Bath.—A mustard bath may be employed for the feet. The foot-bath should contain water at about 110 degrees F., to which an ounce of mustard has been added; the feet may be kept in it until a warm glow is felt in the skin.

Hot-Air Bath.—To promote perspiration in dropsy, Bright's disease, or chronic rheuma-

tism, these baths are invaluable in such cases. They are best given to the patient in bed by making use of Allen's lamp, the boiler being removed. The patient is stripped, covered in flannel or a blanket, and a blanket is laid on the bed; a body-cradle or wicker-work support with a mackintosh over it, is then placed on the bed over the patient and one or more blankets thrown over this, so as to completely cover him, and the clothes tucked in round the bed close to the neck. The covering blanket being removed, the lamp is then lighted, and raised from the ground to the required height, the tube being passed under the bed-clothes above the level of the body (fig. 56).

The hot air enters and surrounds the body in a warm bath, soon producing a copious perspiration. The head may be wrapped round in a towel wrung out in cold water, and changed if necessary. Fifteen to thirty minutes is usually a sufficient length of time for the bath, and the patient must not be left alone. The effect may be much increased by imbibing plenty of fluids, or by the previous administration of drugs, such as pilocarpine, which encourage perspiration. The temperature of the bath should be measured by a thermometer suspended inside the cradle, and may range from 110 to 150 degrees F.

Vapor-Baths may be given in the same way if steam is used instead of air, the temperature varying from 100 to 110 degrees F. Extempore arrangements may be made with a kettle provided with a long rubber tube to pass under the bed-clothes and convey the steam, or bricks may be heated and wrapped in a flannel which has been previously soaked in water, or vinegar and water, and then placed on a dish inside the bed under the raised bed-clothes. Some form of

cradle may always be extemporized with cardboard or some stiff material, such as half a band-box, etc.

The same baths can be given to an individual in a sitting posture. The patient being seated in a cane-bottomed chair, the lamp is placed underneath the chair, and then a blanket is arranged to cover and surround him and the chair, but leaving the head uncovered.

WET PACK.—*The Cold Wet Pack* is used to reduce temperature in fever, or to promote free perspiration and sleep. The bed should be guarded by a waterproof sheeting, with a blanket placed over it; the patient is then stripped, and lies on his side with a blanket over him. A sheet, previously wrung out in cold water, is folded lengthways with the edges toward the middle, and is closely adapted all over the patient under the blanket, but leaving the head uncovered; the blanket is then tucked round him.

The Hot Wet Pack is given in a similar manner, hot water at 110 degrees F. being used instead of cold, and three or more blankets are thrown over the patient and tucked round, two hot bottles being placed at the feet and one on either side. The effect of the pack must be noticed, and if severe exhaustion is produced it must not be continued; but if the result is a feeling of comfort it may be continued for half an hour or more, when the patient may be quickly sponged with tepid water, dried, rubbed briskly with alcohol, and wrapped in a blanket.

The Half Pack is a modification of the cold wet pack, and is carried out in much the same manner. Instead of the large sheet, one or two towels folded lengthwise should be wrung out in cold water, and folded round the body below the armpits and over the hips, leaving the limbs

uncovered; the blanket is then folded round and tucked in.

Tepid Sponging may be employed with great benefit and comfort to the patient in cases of fever and restlessness, and reduces the temperature when the skin is dry and pungent.

The bed should be guarded with a thin rubber sheet and a blanket laid underneath the patient. The bed-clothes and the patient's night-dress being removed, he is covered with a blanket, and the skin slowly sponged over from above downward with tepid water, or water at a temperature of 116 degrees F., to which some alcohol has been added. A small portion of the body only should be exposed at one time, and the wet sponge passed two or three times over each part before drying it; a hot bottle may be placed at the feet during this process. The effect is to reduce the temperature, soothe the nervous system, and promote sleep, and it has a very refreshing effect in typhoid and other fevers.

For the night sweats of phthisis, the sponging should be done quickly instead of slowly, and a fresh night-dress put on afterward.

Enemata.

Pump Syringe.—There are several forms of instruments in use for the purpose of administering an injection into the bowel. Some are provided with a syringe of metal and a piston, with tubes of a suitable kind. Others, such as the Richardson syringe, consist almost entirely of india-rubber. This latter is provided with a bulb which acts as a pump, to each end of which is fitted a tube of india-rubber, one of the tubes terminating in a bone nozzle with a shoulder-piece. Before introducing the nozzle of the syringe, the bulb and tube should be

filled with the liquid, to exclude all the air, that it may not be injected into the bowel and cause distress to the patient. The nozzle is then oiled and introduced into the rectum, the end of the other tube is *previously* sunk in the fluid to be injected; the bulb is then squeezed, and water is sucked in to the syringe, and injected into the bowel (fig. 57). The india-rubber is apt to get stiff and broken in cold weather, and should not be coiled up in a box, but hung up by the metal end. Before using any form of instrument, a quantity of warm water should be pumped through it in order to make sure that it is in good order and thoroughly clean, then the nozzle should be anointed with vaseline or sweet-oil, the bulb and tube filled with the fluid before introducing the nozzle.

It is usual to inject warm fluid at a temperature from 90 to 100 degrees F. The patient should be placed at the edge of the right-hand side of the bed, either lying on the back with the knees well raised, or lying on the left side with the knees drawn up. A mackintosh or rubber sheet is placed over a folded towel under the pelvis to guard the bed. The fluid to be injected should be placed in a basin on a chair by the bedside, and ascertained to be of the right temperature. The nozzle of the bone-tube should be warmed and smeared with oil or vaseline. The syringe should be filled, and the air ejected by squeezing the ball until the fluid begins to emerge through the nozzle, which may then be gently passed into the bowel in a direction slightly backward up to the shoulder-piece. The fluid may then be slowly injected, taking care to desist before the end of the tube in the fluid is uncovered, otherwise air will be sucked in and injected, distressing the patient.

A towel or diaper should be pressed against the bowel as the tube is withdrawn, the patient being kept quiet for a time in order that the fluid may be retained for ten or more minutes. The night-stool or bed-pan should be always in readiness close by the bedside. If any difficulty is experienced in introducing the nozzle into the bowel, or any resistance felt to the injection of the fluid, the nozzle should be slightly withdrawn and pushed on in a somewhat different direction.

Glass Syringe.—When quite small quantities, such as a few ounces only, have to be injected, a glass syringe with tube and nozzle should be employed. This is also useful for nutrient injections, or medicated fluids, and can easily be cleaned.

Long Rectal Tube.—In cases of fæcal impaction, or intestinal obstruction, when the use of the ordinary enema is ineffective, the fluid may have to be injected with the long tube. This is used by the medical attendant, but the nurse may be required to employ it. It is a long tube of india-rubber, one end of which can be fitted on to the nozzle of the enema syringe. The tube is previously softened in hot water, and slowly inserted into the rectum; as it is passed further and further, the end may be guided to the left side, but no force should be used, as there is danger of damaging the bowel. It is not always easy to introduce it, and when it seems to be traveling on it may really be coiling upon itself. When it has been introduced as far as it will go easily, the fluid may be injected.

Simple Enema.—Warm water, soap and water, oatmeal-gruel, or barley-water are commonly used in ordinary cases, and the amount of fluid to be injected will depend partly on the

age of the patient and the nature of the case. For infants one ounce, for children from four to ten ounces, will be sufficient; while for adults two or more pints may be injected.

Oil Enema.—Olive or linseed oil injections are more effectual in softening hardened masses impacted in the bowel; one and a half to two pints of oil may be used. In cases of intestinal obstruction, the injection may be given with the pelvis raised above the level of the head and shoulders, and the enema should be retained as long as possible.

The fluid should always be carefully warmed to a temperature of 80 to 100 degrees F., and oil may be heated by surrounding the basin containing it with quite hot water, until the oil is sufficiently warm.

Medicated Enemata.—Astringent or sedative fluids are often used for injection in diarrhœa, in hæmorrhage from the bowel, or to give relief from pain. The amount of fluid injected is considerably smaller than for aperient enemata. Two to four ounces of water containing the astringent is sufficient, or the same quantity of starch mucilage with half a teaspoonful of laudanum may be used as an opiate.

Salt Injections, in the proportion of one tablespoonful of salt to a pint of gruel, are useful for destroying thread worms in the rectum.

Turpentine Injections should contain from half to one ounce of turpentine, with a pint of gruel or barley-water. The instrument should be afterward cleansed by a stream of soap and water.

Nutrient Enemata.—This mode of feeding is of the greatest value in prostration, or when vomiting, or disease of the stomach prevents nutrition being carried on by the mouth. After profuse hæmorrhage, long and severe opera-

tions, or during temporary unconsciousness, the patient's life may be preserved by the injection of warm fluids or stimulants.

The quantity injected should not exceed four ounces, and two or three ounces may sometimes be more easily retained. The injection should be warm (90 to 100 degrees F.), and may be slowly administered with a glass syringe directly after a natural motion, or about an hour after the bowel has been washed out with a simple enema. If the injections have to be continued, the bowel is apt to become irritable, so that they should not be given more frequently than every four hours.

The nutrient fluid should be about the consistence of cream, and may be composed of strong beef-tea, milk, eggs, gruel, meat extracts, or stimulants. Two or three ounces of beef-tea, the yolk of an egg, and half an ounce of brandy make a very useful injection. The food may be artificially digested before injection by the addition of a dessert-spoonful of the Liquor Pancreaticus (Benger); or pancreatized milk and beef extract may be used (see *Appendix*).

Douches and Ice-Applications.

Hot and Cold Douche.—The application of a stream of hot or cold water is beneficial for reducing inflammation in joint affections, and to relieve pain. The water may be poured from a can held at some height above the part by an attendant, or a tin can provided with an india-rubber tube may be placed at a suitable height, and the fluid directed where required (see *Vaginal Douche*).

Vaginal Injections are best given with a glass syringe and india-rubber tube, but the Richardson's syringe is sometimes used. A spe-

cial tube is provided with these instruments, made of hard rubber. The tube is from five to six inches long, and is pierced with holes along its sides toward the end of the nozzle; before use it should be soaked in a solution of carbolic acid, warmed by passing a stream of hot water through it.

The bed must be arranged with a sheet of rubber or mackintosh and folded sheet, and the patient should lie near the edge on her back with the knees drawn up, with a round bed-pan or bed-bath underneath her.

The tube being oiled, the nozzle is passed under the right knee into the vagina in a direction upward and backward. Care should be taken that the tube is filled with the solution, and free from air before injection, and the injection should be stopped before the vessel is empty.

The Vaginal Douche may be given in a similar manner. An instrument may be obtained for those who require its constant use, which can be managed without assistance. It consists of a rubber bag containing from two to four quarts, from the bottom of which comes a long tube furnished with a stop-cock and a perforated nozzle. The reservoir is filled with the fluid to be injected, and hung up, or placed on a shelf a few feet above the patient. When the fluid has entered the tube, the nozzle may be inserted, and the patient can control the flow by using the stop-cock.

Vaginal injections may be used at a temperature varying from 70 to 100 degrees F., and the temperature of the hot douche should be from 100 to 115 degrees. For antiseptic purposes, carbolic acid of the strength of 1-40 to 1-80, or other antiseptics ordered.

The vaginal tube, preferably of glass, should

not be perforated at the extremity if the fluid is not intended to enter the uterus.

NASAL DOUCHE (fig. 58).—An india-rubber tube a few feet in length is required, provided with a weight at one end and a nozzle at the other. The fluid to be used is placed in a bowl on a ledge at some distance above the patient's head. The weighted end is sunk in the fluid, and the fluid started running by sucking the nozzle end, or pinching the long tube to exhaust the air, when there will be a continuous stream kept up. The patient should be directed to hold the nozzle in the nostril, lean over a basin, and keeping the mouth open to breathe through it and not through the nose. The fluid should enter one nostril, and, running round the back, escape from the other. This process requires some practice to perform efficiently.

ICE BAGS (fig. 59).—India-rubber bags are made for the application of ice, the shape varying according to the part to which the ice has to be applied, or an efficient substitute for an ice bag may be made with a common bladder.

ICE CAPS (fig. 60) are also used for applying cold to the head, consisting of coils of tubes through which iced water is made to percolate by means of a syphon, and is received into a bucket at the bedside. Metal tubing (Leiter's) may be used in the same manner. This tubing is pliable, and can be adapted to the part, the water passing through by the syphon action, and it has the advantage of being less disagreeable to the patient than the india-rubber apparatus.

Ice should be kept in large lumps, from which pieces are separated by a hat pin or long needle. To prevent its melting too rapidly, it should be kept in a refrigerator or in a cool room. It is best to wrap it in flannel and place

it in a receptacle so arranged that the water can drain off as soon as the ice melts, and not to keep it standing in the water which has melted off.

Ice Poultice.—Take a fold of gutta-percha tissue a little larger than the area to be covered. Sprinkle on the lower leaf of the tissue a thin layer of linseed-meal, and upon it place ice crushed small to the depth of half an inch, sprinkle the ice with common salt, and on the top of it add another layer of linseed-meal. Turn the upper leaf over the lower and seal the edges with chloroform or turpentine; put the poultice into a flannel bag, and place under it a layer of lint. (*Guy's Pharmacopœia*).

Ice Cradle (fig. 61).—A special form may be used, or else one or more cradles sufficiently long to cover the whole body are placed over the patient under the sheet, which is the only covering left on the bed. The ends of the sheet are turned up over the cradles to allow a free current of air.

From the cradles are suspended a number of small pails filled with ice. Children's toy pails answer very well, or round tin boxes, such as coffee tins, can easily be adapted for the purpose.

It is a good plan to cover the pails with bags made of flannel or absorbent cotton, to absorb the moisture caused by condensation, which might otherwise drip on the bed.

The patient's feet should be wrapped in a small blanket or a hot-water bottle placed at the soles, as they usually get very cold.

Poultices and Fomentations.

Poultices.—The application of heat and moisture to the surface of the body is best effected

by a poultice. Various substances are used for this purpose; linseed-meal and bread are best.

Linseed Poultice of crushed meal. A bowl and spatula or broad knife are required, which should previously be heated by being dipped in boiling water. A sufficient quantity of boiling water is put into the basin to make the poultice of the required size; the linseed-meal is then quickly added little by little with one hand, stirring well the whole time with the spatula or knife until the right consistence is attained.

The mass should not be too firm or too sloppy, but sufficiently moist to turn out of the basin without sticking to the sides. The poultice is evenly spread on a piece of warmed linen, lint, or teased-out tow. The extra margin is then turned in over the edges. A single layer of thin umslin may be spread over the face of the poultice if not required to be next the skin. The heat of the poultice should be tested with the back of the hand before being placed on the body, and should be as hot as can be comfortably borne. An external covering of cotton batting, lint, or waterproof should be adapted, and the whole well secured in position by a bandage, napkin, or binder. The essential points in giving a poultice are that it should be hot and of the right consistence; it is necessary that the water should be boiling, that the implements should previously have been heated, and that there should be no delay in applying it when made. If the poultice has to be carried from one room to another, it should be placed on a hot plate and covered over with a napkin. To make it of the right consistence, too much water should not be used, but if too little is added it will be hard and cold, and the thickness should not be out of proportion to the size, since the weight pressing on a tender or in-

flamed part will in itself cause pain. The poultice should be removed before it gets cold, and a fresh one applied if necessary every four or six hours, but the old one should not be removed until the new one is ready. When discontinued, the skin should be dried with a soft towel, and covered with flannel or cotton-batting.

A JACKET POULTICE is often used for chest-affections. A large piece of linen should be cut out of sufficient size to cover the back, sides, and front, and after the poultice has been spread it is placed round the chest, and the edges secured with safety-pins over the shoulders, and underneath the arms. It may be made in two pieces for an adult, or in one for a child.

BREAD POULTICES.—Coarse bread-crumbs from stale bread should be added to boiling water in a basin and well stirred. The basin should be covered up and placed by the fire for a few minutes. The water must then be drained off, and fresh boiling water added, and again poured off, when the poultice may be spread and applied.

This form of poultice is very soft, and well suited for small applications to tender parts, but does not retain the heat so well as the linseed-meal. An excellent poultice is made by mixing equal quantities of linseed-meal and bread-crumbs.

CHARCOAL POULTICE.—This is often required for foul and sloughing parts, as in gangrene or decomposing ulcers. A bread poultice is prepared, to which a quarter to half an ounce of finely powdered charcoal or more, according to the size required, is gradually added and well mixed, or the charcoal may be added in the proportion of half an ounce to four ounces of

linseed-meal and bread in equal parts. The surface of the prepared poultice should be sprinkled with fine charcoal before application.

YEAST POULTICES are useful for wounds or ulcers, and the following proportions may be used: Two ounces of beer yeast should be mixed with an equal quantity of hot water, a quarter of a pound of flour, linseed-meal, or fine oatmeal is gradually stirred in, and heated until it rises, and is sufficiently hot; an earthenware vessel should be used for its preparation.

MUSTARD POULTICES may be made of any strength. The directions in the Pharmacopœia require equal parts of mustard in powder and linseed-meal. The meal should be mixed with boiling water and the mustard added while stirring. A less proportion of mustard should be added for patients with delicate skins, and the poultice may be applied for a longer time. It should be spread on a cloth or on brown paper, and a layer of cheese-cloth or muslin may be placed over it.

A redness of the skin, accompanied by a burning sensation, is produced after a time; but there is a great difference in the delicacy of the skin in individuals; a strong mustard poultice should not therefore be left on, especially in the case of children, without ascertaining its effect. A corner should be turned down after a time, and the skin examined to prevent the production of a blister.

FOMENTATIONS AND STUPES.—These are convenient methods of applying warmth and moisture to the skin, and have the advantage of cleanliness and simplicity. A piece of coarse flannel about a yard square should be folded to the size required and placed in a basin of boiling water. It is then put on a towel, and the ends of the towel twisted tightly in con-

trary directions until the water is thoroughly squeezed out of the flannel, which is then carried inside the towel to prevent its cooling, and applied. The outer surface should be guarded by several folds of dry flannel to avoid wetting the clothes.

The fomentation will require changing every half hour, or more often, if great heat has to be constantly kept up, and the second hot flannel should be ready before the first is removed.

Wringers (fig. 62) are used in hospitals where fomentations are constantly required. They consist of coarse toweling or canvas provided with a wooden rod at each end, to take hold of while wringing out the boiling water, and prevent burning the fingers.

Poppy Fomentation.—Break up two poppy heads, and boil them in two pints of water until the quantity is nearly reduced to one pint, then strain, and soak the flannel in the boiling fluid.

Laudanum Fomentation.—When the flannel has been wrung out of the hot water, the surface should be quickly sprinkled with half an ounce or an ounce of laudanum before applying to the skin.

The Turpentine Stupe is used for counter-irritation, three or four teaspoonfuls of turpentine being used and well distributed over the surface of the flannel by afterward wringing it out in hot water; care should be taken that it does not blister the skin.

Spongio-Piline is a thick, soft material, one surface of which is covered with waterproof to prevent evaporation. It may be used for fomentations instead of flannel.

Counter-Irritation—Blisters.

Counter-Irritation.—Various means are employed to produce redness of the skin and to

assist in relieving pain and inflammation in the deeper parts, among which are mustard applications and turpentine stupes.

MUSTARD LEAVES.—A very convenient substitute for a mustard plaster can be obtained in the form of a leaf or thin sheet of paper prepared with mustard. The leaf is soaked for a few seconds in cold water, or tepid water in winter, applied wet to the skin, and secured by a napkin or bandage. The action is very rapid, and sometimes too severe.

COUNTER-IRRITANT.—One of the best counter-irritants we have ever used to relieve severe pain quickly is composed of equal parts of essential oil of mustard and menthol.

It should be lightly and rapidly applied to the surface with a camel's-hair brush, or with a pledget of absorbent cotton tied to the end of a small stick; it will burn for a few moments, when first applied, but without blistering.

It is exceedingly volatile, and for this reason is apt to smart the eyes of the patient or attendant when used near the face; which may be avoided by the patient holding a handkerchief over the face during the application and the attendant turning the face away while applying the remedy.

The pungent odor of the mustard, in no way harmful, passes out of the room in a few minutes, while the patient rejoices at the rapid relief received from the pain.

LINIMENTS are also used for this purpose, the stronger ones requiring care in application, such as croton oil, belladonna, iodine, etc. These should be painted on with a brush and not rubbed in, and the fluid used sparingly at first over a small surface to test its effect.

BLISTERS are a powerful form of counter-irritation, the cuticle or superficial part of the skin

becomes raised from the part beneath by an effusion of fluid or serum, drawn from the blood by the action of the blistering material.

There are two methods in common use. The application of blistering ointment spread on stiff paper or leather to form a plaster, the Emplastrum Lyttæ; and painting the part with blistering fluid.

The plaster may be secured by a bandage or handkerchief, a less painful method than using sticking-plaster, which drags when the blister rises, and adheres to the skin and hairs round the tender region. In order to vesicate, the plaster should remain on from eight to ten hours; three or four hours will suffice to produce redness to the skin.

When vesication has been produced, the plaster should be gently removed without breaking the blister.

Dressing Blisters.—The vesicle should be opened at the most dependent part by sharp-pointed scissors, and the fluid allowed to escape into a test-tube or glass vessel and kept for examination.

The surface may then be dressed with a fold of lint covered with sweet oil or ointment, a thin layer of absorbent cotton being secured over it by a bandage. A warm linseed-meal poultice is a comforting application after severe vesication; but if it is desired to keep the blister from healing, savin ointment should be applied on lint instead of simple dressing.

Leeches—Cupping.

Leeches are used to remove a small quantity of blood. Before applying them, the skin should be washed over with warm water and dried, and the leech should also be wiped with a soft cloth.

To apply the leech, hold it by its larger end in the folds of a cloth, and allow the smaller extremity or head to be directed over the skin in the necessary region. When the head has taken hold, the body may be released, and the leech will adhere to the skin by its sucker. Another method of application is by means of a leech-glass, or an ordinary wine-glass or test-tube may be inverted over the part with the leech inside until it has begun to bite.

If there is difficulty in getting the leech to bite, a little milk or sugar and water may be first smeared over the skin.

The leech should be allowed to drop off when it has sucked its fill, and not be dragged off. If the leeches are likely to be used again, they should be sprinkled with a little salt until they have disgorged the blood, washed, and kept in a glass or earthenware jar with a perforated cover, filled with fresh water. The leech bites should be washed with warm water, dried, and covered with cotton batting, which will in most cases stop the bleeding.

If necessary, the bleeding may be further encouraged by applying a hot fomentation.

To Arrest Bleeding from Leech-Bites.—The bleeding may be so persistent as to produce exhaustion. Patients, and especially children, should not be left for the night after the application of leeches until the bleeding has ceased. If the bleeding is over a hard surface of bone, it may be easily stopped by firm pressure with a pad of lint or absorbent cotton held on or bandaged on for a few minutes.

If there is difficulty in stopping the bleeding, a surgeon should be summoned, pressure being applied until his arrival.

CUPPING is a method of abstracting blood locally, and there are two ways of applying it—

wet cupping and dry cupping. *Wet cupping* is only practiced by the surgeon; several incisions being made in the skin, and the blood drawn into a cup by atmospheric pressure. *Dry cupping* is used when it is desired to draw the blood into the superficial tissues without shedding it. In either case, the cups are applied after the same manner.

The part to be cupped should be previously sponged with warm water, and the spot chosen should be as flat as possible. The cups are of different sizes, and made of glass. A few drops of spirit are placed in the cup, which is then shaken so as to moisten the sides, the excess of spirit is thrown out, and a small piece of blotting-paper moistened with spirit is set on fire and dropped into the cup. When the spirit inside flares up, the cup is immediately turned over, and the edges firmly applied to the skin. The flame immediately becomes extinguished, and the air being exhausted, the skin in the interior rises up into the cup, forming a considerable swelling; or if incisions have been made by the scarifier, the blood trickles out and slowly fills the vessel. To remove the cup, one edge should be raised, and the skin firmly depressed with the thumb until the air gains admittance, when it can be easily removed. If blood is drawn, it should be received into a measure without spilling it, and the amount noted. The wounds may be sponged and covered with lint or plaster, or allowed to bleed further into a hot poultice.

Ointments and Suppositories.

OINTMENTS are used for application to raw surfaces and skin affections. They should be evenly spread by a spatula or broad knife over the smooth side of stripe of lint cut to a suit-

able shape; then spread over the affected part and secured by a thin bandage.

Inunction may be used for parasitic affections, such as the itch (see *Scabies*).

Suppositories, Medicated.—These are used for the purpose of introducing drugs of different kinds into the rectum. The drug is mixed up with cacao-butter, or some fatty material which is easily dissolved, and the ingredient becomes absorbed into the circulation. They are shaped like a cone, and may be introduced by the patient himself, inserting the small end first, and pushing it in well up into the bowel. If necessary, the nurse can pass it, by previously oiling one finger and pushing the suppository well beyond the sphincter, the patient lying on the left side with the knees well drawn up.

Glycerine Suppositories are useful in constipation, and are of different sizes for children and adults, or the large size (double cone) may be halved.

Nutrient Suppositories may be made of soluble meat or of meat peptone, and the outside should be oiled before introduction.

Applications to Eye, Ear, and Throat.

Eye-Drops.—To be efficacious, the fluid must have access to the surface of the eyeball underneath the lids. The patient, sitting in a chair, must throw the head well back, the under eyelid is then drawn down with the finger, and the upper lid drawn up with the thumb, and a drop is placed in the eye at the inner corner near the nose; the patient's head is then tilted over so that the drop runs across the eye while the lid is still held up, and the fluid bathes the surface of the eyeball. The fluid may be dropped in with a drop-tube or eye-

dropper specially constructed, or a camel's-hair brush may be used for the purpose.

Eye-Lotions or *Collyria* ought generally to be applied warm, absorbent cotton being used as a sponge and destroyed afterward. In inflammatory and purulent discharge from one eye, great care should be exercised to prevent the disease from being conveyed to the sound eye, or to the eyes of others by the nurse's hands or by the dressings.

Ear-Syringing.—A syringe of suitable size should be used, capable of containing several ounces of fluid. Two slop-basins are required, one to hold the fluid, and the other to receive it as it returns from the ear. To prevent the water from running down the neck, a trough is used which fits on to the ear, and is held in position by a spring passing over the top of the head, or by a string round the ear (fig. 63); in addition, a towel should be closely fitted round the neck. Warm water is drawn into the syringe, and the air discharged before introducing the nozzle, which should be kept applied at the upper part of the orifice, while the upper part of the ear is drawn gently upward and backward.

The fluid returns along the floor of the canal, and is directed by the trough into a basin, which can be held by the patient ready to receive it. Attacks of coughing or giddiness are apt to accompany syringing of the ear, but soon pass off. When there is hard wax blocking up the canal, it may be softened by introducing a drop or two of warm olive-oil previous to using the syringe, when it may be more easily removed.

In placing absorbent cotton in the ear to soak up discharges of matter, the plug should be

placed in the fold just outside the orifice, and not inside the canal.

THROAT APPLICATIONS.—*Gargles* are employed for washing the tonsils and back of the throat. About half an ounce of the fluid is taken into the mouth, the head being held well back, and moved from side to side so as to wash the fluid against the back of the throat, or the breath is expired through the fluid, causing it to bubble and extend to the adjacent parts. Gargling should be repeated several times.

Sprays are in many respects more convenient than gargles, and are more pleasant for cases of ulcerated or painful sore throats. The spray-producer is a simple contrivance by which fluids can be pumped in the form of a fine spray on to the tonsils and back of the pharynx. The fluid is introduced into the glass jar, and the apparatus worked by pressing the india-rubber hand ball (fig. 64).

INHALATIONS.—These are useful for the application of remedies to the air passages in laryngeal and bronchial affections, or for asthmatic seizures. Steam is often used by itself, or the vapor is rendered sedative, stimulant, or antiseptic by the addition of solutions to the water.

Inhalations may be managed in a simple manner by covering over the mouth of a jug containing boiling water with a towel or napkin, leaving an aperture of sufficient size to admit the mouth and nostrils. The patient should sit with the head bent over the jug, and gradually bring the mouth near to the orifice through which the vapor is issuing. The breathing should be quiet and natural, and after six or seven inspirations the face should be withdrawn for half a minute, and the process repeated at intervals for a period lasting from ten to twenty minutes. The best time for inhaling is be-

fore bedtime, and the patient should avoid going out, or into a cold room, for some time afterward, if it has been performed in the daytime.

Vessels of various forms have been devised for inhaling; the simplest being an earthenware vessel provided with a mouthpiece and a tube issuing from the side to admit the entrance of air. The vessel is filled half full by removing the mouthpiece and pouring in hot water containing the solution for inhalation, or else a sponge is fitted into the mouthpiece and the required number of drops poured on to it.

The steam passes through the sponge, and is saturated with the solution.

Fuming Inhalations are used in spasmodic asthma, either in the form of cigarettes, nitre-papers, or powders. The papers may be placed on a plate and allowed to smoulder, the smoke being directed toward the patient's mouth and nose. When the fumes of powders are inhaled, they may be conveniently directed in the following manner: A sheet of foolscap paper is rolled into a sugar-loaf form, and the broad end placed over the plate on which the powder is burning. The upper end of the cone is opened sufficiently to allow a stream of smoke to issue forth under the patient's nostrils.

Bronchitis Kettle.—An ordinary kettle may be furnished with a steam pipe, and kept boiling on the fire, or a special kind may be procured. Some are provided with a spirit-lamp, and may also be used for the vapor-bath (fig. 66).

CHAPTER XV.

THE ANTISEPTIC TREATMENT—BANDAGING

The Antiseptic Treatment — Method — Importance of Cleanliness—The Dressings—Bandaging—The Roller Bandage—Rules for Bandaging—Simple Spiral—Reversed Spiral—Figure-of-8—Spica—Capeline—Leg Bandage—Finger Bandage — Stump Bandage — Many-tailed Bandage—T-Bandage—Slings—Pads—Sand-Bags.

THE ANTISEPTIC TREATMENT.—This method, which is almost universally adopted in the treatment of wounds, was introduced by Sir Joseph Lister, and is based upon the principles of the Germ-theory, namely, that the putrefaction in wounds exposed to the air is not due to the air itself, but to the solid particles floating in it in the form of dust. This dust may be easily observed in the track of a sunbeam as it passes through a room, and may be shown by the aid of the microscope to contain a very great number of organisms—*bacteria*—varying in their size, vitality, and virulence, according to the unhealthiness of the surroundings in which they have been developed.

These organisms are the germs or spores which, when introduced into wounds, cause putrefaction, inflammation and suppuration, erysipelas, pyæmia, tetanus, and the like; or when inhaled into the interior of the body, may give rise to one or other of the infectious fevers, such as scarlet fever or diphtheria.

A wound which is kept entirely free from all organisms will heal without fail, and the best antiseptic method is that which succeeds in excluding these agents in the most effective manner.

The completeness with which these minute particles can be prevented from entering a wound must necessarily be limited; hence, endeavor is also made to destroy any germs which may have succeeded in gaining an entrance. For this purpose, certain fluids found by experiments to be detrimental to germs are used.

Inasmuch as the secretions and discharges from the wounded surfaces, or blood left in the wound after operation, are a medium in which germs are able to flourish and multiply with activity, it is also a great object in the successful treatment of wounds to make and preserve the wounded tissues in as dry a state as possible.

Antiseptic Method.—Although the methods, materials, and fluids used by surgeons differ considerably, the principles are the same, and everything and everybody connected with the operation has to be subjected to a process of purification.

Cleanliness is the first and most important virtue, and it cannot be too strongly insisted on. It is useless to surround the wound with spray-producers, and to employ all the paraphernalia of antiseptic dressings and fluids, if the patient's skin has not been previously cleansed, or if the hands and nails of the nurse or assistant have not received the necessary attention, or if the room is full of impurities.

In the case of operation it will be the nurse's duty to see that the room has been thoroughly cleaned, and all unnecessary furniture, or articles that are likely to harbor dust, removed.

She will also be expected to ascertain that the patient is thoroughly clean, and that the garments worn at the operation are clean.

The hands of all those assisting at the operation, the instruments, sponges, and everything required to come into contact with the wound will have to be rendered aseptic, and the skin in the neighborhood of the part to be operated on must be thoroughly purified.

The nurse should prepare a basin of hot water, soap, and a nail brush; after the hands have been thoroughly cleaned, they should be dipped in a solution of perchloride of mercury (1 to 2000) or in carbolic solution (1 to 20). Before the operation, the patient's skin should be scrubbed over with hand sapolio or a good soap, and the parts to be operated on shaved, then washed over with the perchloride, or carbolic solutions.

In some cases it may be necessary to employ a preliminary washing with alcohol. Mackintosh sheets, or a sheet of thin rubber, covered with hot carbolized towels, should be spread over the blankets covering the patient, and arranged so as to surround the part to be operated on.

The instruments are prepared beforehand by being boiled for ten minutes, and are then placed ready in a tray containing the carbolic solution (1 to 20).

Sponges or mops should be wrung out in carbolic solution (1 to 40) before the operation, and the sponges should be thoroughly cleansed in 1 to 20 afterward, and kept in a jar of this solution.

The Dressings.

THE DRESSINGS.—After the wound and the surrounding parts have been thoroughly

cleansed from blood, etc., with an antiseptic solution, the soiled towels are removed, and a clean towel wrung out in perchloride of mercury (1 in 2000) should be placed around the wound. The dressing is then applied. It generally consists of layers of double cyanide gauze, wrung out in carbolic (1 in 40), and over this some antiseptic cotton is placed, and then a bandage.

Before applying the gauze to the wound, the amount required for the dressing should be placed in a basin of boiling water. It should then be squeezed tightly, and shaken loosely out before use. The gauze must be covered by layers of salicylic, or other antiseptic cotton, and over this a light bandage of carbolic gauze. If pressure is needed, a flannelette bandage should be applied over all.

Bandaging.

The art of bandaging can only be learned by practice, but there are certain fundamental principles which require to be known. The simplest form of bandage is the roller bandage, and this can be used for all purposes.

Roller Bandages are made of unbleached cotton, flannel, or domett. The length should be from six to eight yards, and the width must be suitable to the part to be bandaged.

For the head and upper limb, the width should be two and a half inches, for the lower limbs three inches, and for the trunk four inches, while for the fingers three quarters of an inch is sufficient.

After the selvedges have been removed from the material, the bandage should be rolled up evenly and firmly by the hand, or by a winding machine. Starting at one end, the strip should be doubled upon itself into a small roll, and,

being held between the forefinger and thumb of each hand, it is rolled tightly up (fig. 67).

Rules for Bandaging.

1. Fix the bandage by two or three turns, one over the other, the outer surface of the roller being next the skin.

2. Bandage from below upward, and from within outward, over the front of the limb.

3. Use firm equable pressure throughout.

4. Let each succeeding turn overlap two-thirds of the preceding one.

5. Keep all the margins parallel, and let the crossings and reverses be in one line, and toward the outer aspect of the limb.

6. End by fixing the bandage securely.

In order to carry a bandage evenly up a limb, it is necessary to use a combination of three different turns,—the simple spiral, reverse, and figure-of-8 (fig. 68).

The Spiral Bandage is used only when the circumference of the part increases by very slight degrees, and consists in covering the part by a series of spiral turns, each overlapping the one below for about two-thirds of its width.

The Reverse or Reversed Spiral is mostly used for bandaging a limb, owing to the enlargement of the limbs at the upper part. The bandage is carried up in the spiral form, but turns or reverses are made to accommodate it to the shape of the limb. To make these turns evenly, the bandage should be held quite slack at the moment of reversing, and not unrolled more than is necessary to make the reverse. All the reverses must be carried one above the other along the outer side of the limb, and should never be made over a prominence of bone.

Figure-of-8 Bandage.—The nature of this is

indicated by its name, and it is useful for carrying a bandage over a joint, and for other purposes. The end of the bandage is made fast below the joint, or else the roll is carried on from the reversed spiral, up in front of the joint, behind the limb above the joint, and down again in front, and continued in the same manner until the joint is quite covered in (fig. 69).

The Spica is an adaptation of the figure-of-8 bandage, and is useful for retaining dressings or applications to the groin, or for bandaging the breast.

To bandage the groin, two turns should be made round the thigh of the affected side from within outward, then the bandage is carried along the lower part of the groin over the dressings round the pelvis, and back over the lower part of the abdomen, crossing the former fold at the groin, and completing the figure-of-8. The remainder of the groin is covered in in a similar manner (fig. 70).

To bandage both groins, the double spica is used, the bandage being used in a similar manner as for one groin, but is brought down from the opposite side of the pelvis to form a loop round the other groin.

To bandage the breast.—Two turns are to be taken round the waist, immediately below the breast, in order to fix the bandage, which is then carried under the affected organ and over the opposite shoulder; then around the waist, so as to fix the former turn, and again under the breast and over the shoulder as before, until the part is sufficiently covered. The breast should be gently raised and supported while the bandage is being applied (fig. 71).

The two breasts may be bandaged separately with the spica, or the many-tailed bandage may be used for retaining dressings in place.

To bandage the head.—For ordinary purposes it is sufficient to carry two turns of the bandage round the forehead and occiput, and then fastening the bandage behind one of the ears to carry it round the chin and over the top of the head. The bandage should be pinned or sewed where the turns cross one another, to make it secure.

Capeline Bandage.—To cover in the whole head by this method, two rollers are fastened together as shown in fig. 72, one being rather longer than the other. The larger roll should always circle round the head, while the smaller should travel backward and forward, the horizontal turns serving to fix the vertical. In keeping this bandage, it is necessary to keep the first circle low down close to the brows in front, and well below the occiput behind. The middle of the roller is laid against the forehead, and the ends passed behind the occiput, where they are crossed. After this one end continues to encircle the head, fastening down at the forehead and occiput the other end of the roller which is carried backward and forward. The second head of the bandage starting from the occiput is brought over the crown to the bridge of the nose in the middle line, and after being fixed is brought back on the right of the mesial line to the occiput, where it is again fixed and carried forward to the left of the mesial line. This arrangement is repeated until the whole of the scalp has been covered over (fig. 73).

To bandage the eye, take a turn once round the head and then bring across the eye diagonally behind the ear of the same side; a small square of linen and a pad of absorbent cotton should be placed over the closed lid before the bandage is applied. If it is desired to get

pressure upon the eyeball, the bandage should be brought upward across the eye in the reverse direction to the diagram (fig. 74).

To bandage the leg, one or two turns are carried round the foot close to the toes, and the remainder of the foot covered by the reverse turns; a figure-of-8 is then made round the ankle, leaving out the heel. The bandage is carried up the leg by reverse turns to the knee, where the figure-of-8 is again used, and the thigh covered by the simple spiral or reverse turns if necessary.

To bandage the finger.—A bandage of half or three quarters of an inch should be used. One or two turns are made round the wrist, leaving out a loose end; the bandage is then brought over the back of the hand and taken in a series of spirals to the tip of the finger which it surrounds. A series of regular spirals are made in an opposite direction to the root of the finger again, and the bandage is then taken across the back of the hand, and tied round the wrist with the loose end left on commencing.

To bandage a stump.—This is first fixed by simple turns below the nearest joint, and brought downward in figure-of-8 round the limb till the end of the stump is reached, which is next covered in by oblique and circular turns carried alternately over the face of the stump and round the limb. If a double-headed roller is used, it may be applied in the manner directed for the capeline bandage.

Many-tailed Bandage.—This form of bandage is useful for retaining dressings on the limbs, abdomen, or breast, so that the dressings can be renewed with as little disturbance to the patient as possible.

For a limb, it is only necessary to take a piece of bandage the length of the limb and lay

across it strips of another roller, long enough to go once and a half round the limb. These are tacked at the center at right angles to the central strip, so as to overlap one another by one-third. The long central piece is then placed behind the limb, and the cross pieces folded round separately, commencing from below and crossing one another in front.

The many-tailed bandage for the abdomen is often used after ovariotomy or abdominal section, and should be made of flannel, the strips being cut of a length suitable for the patient.

THE T-BANDAGE is useful for retaining dressings on the perineum. It is formed of one piece of bandage to go round the waist, and fasten by tying or a safety-pin; to the center is attached another piece to pass between the thighs, being fastened in front to the circular portion. This vertical piece may be conveniently split toward the end, so as to pass on each side of the scrotum, and is useful for keeping dressings upon the groins. An extemporary T-Bandage may be formed from an ordinary roller by fastening it round the waist with a knot in front, and then carrying the end between the thighs, on one side of the genitals, looping it over the circular band behind, and bringing it forward again on the other side of the genitals to fasten in front. For females, an ordinary diaper may be used as the vertical portion.

Slings, Pads, and Sand-Bags.

SLINGS.—*A sling for the hand or wrist* may be formed by a large handkerchief folded into the shape of a broad cravat, which can then be knotted round the neck, so as to support the hand rather above the level of the elbow.

Slings for the Arm.—A large handkerchief must be folded into a triangle, and placed with

the base beneath the wrist. The end of the sling in front of the affected arm is then passed over that shoulder to meet its fellow at the back of the neck. The apex of the triangle may be brought round the elbow and pinned in front.

PADS for splints may be made of tow carefully teased out, or of absorbent cotton. The covering should be of soft cloth, muslin, or old linen. The pad should be made to slightly overlap the splint in all directions. Disused pads should be burnt, and the splints washed.

SAND-BAGS should be kept in readiness to support injured limbs or cases of fracture. The covering may be of soft leather or strong calico. The sand should be fine and well dried, and the bags need only be three-quarters filled.

CHAPTER XVI.

ARTIFICIAL RESPIRATION—APPLICATION OF ELECTRICITY—MASSAGE.

Artificial Respiration—Clinical Thermometer—Hypodermic Injection—Transfusion—Batteries—Application of Electricity—Massage, or Rubbing.

Artificial Respiration.

ARTIFICIAL RESPIRATION is required for cases of suspended animation after hanging, drowning, suffocation from noxious gases, or for failure of respiration in chloroform inhalation. Asphyxia, or deficient oxygenation of the blood, is the main cause of the condition, and the patient lies in a state of insensibility, the respiratory movements are absent, the pupils often widely dilated, and the countenance and extremities livid or dusky pale. The heart may continue to beat for some time, and if the respiratory movements are artificially kept up, life may be saved. In cases of this description no time should be lost in carrying out the movements, with the greatest possible promptness.

SYLVESTER'S METHOD (fig. 75).—Loosen all clothing about the neck, chest, and abdomen, and lay the person on his back on the ground. Clean the mouth of dirt, blood, etc., and extend the neck by throwing the head well back, a support being placed under the shoulders. If the chin be well kept up, there is no need for

the tongue to be drawn out of the mouth. Stand or kneel at the patient's head, and take hold of the arms at the elbows and carry them well upward until the hands meet above the head. The chest walls are expanded by this movement and air enters the lungs, as in inspiration. After a pause of two or three seconds, the arms are brought down against the sides and front of the chest, forcible pressure being made by the operator leaning over and bringing the weight of his body to bear on the chest for a moment. By this second movement the air is expressed from the lungs, as in expiration. In three or four seconds the same series of movements are repeated, about fifteen respirations being made per minute. The process should be steadily continued for an hour or more before success is despaired of.

When natural breathing is restored, the circulation should be encouraged by rubbing the limbs in a direction toward the heart, and warmth may be applied by a hot blanket, hot bottles, etc. Stimulants may be given by the mouth as soon as the patient is able to swallow; or, if the collapse is great, stimulant enemata may be administered.

How to Take the Temperature.

CLINICAL THERMOMETER (fig. 76).—The bodily temperature is ascertained by this instrument, which is self-registering, and ranges from 90 to 112 degrees F. Each degree is marked by a long line, and divided into five parts, each part representing two "points" or tenths of a degree. An arrow commonly marks the average temperature of health or the "normal" temperature at 98.4 degrees. The index marks the temperature, and is either a small portion of detached mercury in the steam of the instrument, or else

the whole column is cut off just above the bulb and makes its own index.

Before taking the temperature, the index or mercury should be shaken down below the normal point, by a rapid swing of the arm, the stem being firmly held in the hand. The bulb is then introduced between the folds of the skin in the armpit, the elbow being drawn forward across the chest, or else it is placed under one side of the tongue, and the patient told to close the lips. The thermometer should be left in position for five minutes, and the temperature read from the upper end of the index, and noted on the chart. Temperatures should be taken as far as possible at the same hours each day, the morning and evening being sufficient in most cases; the time of the day may be stated on the temperature chart. In a case of doubtful temperature, the thermometer should be introduced a second time.

In some instances it is advisable to take the temperature in the rectum; the bulb, being previously well oiled, should be introduced for about an inch and a half, and retained for five minutes.

The thermometer should always be carefully cleansed after taking a temperature.

Hypodermic Injections.

HYPODERMIC INJECTIONS are usually given by the medical attendant himself, but in exceptional cases it may be necessary for the nurse to be able to use them. By this process a small quantity of fluid containing the drug in solution is injected under the skin, and becomes absorbed in a short time.

The syringe (fig. 77) is a small glass cylinder marked to show the number of drops. The fluid is drawn in by means of the piston, and the end

of the cylinder is fitted with a hollow needle. To give the injection, the needle should first be ascertained to be clear, and the required number of drops drawn in by putting the point of the needle in the fluid and elevating the piston. The syringe should next be held with the point upward and air-bubbles allowed to escape. A fold of skin is then pinched up on the back of the elbow between the finger and thumb, and the needle pushed quickly under the skin into the loose tissue beneath, when the fluid may be slowly injected. The needle is then withdrawn, and the finger placed over the puncture for a moment to prevent the fluid returning. After using, a stream of water should be drawn into the cylinder and the needle cleansed.

Transfusion or Infusion.—In prolonged syncope or collapse from extreme loss of blood, transfusion is often performed by the surgeon. A special apparatus is used, or, in cases of urgency, a large glass syringe and india-rubber tubing can be improvised. The nurse would have to get ready aseptic vessels, a measure glass, and hot water; aseptic gauze and bandages for the wound in the veins, and some salt solution containing one dram to a pint of water at a temperature of 100 degrees, unless some other saline solution is ordered.

Batteries.—Application of Electricity.

Two forms of electricity are used in medicine: one the *continuous* or *galvanic* current, the other the *interrupted* or *faradic* current. There are several different methods of obtaining the galvanic current, but one common form in use is composed of a metal and carbon immersed in a corrosive fluid. One arrangement of this fluid is called a "cell," and a combination of several of these cells forms a galvanic

battery. For medical purposes, a battery of from twenty to fifty cells is usually employed, and the number in use can be regulated at the will of the operator by contrivances which vary in the different kinds of machines.

The Electrodes, or instrument by means of which the electricity is applied, are furnished with insulating handles to prevent the current passing through the operator. They are provided at one end with a sponge, or else are covered over with wash-leather.

The faradic or interrupted current is of instantaneous duration, and occurs only at the moment of making or breaking contact. The battery is connected with an induction coil, and a special mechanism is provided for automatically making and breaking the primary or the secondary current, a spark of electricity being produced at this point. The primary or the secondary current can be employed at will by a simple mechanism, the latter being by far the stronger of the two, and the strength of the current may be varied by the dial regulator.

Before applying the current, the nurse should ascertain how to make the necessary wire connections of the battery in use, and how to regulate the strength of the current; and she should receive instructions as to the strength of the current to be applied in the particular case, and the duration of the application.

If the electricity is to be limited in its action to the skin, the electrodes must be used dry and the skin powdered. But if, as is usually the case, the muscles and nerves are to be acted on, the skin must be thoroughly moistened by sponging over with water or salt water, and the electrodes kept moist during the whole time of the application. One electrode is usually held still at a certain part, while the other is

moved gently to and fro over the muscle or group of muscles requiring to be stimulated.

It is advisable always to commence with weak currents, gradually increasing the strength, and attention should be paid to complaints of pain, and to the muscular contractions produced by the application of the interrupted current.

Great benefit often ensues in cases of paralysis from spinal or nerve disease, and in different forms of hysterical seizure, after the use of electricity.

Massage.

MASSAGE, OR RUBBING, is useful in restoring the muscular nutrition, in increasing the activity of the circulation, and in relaxing the stiffness and fixation of joints after injury. It can hardly be learned without personal instruction, and this can usually be obtained at the various institutions and hospitals in which cases requiring massage are treated.

The method is well described by E. M. in the Appendix of Dr. Playfair's small work on *The Systematic Treatment of Nerve Prostration and Hysteria*:—

"The patient lying in a blanket, begin at the feet by taking up the skin over the whole surface and firmly pinching it, twisting the toes in all directions, kneading the small muscles with the ends of the fingers and thumb, the large muscles of the legs with both hands, grasping alternately, frequently running the hand firmly up the leg and striking the muscles very often with the side of the hand. Before commencing the kneading of any of the limbs, rub them freely with cold cream, and the more oil a patient's skin absorbs the sooner does she begin to make flesh. The hands and arms are manip-

ulated in the same way, working upward (fig. 79). The patient then lying flat upon her back with the knees up, the abdomen is first pinched all over, and then the abdominal walls are firmly grasped in both hands, one hand grasping as the other relaxes. This part of the body is finished by the hands being placed one on each side just below the ribs, and firmly drawing the flesh forward, especially in the direction of the colon. Great attention should be paid to this part of the body, if the patient is troubled with indigestion. The patient now lying quite flat upon her face, commence at the nape of the neck, and pinch up the muscles on either side of the vertebræ, and along the whole of the back. Then place the two first fingers of the right hand, one on each side of the spine, and make a sweep downward the length of the spine; this should be done several times quickly. By working at tender spots longer and gently, the tenderness soon disappears. The patient must be taught to relax all the muscles of the body, and to lie perfectly passive, otherwise she will be much bruised, and the massage, instead of being a pleasure, will be a source of pain. Toward the end of the treatment, the limbs are exercised by movements of flexion and extension, especially the legs in the case of a patient who has not walked for years. In the first day or two, about twenty minutes is sufficient, but in about a week the patient is able to bear the full time (an hour and a half) twice a day, and she should then be left in the blanket for about an hour to rest quietly."

CHAPTER XVII

COOKING FOR INVALIDS.

Gruel—Arrowroot—Toast and Water—Barley Water—Imperial Drink—Linseed-Tea—Rice Water—Lemonade—Orangeade—Egg-Flip—Liebig's Quick Beef-Tea—Beef-Tea—Fluid Beef—Infusion of Raw Meat—Chicken Broth—Mutton Broth—Veal Broth—Meat Panada—Meat Jelly—Raw Meat Pulp—Peptonized Milk Peptonized Beef-Tea—Tea—Revalenta Arabica—Chicken Cream—Caramel Custard—Potato Soup—Scotch Collops—Fish Omelet—Filleted Sole—Turbot Souffle—The Fin of Turbot—Macaroni—Light Pudding—Calves' Feet Stewed.

GRUEL.—One pint of gruel is made by placing two dessertspoonfuls of patent groats in a basin, and gradually stirring in two tablespoonfuls of cold water. Next pour the mixture into a stewpan containing 1 pint of boiling water, and let it boil for ten minutes, stirring it continually.

If the gruel is for a cold, stir in a small piece of fresh butter and sweeten it, adding two tablespoonfuls of brandy or rum, if the patient is not feverish.

A CUP OF ARROWROOT.—*Ingredients.*—A dessertspoonful of arrowroot, half a pint of milk.

Time required, about a quarter of an hour.

Take a dessertspoonful of arrowroot and put it in a small basin, add a dessertspoonful of

cold milk, and stir smoothly into a paste with a spoon, adding a small teaspoonful of sugar, according to taste. Take a small saucepan and put half a pint of cold milk in it; put the saucepan on the fire, and when it is quite boiling pour it on to the arrowroot paste, stirring all the time.

A more nourishing preparation may be made by adding to the mixture above described the yolks of two eggs, whipping it all well together. But the eggs should not be added until the mixture has cooled a little, or they will curdle.

Toast and Water.—One quart of toast and water may be made by browning a crust of bread before the fire, and placing it in a glass jar, after which 1 quart of cold water is poured over it. The jar should then be covered, and allowed to stand aside for half an hour.

Barley Water.—About half a pint of barley water may be made by taking 2 ounces of pearl barley, and washing it well in several waters, after which a quarter of a lemon should be carefully peeled and placed in the jar with the washed barley and two lumps of sugar. Pour a pint of boiling water into the jar, and set it aside to cool.

Imperial Drink.—Place a dessertspoonful of cream of tartar and two tablespoonfuls of powdered sugar in a jar. Pare the rind of a lemon very thin, and cutting it into little slices, place them in the jar. Next pour 1 quart of boiling water into the jar. Cover the jar and let it stand until it is cold, then strain it.

Linseed-Tea is an excellent drink for many patients, but should not be given to those who are taking iron, lead or copper as medicines. In order to make it, take 1 ounce of sugar and the same quantity of whole linseed, adding four

tablespoonfuls of lemon-juice and half an ounce of licorice-root. This mixture should be placed in a jar, and 2 pints of boiling water poured over it.

The jar should remain for four hours in a hot place, after which the contents may be strained and used.

RICE WATER.—*Ingredients.*—Three ounces of Carolina rice, 1 inch of cinnamon stick, and sugar.

Wash 3 ounces of Carolina rice in two or three waters. Put 1 quart of warm water into a stewpan, and place it on the fire to boil. Put the rice and 1 inch of cinnamon stick into the stewpan with a quart of boiling water, and let it boil for one hour. Then strain the rice water into a basin, adding sugar according to taste, and when cold it will be ready for use.

LEMONADE.—After having placed the kettle on the fire, take two lemons, and after washing them clean, peel them very thinly. Cut off all the pith or white skin, and cutting up the lemons into thin slices, take out all the seeds and put the slices of the lemons into a jar, adding about 1 ounce of loaf-sugar, according to taste. Pour one pint and a half of boiling water on to the lemons in the jar, and cover it over. Put it aside to cool. When quite cold, the lemonade should be strained into another jar ready for use.

Time required, about two hours.

ORANGEADE.—Pour boiling water on a little of the orange, covering it up. Boil some water and sugar to a thin syrup, and skim it. Squeeze the juice out of the oranges, and mix it with the syrup, but not until both are cold. Add as much water as will make a rich sherbet, and strain it through a jelly-bag. It is then ready for use.

EGG-FLIP.—Beat half an ounce of powdered sugar and the yolks of two eggs together, adding eight tablespoonfuls of brandy and eight tablespoonfuls of cinnamon and water previously mixed together.

LIEBIG'S QUICK BEEF-TEA.—*Ingredient.*—Half a pound of gravy-beef.

Time required, about a quarter of an hour.

Cut up half a pound of gravy-beef very fine, removing all the skin and fat, and place it in a saucepan with half a pint of water. Put the saucepan on the fire, and let it boil quickly. After it has boiled for five minutes, then pour it off into a cup, and it is ready for use.

BEEF-TEA.—*Ingredient.*—One pound of gravy-beef.

Time required, about six hours.

One pound of gravy-beef should be placed on a board, and minced up very finely, all the skin and fat being removed. The meat should then be put into a saucepan with one pint and a half of cold water, half a saltspoonful of salt, and a little pepper. When just boiling, remove the saucepan to the side of the fire and let it simmer gently for five or six hours with the lid on. Next pour off the beef-tea, and let it get cold.

It is well to skim all fat from the beef-tea before warming it up for use. But it is better not to *strain* beef-tea, as this removes all the little brown particles which are most nutritious.

FLUID BEEF.—Take 1 lb. of newly-killed beef, chop it fine; add four wineglassfuls of soft or distilled water, four or six drops of pure hydrochloric acid, a saltspoonful of salt, and stir it well together.

After three hours throw the whole on a conical strainer, and let the fluid pass without pressure.

Pour a wineglassful of soft or distilled water

slowly on the flesh residue in the strainer, and let it run through while squeezing the meat. The resulting fluid has a red color and a pleasant taste of soup. A wineglassful may be taken at pleasure. It must not be warmed more than by partly filling a bottle with it and placing the bottle in hot water. A little spice or Worcester sauce, or a wineglassful of claret, may be added to each teacupful of soup to disguise the flavor. The acid may be omitted if not desirable. Fowl may be used instead of beef. (Dr. Broadbent.)*

Infusion of Raw Meat.—This is made from meat chopped up finely or passed through a meat chopper, and left to soak in half its weight of water for two hours; then it is pressed through a cloth so that the juice remains in the water. Infusions of raw meat should not be kept longer than twelve hours, and then only in ice or in a cold cellar, as they are apt to get rancid. If made from raw meat, an infusion has the color of blood and is, therefore, disagreeable to most patients. Veal infusion is not so nourishing as that made from beef or mutton; chicken infusion is least nourishing, but most appetizing. Meat infusions should never be cooked, but may be flavored with a slice of lemon or a little claret when taken cold. They may also be added to ordinary beef-tea, Armour's or Liebig's extract of a moderate degree of heat; a few tablespoonfuls of the infusion are enough at a time.

Chicken Broth.—Skin and chop up half an old fowl or chicken, then place it in a stewpan with a quart of water, adding a sprig of celery or parsley, a bit of mace, with a crust of bread, salt and pepper.

* N.B.—Valentine's "Meat Juice" may be used as a substitute for "Fluid Beef," and, like it, should only be warmed by placing the vessel containing it in hot water for a few minutes.

When sufficiently boiled, take off the broth, strain it, and skim it when cool.

THIN MUTTON BROTH.—Take off the fat and skin from two chops from the neck or loin of mutton. When chopped into thin bits, boil them for half an hour, in three-quarters of a pint of water, with a little thyme and parsley. Let the broth boil quickly, skimming off all the fat.

Two tablespoonfuls of powdered biscuit may be added to each pint, and boiled with the broth for five minutes, stirring briskly if the broth is not sufficiently nutritious.

MUTTON BROTH.—To make 2 quarts of mutton broth, take 4 lbs. of the scrag end of the neck of mutton, and chop it into large pieces on a board, taking away the fat. Place it in a stewpan with two knuckle bones of mutton, and pour 5 pints of cold water over it, adding a saltspoonful of salt. When it is just boiling, put it aside, and let it simmer gently for four hours. Watch it, and skim it frequently. Drain the stock into a basin, let it cool and form into a stiff jelly. Remove all fat from the surface of the stock, so as to take off every particle of grease. After this the stock should be ready for use.

VEAL BROTH.—Mince up 1 lb. of lean veal without bone, and putting it into a quart of cold water with a little salt, simmer beside the fire for three hours.

The broth is rendered more nutritious by the addition of two tablespoonfuls of pearl barley, rice, or tapioca, which should be soaked for twelve hours, then boiled till soft, and added when the broth is heated for use. A small piece of onion may be added when desired.

MEAT PANADA.—Grate an ounce of stale bread-crumbs, and after having soaked them in boiling water, mix them with about three-quar-

ters of a pint of chicken or veal broth or beef-tea; it should then be boiled until it thickens, when it is ready for use.

MEAT JELLY.—Put one small carrot and one small onion to fry in a little butter with a slice of bacon in a saucepan (a small piece of celery may be added). Let it all fry together for about 10 minutes, taking care it does not burn. Take 2 lbs. either of veal or shin of beef, or a chicken; cut it up and put into the same saucepan with the fried vegetables with 2 pints of cold water and a teaspoonful of salt; let it simmer till it is reduced to about three-fourths of a pint. This will take about 6 hours. Then strain off through a fine strainer, and when cold take off the fat. It will then be ready for use.

If preferred, the meat can be put in an earthenware jar in the oven instead of in the saucepan.

RAW MEAT PULP is made by rubbing meat through a grater, when it may be made into sandwiches flavored with cod-roe or a very small quantity of anchovy paste.

Raw meat pulp may also be run through a meat-chopper and made into sandwiches.

PEPTONIZED MILK (Roberts).—Mix three-quarters of a pint of fresh milk with a quarter of a pint of water, and warm in a saucepan to the temperature of about 140° Fahr., then pour into a glass jar or basin; add two teaspoonfuls of Liquor Pancreaticus and half a level teaspoonful of bicarbonate of soda, stir, and place near the fire to keep warm. In a few minutes a considerable change will have taken place in the milk, but in most cases it is best to allow the digestive process to go on for from ten to twenty minutes. A few trials will indicate the amount of peptonization acceptable to the indi-

vidual patient; and as soon as this is reached the milk must be boiled up to prevent further peptonization, if it is not required by the patient at once.* But, if possible, it is better to use the milk without the final boiling, as the half-finished process of digestion will go on for a time in the stomach.

PEPTONIZED BEEF-TEA.—Half a pound of finely minced lean beef is mixed with a pint of water. This is allowed to simmer for an hour and a half. When it has cooled down to a lukewarm temperature (about 140° Fahr.) a tablespoonful of the Liquor Pancreaticus is added, and it is then kept warm for two hours, and occasionally stirred. At the end of this time it is boiled for five minutes, and the liquid portion, measuring about half a pint, is strained off. Beef-tea prepared in this way is rich in peptone, highly nutritious, and of very agreeable flavor.

The Liquor Pancreaticus, or Peptonizing Powders, are prepared by Armour, and may be obtained from any chemist. Full directions are given with these preparations for pancreatizing and peptonizing most forms of foods.

TEA.—Tea may be made with boiling milk instead of water, allowing it to stand from three to four minutes. (Sir Andrew Clark's recipe.)

REVALENTA ARABICA.—Mix a teaspoonful of the Revalenta in a dessertspoonful of cold milk until it is quite smooth. Have a breakfast-cupful of boiling milk; stir in the mixture and add a little salt. Continue stirring from half an hour to an hour until all rawness has gone. Serve like white soup.

CHICKEN CREAM.—Take half the breast of a

* The addition of a little coffee to the milk covers the slightly bitter taste caused by the Liquor Pancreaticus.

chicken, cut it up very fine, then pound it in a mortar. Put a small teacupful of milk into a little saucepan and heat it, then add the pounded chicken by degrees, stirring all the time until it is of the consistency of thick soup. Put in a pinch of salt and pepper and one or two tablespoonfuls of cream to taste. Serve hot. This may be made with veal, mutton, or beef, but the meat must be always run through a meat chopper, or thoroughly pounded first and any fat removed.

Caramel Custard.—Put 2 ounces loaf-sugar and two tablespoonfuls of cold water into a small saucepan and let it stand on the fire till it becomes brown, taking care it does not burn. Take a flat-bottomed mould, or several small pots, heat them, and pour enough caramel into each to cover the bottom of the mould. Beat up three eggs as you would for an omelet and mix them with half a pint of boiling milk, a pinch of salt and 2 ounces sugar, strain it and pour into the mould or moulds. Let it stand until quite cold, then turn out into a dish.

Potato Soup.—Take 1 lb. of potatoes, peel and slice them, and add to them one small onion, two leaves of celery which have sweated for five minutes in 1 ounce of butter. Pour over the vegetables 1 pint of white stock (other stock will do), and stir frequently; let it boil gently till the potatoes are reduced to a pulp. Put half a pint of milk into a stewpan and heat it. Pass the contents of the first stewpan through a fine sieve with a spoon, adding by degrees the half pint of hot milk which will enable it to pass through more easily. Wash out the first stewpan, and pour in the purée. Add salt to taste and a quarter of a pint of cream; stir smoothly with a spoon until it boils, then serve.

SCOTCH COLLOPS.—Put a small piece of butter into a saucepan to melt; have some tender uncooked beef or mutton. Trim and mince very finely, or run through a meat chopper. Put into the saucepan with the butter, add pepper, salt, a small bit of onion, and a clove if liked, or a leek. Keep on the fire for one hour, stirring now and then. When served, the collops should be dry and crumbly. This dish may be prepared beforehand, and warmed when wanted. Take out the onion, etc., before serving.

FISH OMELET.—Any light fish, such as whiting or haddock, may be cooked and shredded into the eggs when they are being stirred.

FILLETED SOLE dressed in water souchet. Serve the soles in the water in which they were boiled, adding sprigs of parsley, and serve with thin brown bread and butter.

TURBOT SOUFFLE is nice and not too rich. Haddock also makes good fish soufflé.

THE FIN OF TURBOT is considered to be the most delicate part of the fish. It is very nutritive, and suitable to invalids, as it is easily digested. It should be plain boiled and served with slices of lemon.

MACARONI.—Put the macaroni or rice into boiling water with some salt. Boil slowly, and see that it is not overdone. Strain off the water, add butter, good fat, gravy, or stock. At the last moment add some grated cheese, if desired.

LIGHT PUDDING.—Put 1 pint of milk in a saucepan and bring it nearly to the boil. Take off the fire, and add 3 tablespoonfuls of small sago (rice, hominy, or semolina), put on the fire and let it boil, stirring all the time. When it has boiled, let it simmer for a quarter of an hour. Break 2 eggs, keep whites and wolks separate, and stir yolks into the sago. Beat

whites to a stiff froth, stirring very lightly into the mixture.

CALVES' FEET STEWED.—They must stew very gently for several hours, as the meat should be very tender. Then take the meat from the bones and put the bones down, boiling until the stock is much reduced in quantity. Strain off, thicken with an egg well beaten up, add chopped parsley, a leaf of lettuce chopped with it, pepper and salt, half a glass of white wine (not sweet), or instead lemon juice. Serve the meat in this sauce, which must not boil or it will curdle, adding the wine or lemon juice the last thing. Sheeps' trotters may be served in this way.

Calves' feet are also nice plain boiled, with celery, parsley and butter.

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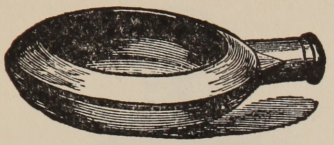


FIG. 1.—Round Bed-Pan.

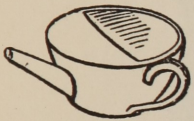


FIG. 3.—Feeding-Cup.

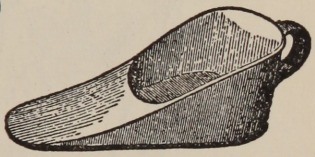


FIG. 2.—Slipper Bed-Pan.

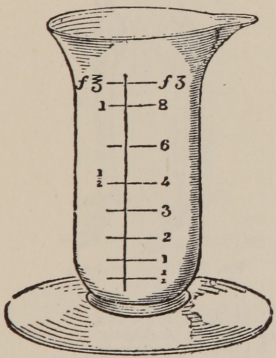


FIG. 4.—Medicine-Glass.

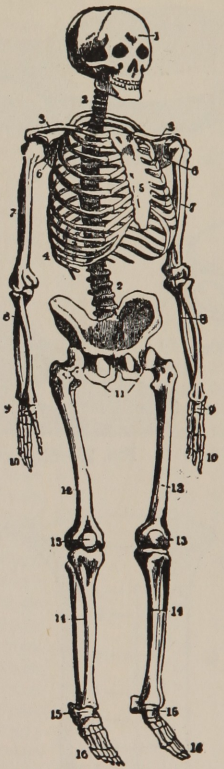


FIG. 5.—Human Skeleton front view.

1. Skull.
2. Spine.
3. Clavicle.
4. Ribs.
5. Sternum.
6. Scapula.
7. Humerus.
8. Radius and Ulna.

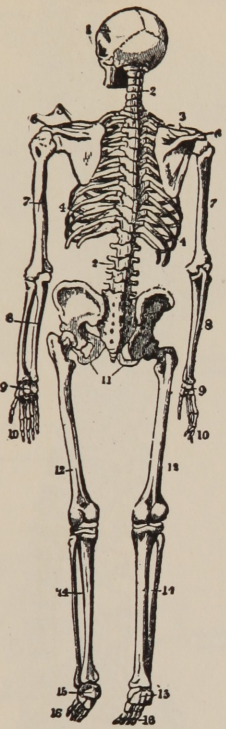


FIG. 6.—Human Skeleton; back view.

9. Carpal bones.
10. Metacarpal bones.
11. Pelvis.
12. Femur.
13. Patella.
14. Tibia and Fibula.
15. Tarsal bones.
16. Metatarsal bones.

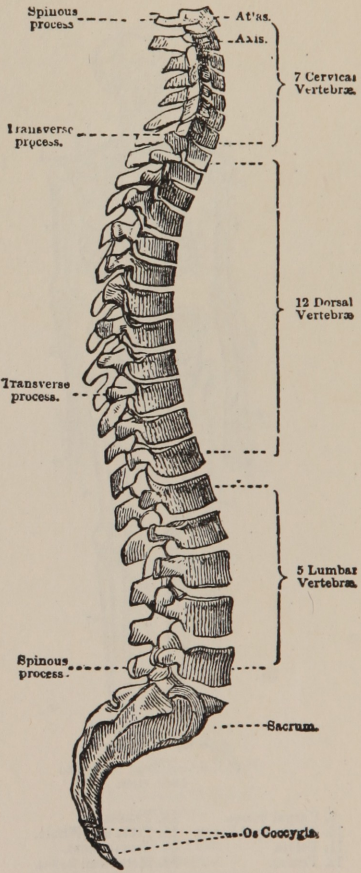


FIG. 8.—Spinal Column.

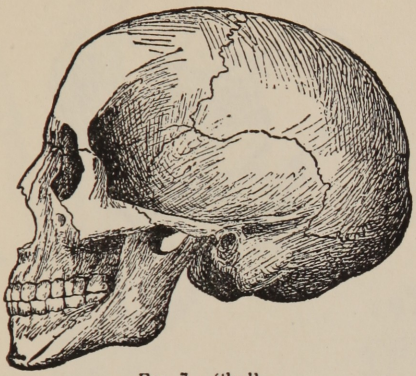


FIG. 7.—Skull.

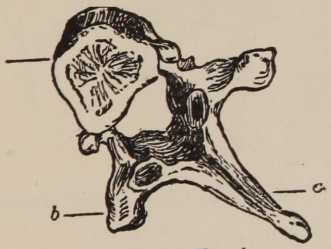


FIG. 9.—Dorsal Vertebra.

a, body; *b*, transverse process; *c*, spinous process.

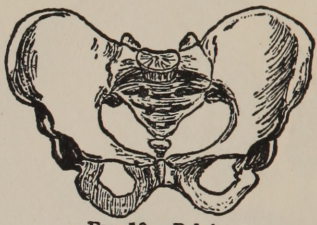


FIG. 10.—Pelvis.

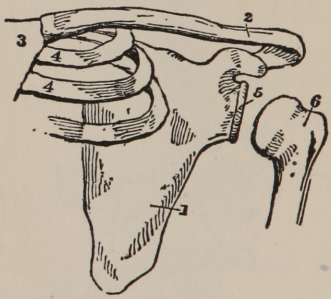


FIG. 11.—Scapula, Clavicle and Humerus.

1. Scapula.
2. Clavicle.
3. Sternum.
4. Ribs.
5. Glenoid cavity.
6. Humerus.

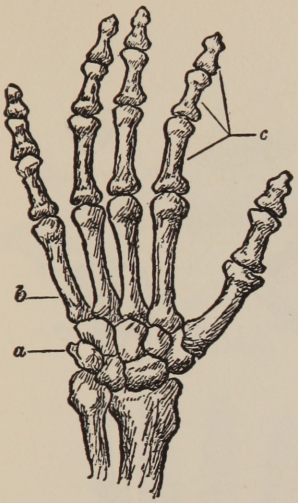


FIG. 13.—Bones of Hand and Wrist.
a, carpus; *b*, metacarpal bones; *c*, phalanges.

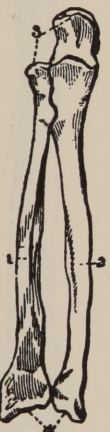


FIG. 12.—Radius and Ulna.
1. Radius.
2. Ulna.
3. Olecranon, &c.
4. Wrist-joint.

FIG. 14.—Femur.

FIG. 15.—Patella.

FIG. 16.—Tibia and Fibula.

1, tibia; 2, fibula; 3, broad portion of tibia, forming part of knee-joint.

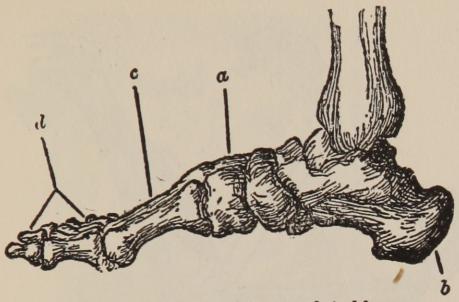


FIG. 17.—Bones of Foot and Ankle.
a, tarsus; *b*, os calcis; *c*, metatarsal bones; *d*, phalanges.

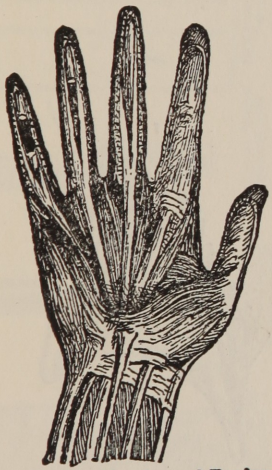


FIG. 18.—Muscles and Tendons of Hand.

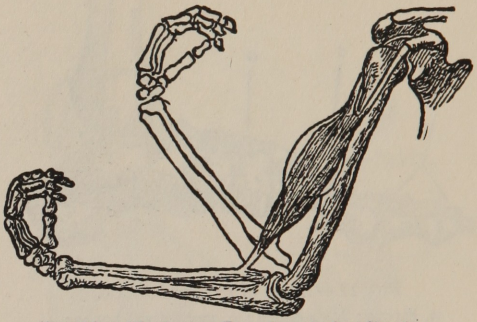


FIG. 19.—Flexion of Fore-Arm (*after Huxley*).

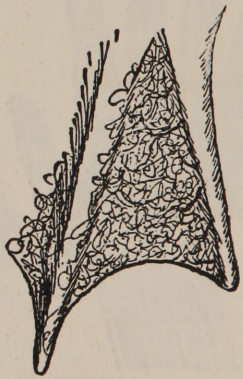


FIG. 20.—Web of Frog's Foot.

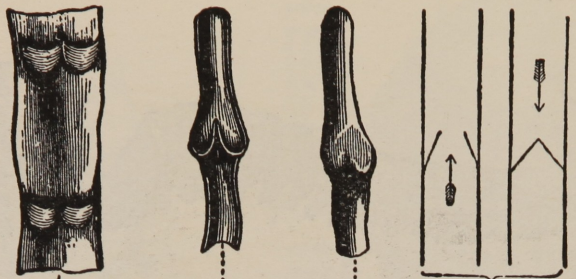


Fig. 22.

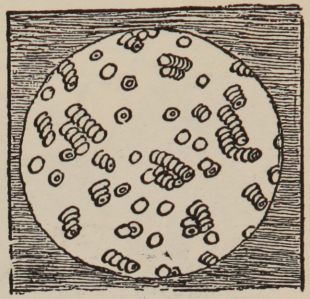


Fig. 23.—Blood-Corpuscles seen under Microscope.

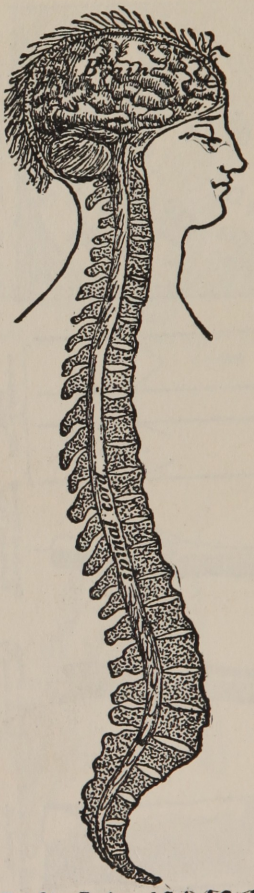


FIG. 24.—Brain and Spinal Cord shown in Position.

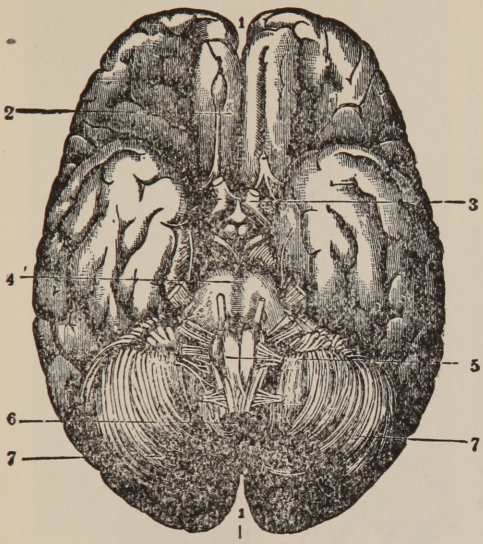


FIG. 25.—Brain seen from below.

1. Fissure.
2. Nerve of smell.
3. Nerve of sight.
4. Pons.
5. Medulla.
6. Spinal cord.
7. Cerebellum.

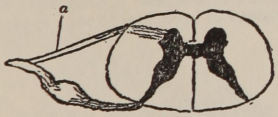


FIG. 26,—Section of Spinal Cord with Nerves.

a, anterior nerve root.

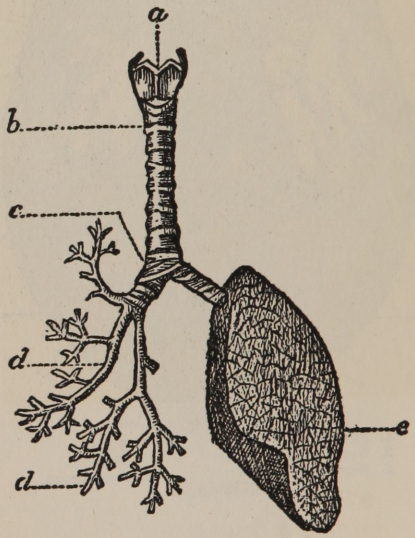


FIG. 27.—Air-Passages and Lungs.
a, larynx; *b*, trachea; *c*, bronchus; *d*, subdivisions of bronchial tubes; *e*, pleura.

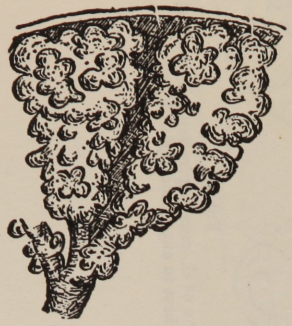


FIG. 28.
a, small bronchial tubes joining air-sacs (highly magnified).

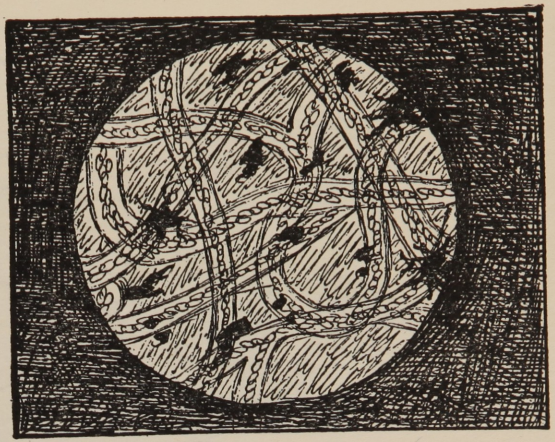


FIG. 21.—Capillary Circulation in Web of Frog's Foot, seen under Microscope.

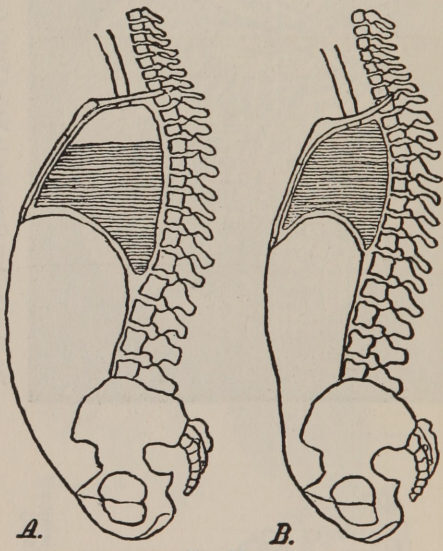


FIG. 29.

A, expansion of chest in inspiration ; B, contraction of chest in expiration (*after Huxley*).

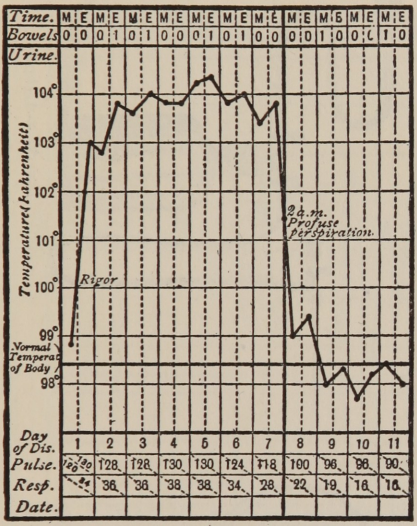


FIG. 30.—Temperature Chart. Acute Pneumonia Crisis on 7th day

Fig. 31.—Aspirator.

Fig. 63.—Trough for Ear-Syringing.

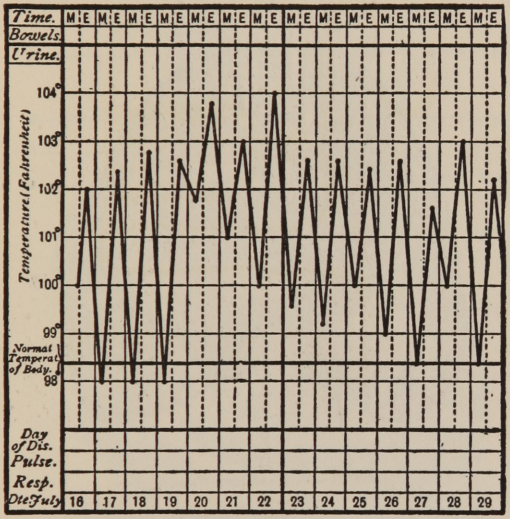


FIG. 32.—Hectic Fever. Pulmonary Consumption.

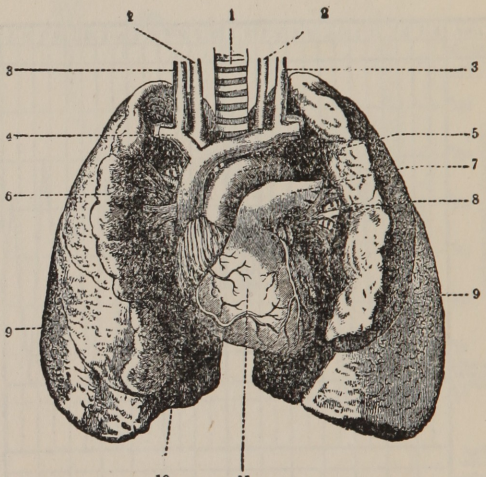


FIG. 33.—Heart and Blood-Vessels.

1. Trachea.
2. Carotid artery.
3. Jugular vein.
4. Subclavian vein.
5. Aorta.
6. Superior vena cava.
7. Pulmonary artery.
8. Pulmonary vein.
9. Lung.
10. Auricle.
11. Ventricle.

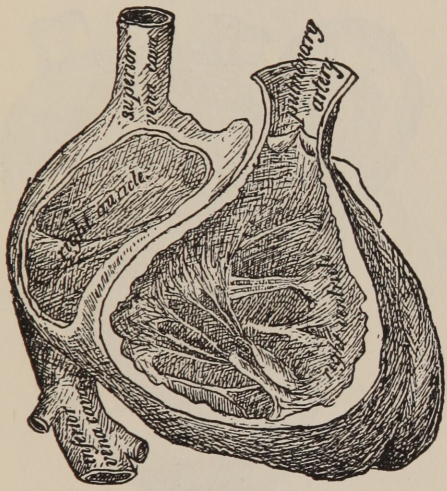


FIG. 34.—Interior of Right Side of Heart.

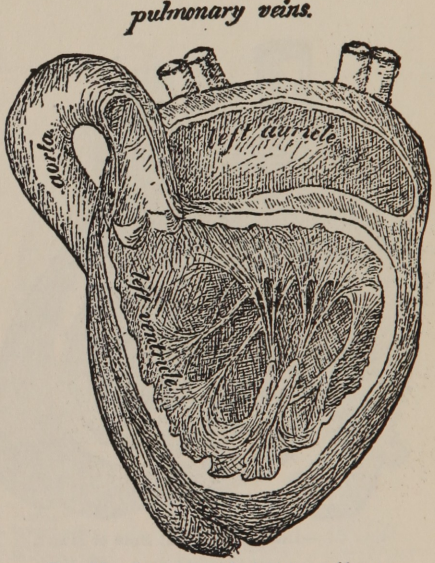


FIG. 35.—Interior of Left Side of Heart.

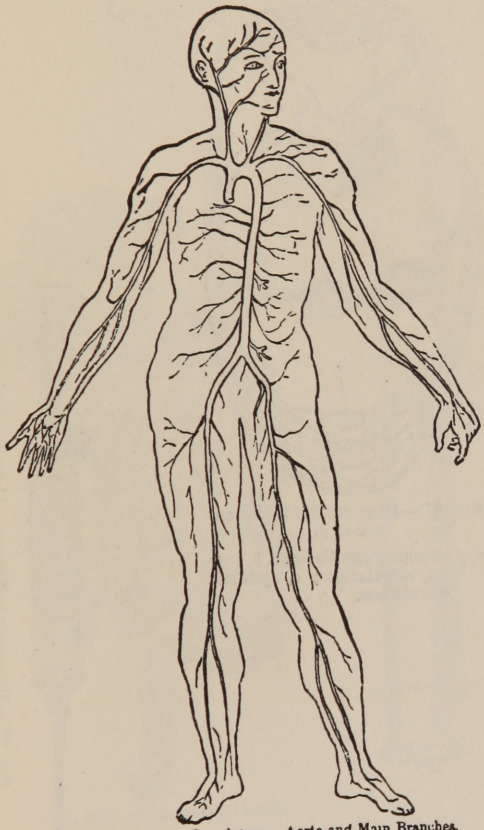


FIG 36 —Systemic Circulation. Aorta and Main Branches.

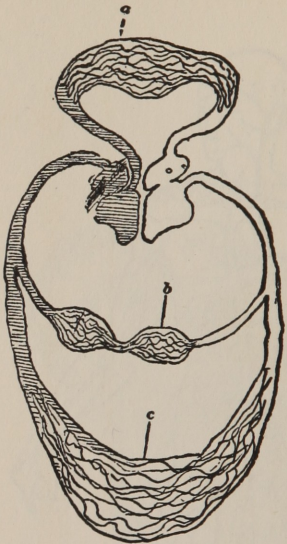


FIG. 37.—Diagramatic Representation of

a, pulmonary circulation; *b*, portal circulation; *c*, systemic circulation.

FIG. 77.—Hypodermic Syringe. (Arnold & Sons.)

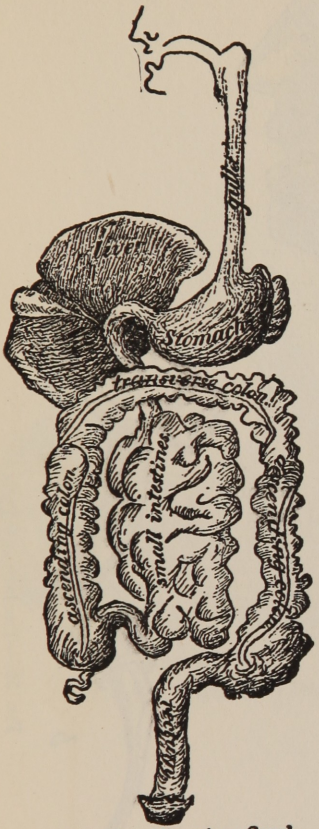


FIG. 38.—Alimentary Canal.

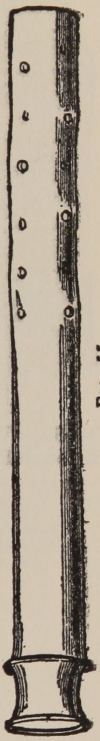


FIG. 55.

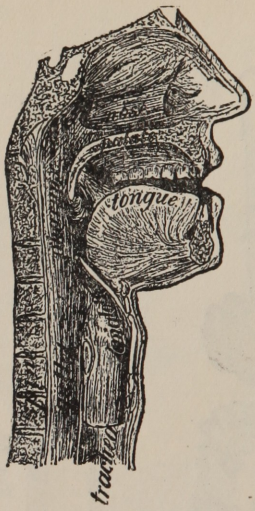


FIG. 39.—Vertical Section through Face and Neck.

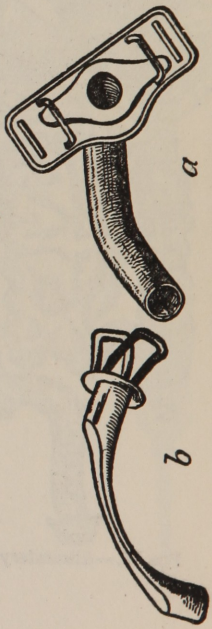


FIG. 53.—Tracheotomy Tube.

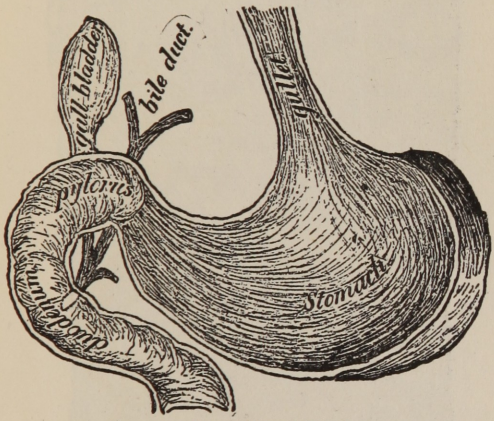


FIG. 40.—Stomach and Duodenum.

FIG. 41.—Section of Skin (magnified), showing Hair with Sebaceous Glands, and Sweat Glands.

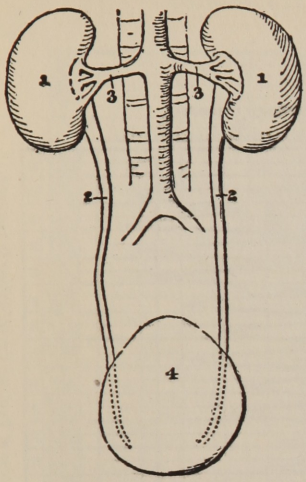


Fig. 42

1. Kidney.
2. Ureter.
3. Renal Vessels.
4. Bladder.

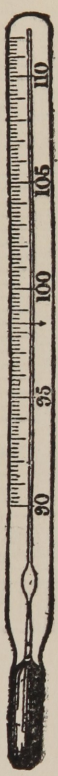


Fig. 76.—Clinical Thermometer.

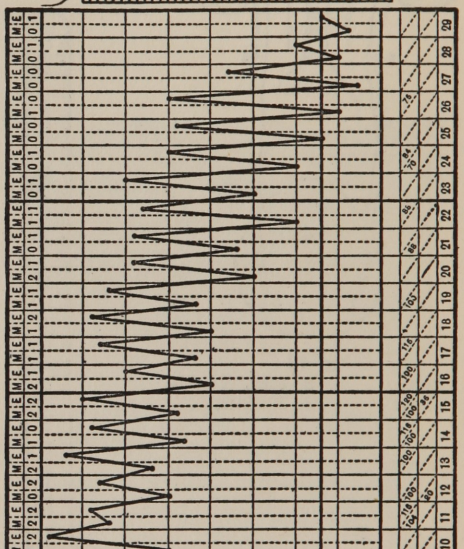


FIG. 43.—Temperature Chart from case of Typhoid Fever, ending in recovery.

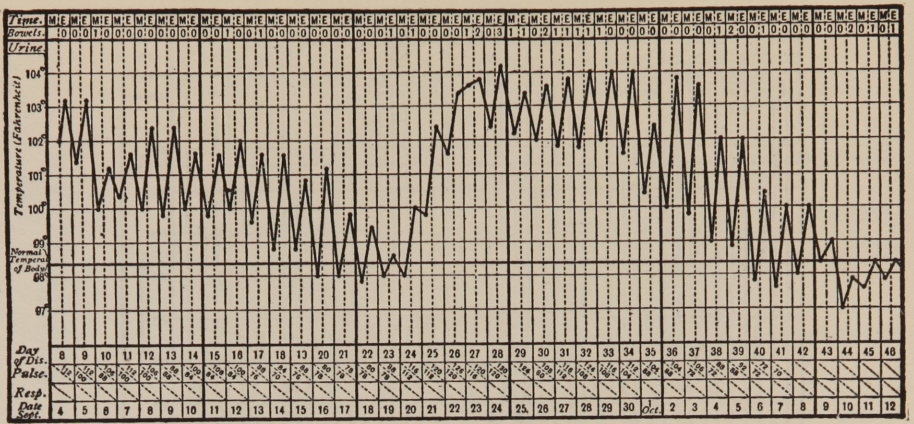


FIG. 44.—Temperature Chart showing relapse in Typhoid Fever.

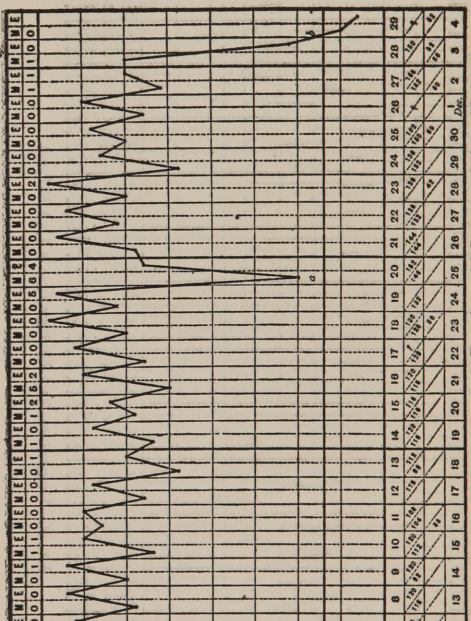


FIG. 45.—Chart showing sudden fall of temperature after (a) Hæmorrhage and (b) Perforation in fatal case of Typhoid Fever.

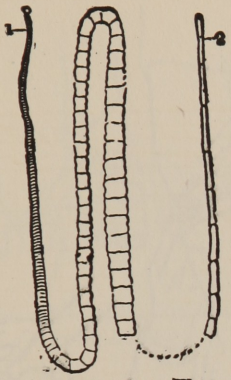


FIG. 46.—Tape Worm.
1. Head. 2. Tail.

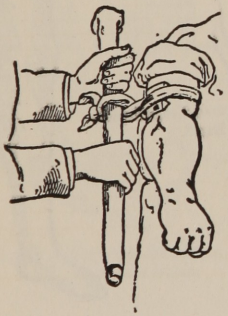


FIG. 47.—Extempore Tourniquet. Handkerchief and Stick.

FIG. 48.—Extempore Tourniquet. Elastic Band.

FIG. 49.—Mode of applying pressure to the Femoral Artery.

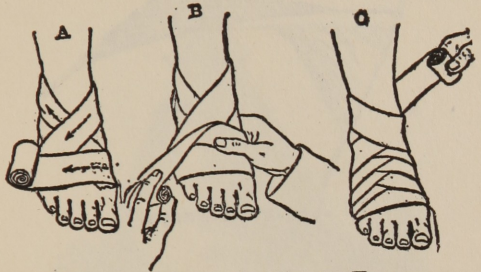


FIG. 68.—Bandaging the Foot.
A, Fixing; B, Reversing; C, Figure of 8.

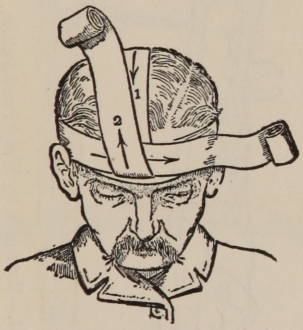


FIG. 73.—Capeline Bandage, viewed from the front.

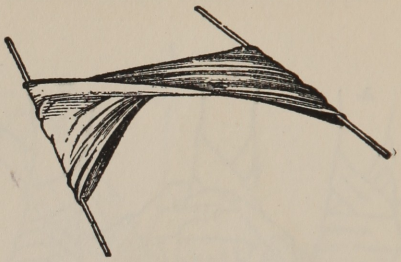


Fig. 62.—A Wringer.

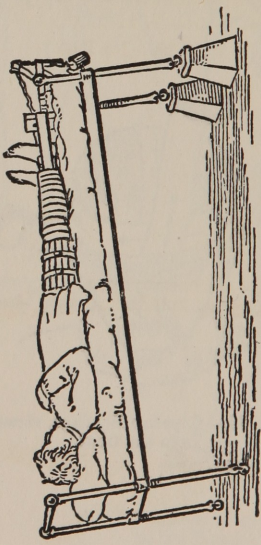


Fig. 51.—Extension by Weight and Pulley.

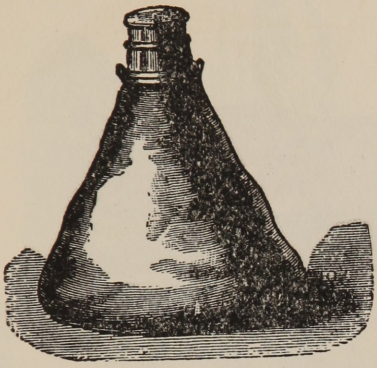


FIG. 59.—Ice Bag.

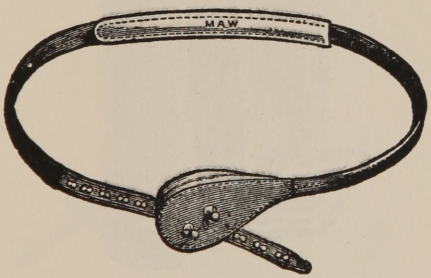


FIG. 54. Truss for Inguinal Hernia.

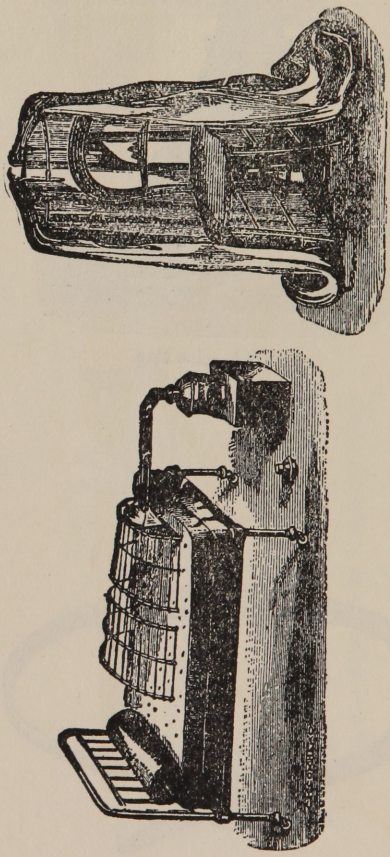


FIG. 56.—Vapour or Hot-Air Bath

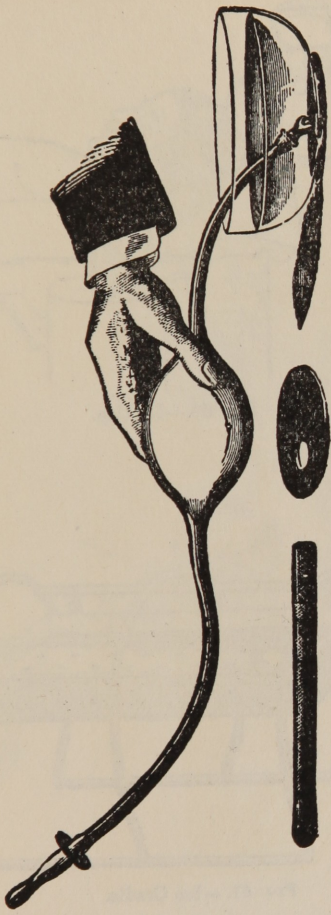


Fig. 57 — Enema Syringe.

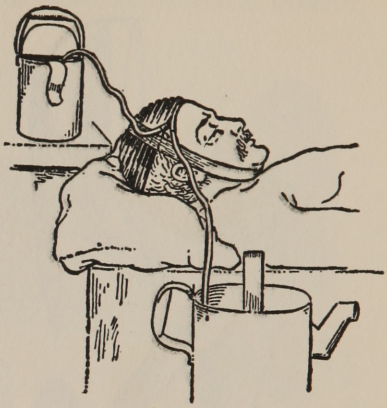


FIG. 60.—Ice Cap.

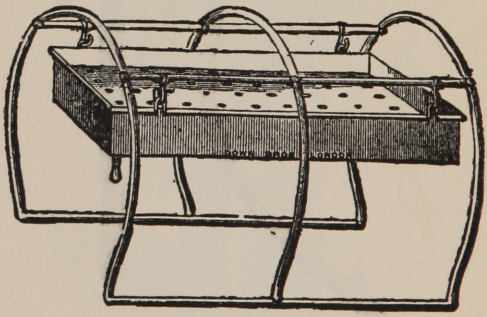


FIG 61.—Ice Cradle.

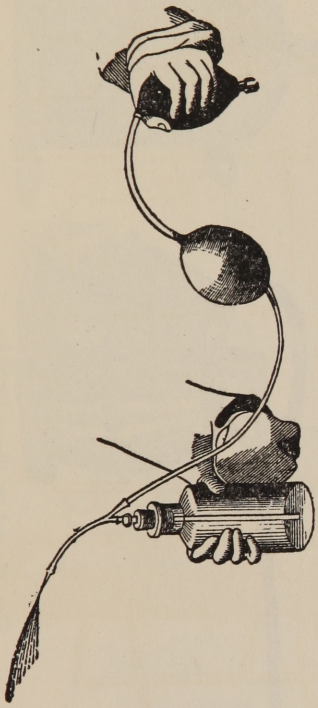
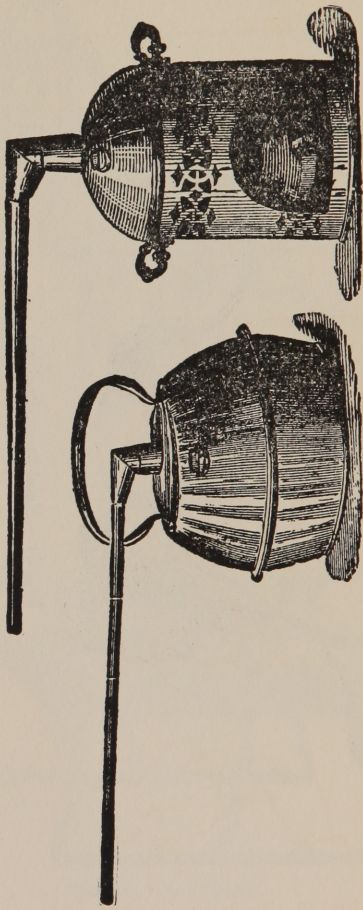


FIG. 64.—Hand Spray-Producer.



Figs. 65. and 66. Bronchitis Kettles.

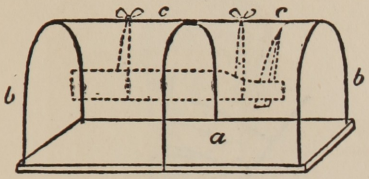


FIG. 52.—Fracture Cradle.
a, board; *b*, *c*, iron rods.

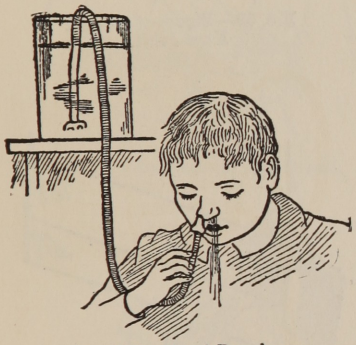


FIG. 58.—Nasal Douche.

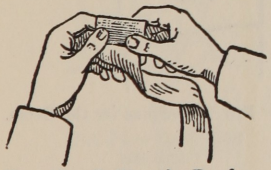


FIG. 67.—Rolling the Bandage.

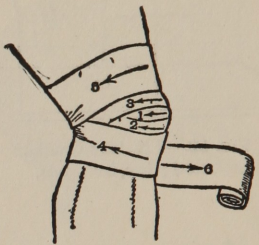


FIG. 69.—Figure-of-8 round Knee-Joint.

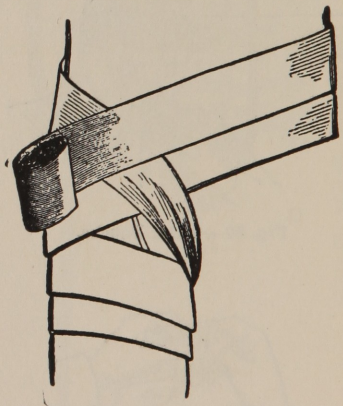


FIG. 70.—Spica for the Groin.

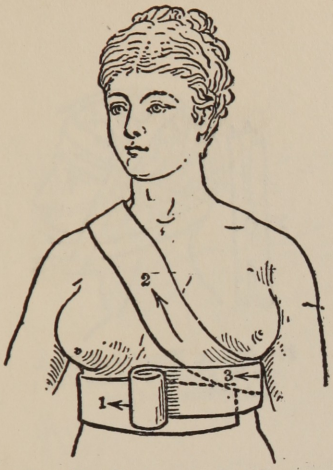


FIG. 71.—Bandage for Left Breast.

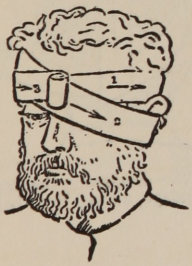


FIG. 74.—Bandaging the Eye.

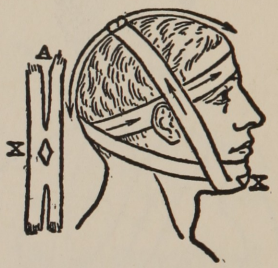


FIG. 50.—A, Four-tailed Bandage for Fracture of the Jaw; X, Aperture for Chin.

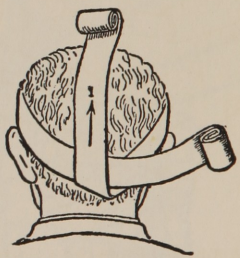


FIG. 72.—Beginning the Capeline Bandage, viewed from behind.

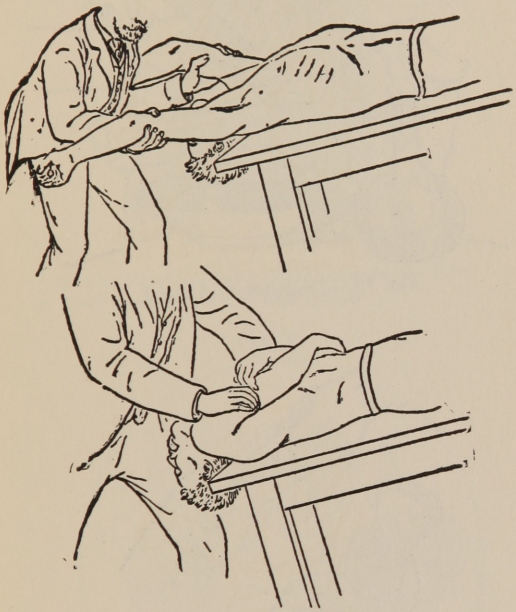


FIG. 75.—Artificial Respiration: Sylvester's Method.

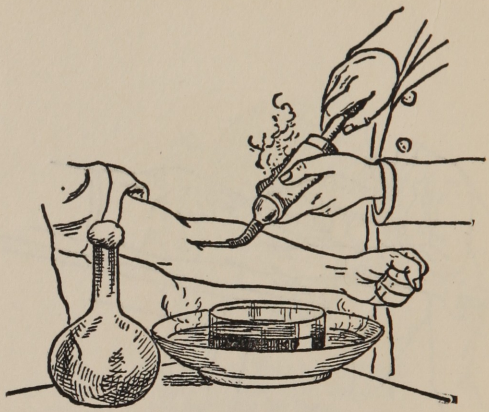


FIG. 78 —Transfusion of Blood.

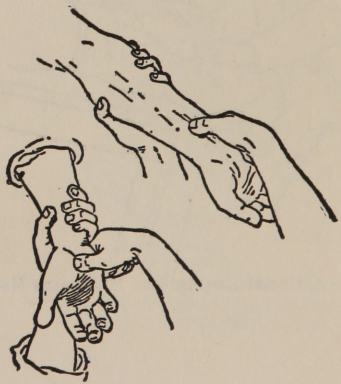
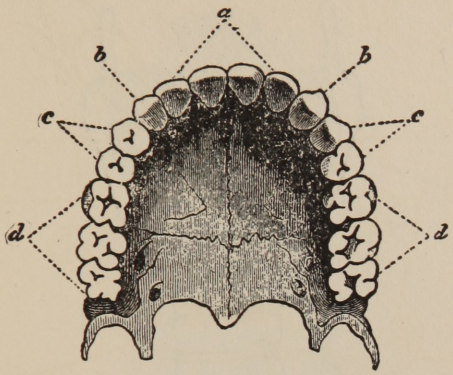


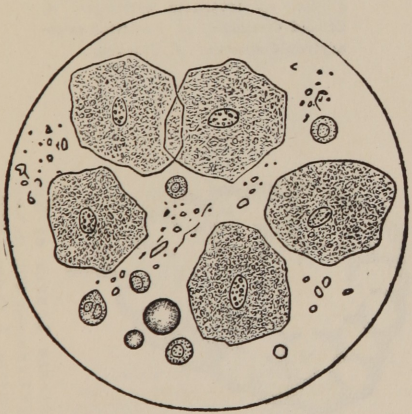
FIG. 79.—Pinching Hand and Fore-Arm.

Fig. 80



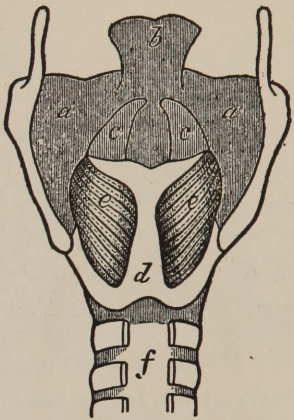
HUMAN TEETH—UPPER JAW.—*a*. Incisors. *b*. Car (*c*. Anterior molars. *d*. Posterior molars.

Fig. 81



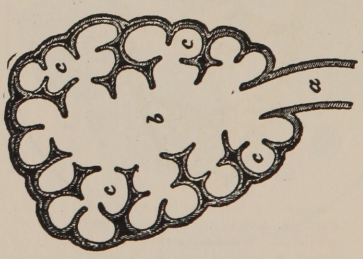
BUCCAL AND GLANDULAR EPITHELIUM, with Granular Matter and Oil-globules; deposited as sediment from human saliva.

Fig. 82



HUMAN LARYNX, POSTERIOR VIEW.—*a*. Thyroid cartilage. *b*. Epiglottis. *cc*. Arytenoid cartilages. *d*. Cricoid cartilage. *ee*. Posterior crico-arytenoid muscles. *f*. Trachea.

Fig. 83



SINGLE LOBULE OF HUMAN LUNG.—*a*. Ultimate bronchial tube. *b*. Cavity of lobule. *c, c, c*. Pulmonary cells, or vesicles.

Fig. 84

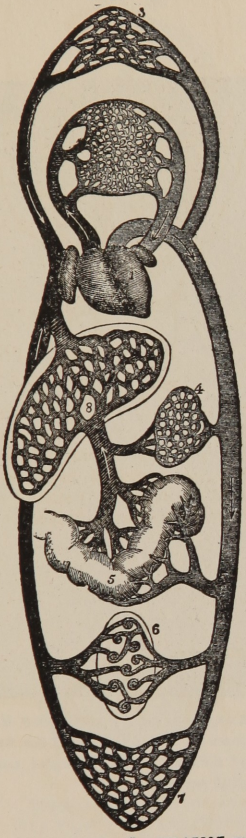
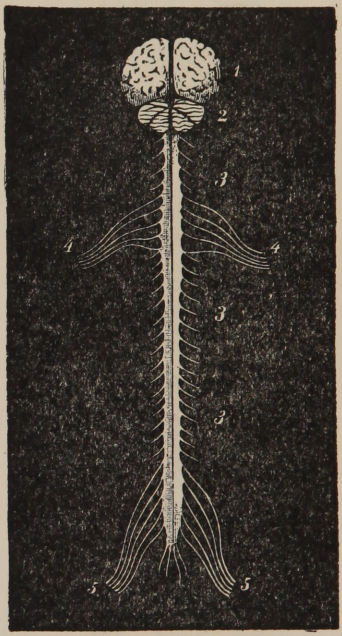


Diagram of the CIRCULATION.—1. Heart. 2. Lungs. 3. Head and upper extremities. 4. Spleen. 5. Intestine. 6. Kidney. 7. Lower extremities. 8. Liver.

Fig. 85



CEREBRO-SPINAL SYSTEM OF MAN.—1. Cerebrum. 2. Cerebellum 3,3,3. Spinal cord and nerves. 4, 4. Brachial nerves 5, 5. Sacral nerves.

Fig. 86

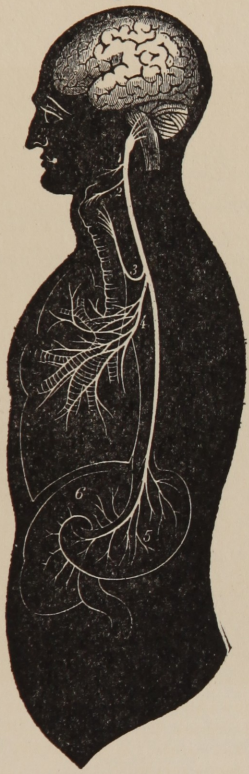


Diagram of PNEUMOGASTRIC NERVE, with its principal branches.—1. Pharyngeal branch. 2. Superior laryngeal. 3. Inferior laryngeal. 4. Pulmonary branches. 5. Stomach. 6. Liver.

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