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LIPPINCOTT'S NURSING MANUALS

FEVER-NURSING

DESIGNED

FOR THE USE OF PROFESSIONAL AND OTHER NURSES AND ESPECIALLY AS A TEXT-BOOK FOR NURSES IN TRAINING

BY

J. C. WILSON, A.M., M.D.

AUTHOR OF "A TREATISE ON CONTINUED FEVERS" AND "A HANDBOOK ON MEDICAL DIAGNOSIS".

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EMERITUS PHYSICIAN TO THE PENNSYLVANIA HOSPITAL, PHYSICIAN-IN-CHIEF TO THE LANKENAU HOSPITAL, PHILADELPHIA; EMERITUS PROFESSOR OF THE PRACTICE OF MEDICINE AND OF CLINICAL MEDICINE IN THE JEFFERSON MEDICAL COLLEGE; CONSULTING PHYSICIAN TO THE RUSH HOSPITAL FOR CONSUMPTIVES, THE JEWISH HOSPITAL, THE BRYN MAWR HOSPITAL, THE PHILADELPHIA LYING-IN CHARITY, FORMERLY PRESIDENT OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA; MEMBER AND FORMER PRESIDENT OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC., ETC., FORMERLY VISITING PHYSICIAN TO THE PHILADELPHIA HOSPITAL AND ST. AGNES' HOSPITAL, ETC., ETC.

NINTH EDITION, REVISED AND ENLARGED

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PREFACE TO THE NINTH EDITION.

Several printings of the "Fever-Nursing" have been made in response to a very steady demand since the last revision. The present editing, however, has become necessary in order to bring the book fully up to date. Among the items of new matter are included the following subjects: Multiple and Intercurrent Relapse and the Cause of Relapse in Acute Febrile Diseases; Blood-Pressure Estimation; the Paratyphoid Infections and the Use of Mixed Triple Vaccines in Prophylactic Inoculations; Sporadic Typhus Fevers—so-called Brill's Disease; the Schick Test and Toxin-Antitoxin Inoculations in Diphtheria Immunity. Two movements of our time have enlarged the requirements of the training of the nurse and greatly widened her field of usefulness—war and social service. The first, waged upon a scale and with a ferocity that seems to shake the foundations of civilization, may prove, as many hope, to be the terminal crisis of a long historical era of military misrule and mark the birth of the history of international justice and peace on earth. The second marks the establishment of good will to men upon practical and efficient grounds. In both of these movements Medicine and its hand-maid, the Profession of Nursing, find a widened opportunity for help and usefulness. That the pages of this little book may be of service to those in search of the technical knowledge that is necessary to high efficiency in the care of the sick and the prevention of disease is the earnest wish of the writer.

1509 Walnut Street, Philadelphia. March, 1919.

PREFACE TO THE FIRST EDITION.

THE following pages embody the substance of a Course of Lectures on Fever-Nursing, originally delivered before the Nurse Class at the Philadelphia Hospital. I have sought to treat the subject in plain words and from the stand-point of the physician; to teach not only *how* fever patients are to be cared for, but also *why* they must be cared for in particular ways.

The directions and descriptions are intended to meet the needs both of the professional nurse and of others who may be called upon to minister to fever cases, and to enable each of these classes of attendants to understand the principles of treatment upon which the directions of the physician are based.

My thanks are due to Miss Dalziel and Miss Moulder for copying the charts.

If this little book prove useful to a wider circle of workers than that of the Hospital Amphitheatre, its purpose will have been fully achieved.

1437 WALNUT STREET, PHILADELPHIA.

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FEVER-NURSING.

I.

ON FEVER-NURSING IN GENERAL.

Fever—Pyrexia, Apyrexia, Hyperpyrexia—Essential Fevers and Symptomatic Fever—Qualifications of the Nurse—Ventilation—Removal of Furniture—Avoidance of Unnecessary Contact—Disinfection—Transmission of Disease—Isolation—Order and Method in the Sick-room—Medical Thermometry—Thermometers and Their Use—Temperature of the Body in Health, in Disease—Unstable Temperature of Convalescence—Temperature Charts—Temperature Curves—Types of Fever—Continued, Remittent, Intermittent Fevers—Inverse Type—Defervescence—Lysis—Crisis—Recrudescence—Relapse.

FEVER is the term used in ordinary parlance to designate any considerable rise in the temperature of the body, which lasts for a time. This morbid condition is found upon investigation to be invariably associated with wasting or increased tissue-change and more or less disturbance of the functions of the body. Pyrexia is the term used to designate abnormal elevation of the temperature of the body. Pyrexia and fever are not the same. The former is merely a single factor in the association of symptoms, or *symptom-complex*, which constitutes the latter. Apyrexia is the absence of abnormal elevation of temperature. Hyperpyrexia is excessive elevation of temperature. Fever is a prominent symptom in the greater number of acute

and in many chronic constitutional diseases. It also occurs in certain local diseases and in the absence of proper treatment after wounds and injuries. Fever is the controlling symptom in a large group of acute illnesses, and then becomes so important as to constitute the essential characteristic of the sickness. Such sicknesses are classed together as The Fevers or the Essential Fevers, and the fever which occurs as a mere symptom in the course of other diseases is known as Symptomatic Fever. Thus typhoid and scarlet fever are essential fevers, while hectic and the irritative fever which accompanies a neglected wound are symptomatic. When we come to consider the causes of fever we will find that the distinction between essential and symptomatic fevers is rather apparent than real.

While the consideration of fever necessarily forms a large part of the training of every nurse and at almost every stage of her preparation, the importance of the subject renders special instruction necessary. To this purpose the following pages are devoted.

I do not consider it necessary to occupy much space with the qualifications of the nurse. It is assumed that she should be in good health, of at least moderate physical strength, scrupulously neat in person and attire; that she be quiet, watchful, orderly, of moderate speech both in kind and quantity, gentle always, firm when needs be; that she be well trained in her work and love it for its own sake as well as a means of support; and that she have enough of the spirit of science in her to be absolutely truthful and direct in reporting the facts of the case and in carrying out the directions of the physicians. The more tact and common sense she has the better.

These are the requirements of the nurse in all sickness. In nursing fevers they are needed in large measure. Health and strength are especially needful, and as febrile illnesses are often protracted and involve serious strains upon the endurance of the nurse, her duty to her self demands the careful observance of hygienic measures necessary to the preservation of her own health.

Many of the fevers are contagious. It is therefore expedient that such cases should be attended only by nurses who have themselves previously experienced an attack of the disease from which the patient is suffering. It is true that there are exceptions to the rule that the contagious fevers are self-protective; that is, that persons who have passed through an attack are immune, in other words, not likely to contract the disease again. But the exceptions are sufficiently rare to warrant the hope that an attack in the past will confer immunity in the future. It is a great hardship for the nurse to contract a fever from her patient, and often a very serious matter for the patient himself and his friends. Nevertheless, cases occasionally occur in which it appears absolutely necessary for an unprotected nurse to undertake the care of a person suffering from a contagious disease. The danger of contracting the disease will then be diminished by unremitting attention to rules, which are derived from the fact that the cause of the fevers is in every case an actual substance, capable of transmission in various ways from person to person, and of producing the disease only when it has reached the interior of the body; that, though too minute to be detected except by staining and the aid of powerful microscopes, it has been proved to be in many of the fevers

a plant-germ or bacterium (plural bacteria), endowed with the capacity of rapid growth and enormous multiplication, and that the vitality of these minute vegetable organisms is destroyed by the action of certain chemical agents known as germicides or disinfectants.

Among the more important of these rules to be observed in all cases of fever are the following:

Ventilate the sick-room thoroughly and continuously.

Direct draughts and extreme reductions of temperature of the room are to be avoided, but fever patients are little liable to "take cold." The local congestions and inflammations to which they are prone are due to other causes, and constitute in most instances incidents of the sickness which arise independently of any such exposure as is involved in efficient ventilation.

The free access of pure air is not only desirable in itself, but it also means the expulsion of the foul air of the room, together with innumerable particles of dust to which adhere disease-germs thrown off from the body of the patient.

Remove from the sick-room all unnecessary furniture.

This rule includes all hangings, pictures, and ornaments. Even the carpet must be taken up when we are dealing with such diseases as small pox or scarlet-fever. In that case a strip of old carpet or a mat beside the bed will add much to the comfort of the nurse, and may be destroyed when the sickness is over. If the carpet be not removed it must be covered with linen, which is to be frequently sprinkled with some efficient disinfectant. For this use old sheets may be tacked down. The bareness of a well-managed hospital ward is a safeguard against the spread of disease.

Avoid in so far as possible close or prolonged contact with the patient and his bed.

Contagion means contact. But this is not the whole truth of the matter. The infecting principle of different contagious diseases shows great variation in its mode of transmission. Thus the poison of scarlet fever is tenacious, and clings closely and for a long time to the patient and his belongings. It is but little blown about in the air, but may be conveyed to great distances in articles of clothing, toys, and the like. Of course, very small or light articles saturated with it, as the scales or particles of skin shed towards the close of the attack, may be carried in the air and transmit the disease. On the other hand, the infecting principle of measles and that of whooping-cough are light and easily wafted about in the air. The nearer the patient the greater the concentration of the poison and the danger of infection. Minute material particles are more liable to attach themselves to rough and woolly than to smooth, hard-surfaced fabrics. The nurse's gown must be of plain, smooth stuff, capable of being washed and very simply made. Her apron, sleeves, and cap must be white. The cap, when properly made and of sufficient size, serves a useful purpose in protecting the hair.

There is much confusion regarding the terms "contagion" and "infection." Contagion means primarily conveyance of disease by actual contact; but contagion is often, as we have seen, indirect and by means of various intervening articles, or even by the persons of those who, themselves immune, may transfer the microscopical organisms which constitute the exciting cause of disease from the sick to the well even at a

distance. For these reasons it is suggested that "transmissible" be used instead of "contagious."

Infection is essentially different from contagion. Bacteriology has enabled us to frame a new definition for the infectious diseases. An infectious disease arises when a pathogenic or disease-producing germ, having gained access to the interior of the body, grows and multiplies, evolving poisonous chemical substances or toxines which are soluble in the fluids of the body and produce characteristic effects.

Constitutional infections by pus-producing organisms are described under the term *Sepsis*. *Pyæmia* is the term used to designate the form of sepsis in which pus-collections occur in various parts of the body; *Septicæmia Bacteræmia*, that form in which circumscribed purulent collections are absent but there is invasion of the tissues and blood by bacteria, with the manifestations of profound disorder of the whole body, and *Septicopyæmia*, that form in which bacteræmia and pyæmia are present at the same time. *Sapræmia* is the condition caused by the absorption into the blood of the products of putrefaction. All these conditions are associated with fever of irregular type and duration. By far the greater number of micro-organisms or germs which cause disease are specific, that is, the particular germ always causes the same disease. But many are merely pyogenic or pus-producing and introduction into the body gives rise to morbid conditions which are not specific in the sense of being definite diseases, but which may be either local, as an abscess or ulcer, or constitutional, and vary according to the intensity of the process from a trifling and transient ailment to an overwhelming and fatal malady.

Use disinfectants thoroughly and systematically.

There is wide-spread misapprehension in regard to the subject of disinfection. Chlorinated lime and carbolic acid as ordinarily used are useless for this purpose. Certainly the odors of these substances, however strong, are wholly without effect in purifying the atmosphere of the sick-room. No volatile substance diffused in the air to any extent that does not interfere with its being breathed by human beings is an efficient disinfectant. The disinfectants are chemical substances which have the power of destroying the activity of infectious material, and the object of disinfection is to prevent the extension of infectious diseases by destroying the specific disease-producing organisms which give rise to them. In popular language, the term disinfection is used in a much wider sense. Chemical agents which destroy or mask bad odors — *deodorizers*, — or which arrest putrefactive decomposition — *antiseptics*, — are spoken of as disinfectants. And such substances have been confidently recommended and extensively used for the destruction of the germs of disease in cholera, typhoid fever, etc. The dangers that attend such misapprehension and misuse of the word disinfection become apparent when we consider the fact that it has within recent years been positively shown that many of the efficient deodorizers and antiseptics are wholly without value for the destruction of disease-germs.

Bad odors in the sick-room and about the dwelling serve a useful purpose in calling attention to the fact that there is something wrong, even if it be simple uncleanliness. Though often associated with substances which constitute the infecting principle of dis-

ease they do not necessarily belong to it, and to get rid of them is by no means to disinfect. In fact, so far as is known, the actual causes of the infectious diseases—pathogenic germs—are unattended by recognizable odors. The heavy, ill-smelling atmosphere which surrounds fever patients is due rather to deranged secretions than to anything in the infecting principle itself.

Those agents which are disinfectants by virtue of their property of acting upon germs so as to destroy their vitality, and thus prevent their growth and reproduction, are called germicides; that is, germ-destroyers. While science has not yet shown that every kind of infectious material owes its specific disease-producing power to the presence of minute organisms or germs, it has been proved that the best disinfectants are potent germicides.

The room, articles of clothing, the person of the patient and of the attendant, discharges from the bowels, and other discharges, the bed-pans, urinals, and other utensils used, particularly in the wards of hospitals, and finally water-closets, privy-vaults, etc., require disinfection. The extent to which disinfection is to be used in any particular case, the agents employed, and the method of their application will be determined by the physician, and will vary according to the nature of the fever.

All body linen and bed-clothing, towels, napkins, dressings, and bandages must be disinfected in the room or ward. Not only discharges from the patient must be disinfected, but also utensils into which they are received must be thoroughly disinfected before they are again used. This is especially important in hospital wards, and when several patients are treated in the same room or house, since it has been shown that

secondary infections may be conveyed by such articles. This rule applies also to dishes, feeding-cups and spoons, and other similar objects.

Insects are very important conveyors of the germs of disease. The sick-room or ward in the case of transmissible diseases must be effectually screened, and flies, mosquitoes, and other insects destroyed.

Recent investigations have demonstrated the fact that many diseases are transmitted by insects. These creatures act in two ways; first as mere carriers of disease-producing germs, as the house-fly in the cases of enteric fever; and second as intermediate hosts in which pathogenic micro-organisms undergo a phase of their life history, as in the case of the genus of mosquito which is responsible for the causation and spread of malaria. As will be seen in the sections upon causation in the descriptions of particular diseases in subsequent pages of this work, species of mosquitoes disseminate among human beings malaria in its various types and yellow fever; the bed-bug plays an active part in spreading relapsing fever, and the species of flea which infests rats and other rodents is the active agent in the transmission of the bubonic plague. Furthermore, the tropical disease known as filariasis is conveyed by a mosquito, Rocky Mountain fever by a tick, several diseases by bed-bugs, the African sleeping sickness by the tsetse fly and a number of severe diseases of domestic animals by insects. But in our climate and in the prolonged season of its activity there is no insect which plays a more active part in the dissemination of diseases than the ordinary house-fly. So common is this insect that Professor Howard, Chief

of the U. S. Bureau of Entomology, has shown that nearly 99 per cent. of all the insects captured in houses throughout the whole country were *Musca domestica*, or the ordinary house-fly, and so important is this fact in the spread of diseases, the causative germs of which are voided with the stools, as was shown in the terrible epidemics of enteric fever among our recruits in the practice camps at the time of the Spanish-American war, that the same authority has suggested that instead of the "house-fly," it should be called the "typhoid-fly." This insect also spreads intestinal diseases, children's complaints, and pulmonary tuberculosis. It has been demonstrated that there is a close correspondence between the period of greatest abundance of flies and the highest mortality from intestinal diseases, namely, the weeks ending July 27 and August 3 (New York, 1907). In fact there is scarcely a disease attended with discharges containing specific germs which may not be transmitted by this insect and many obscure facts concerning the spread of diseases through the air and in the direction of prevailing winds and for limited distances have become perfectly plain in the light of our present knowledge. Among the more important of the diseases thus transmitted, in addition to those mentioned above, are scarlet fever, measles, diphtheria, cholera and smallpox.

The house-fly breeds chiefly in horse manure—95 per cent.—and to some extent in privies, receptacles of kitchen offal and animal and vegetable substances undergoing putrefaction, especially if exposed to air and sunlight. They swarm over food substances and every sort of excrement and discharge, both physiological and pathological. Upon these they feed, carrying the germs

of disease to be discharged upon articles of food in their excrement and at the same time other germs upon their feet. From every point of view as regards sanitation and prophylaxis it is important to get rid of this pestiferous insect. How is this to be done?

In the first place it is necessary to reduce the breeding places to a minimum by disposing of horse and other manure in such a manner that the flies cannot gain access to it and so protecting it by screens that those which are hatched cannot find egress from the receptacles. Putrefying animal and vegetable substances must be gotten rid of in a similar way. All morbid discharges in sickness must be at once disinfected and protected in such a manner as to be absolutely inaccessible to flies. Articles of food and drink of every description must be effectively guarded against flies. The open latrine and the unscreened mess table in the military camps of a former period have their counterparts upon a small scale in mismanaged houses. The decimation of an army is a national calamity; the loss of a child a household tragedy. Make it impossible for flies to come and go by screening the house. Flies that are in or come in may be destroyed one by one by the wire whisks and bats sold for the purpose in the shops, or caught with fly-paper or fly-traps; those that are outside are kept there. To clear a room of many flies the following substances are available:—

1. Carbolic Acid.—Drop 30 drops upon a hot shovel. The vapor is promptly poisonous to flies.

2. Potassium Bichromate.—Dissolve one dram in two ounces of water; add a little sugar. Set about the room in shallow plates. This will prove most efficient.

3. Formalin.—Solution of formaldehyde 40 per cent. A tablespoonful to a gill of water, exposed in shallow vessels is very fatal to flies.

4. Pyrethrum Powder.—Burn small quantities in an iron ladle. The flies become stupefied and may be swept up and burned.

To sum up :—Prevent breeding by destroying breeding places or rendering them inaccessible; destroy flies that are within and prevent those without from coming in—in other words cleanliness and screening.

The nurse cannot do all these things but she can do many of them and she can make it clear to persons who have never realized it that the common house-fly is a very disgusting and dangerous insect.

Visitors are frequently conveyors of disease in two ways. This is true of hospitals and other similar institutions. They may bring it in, as is done in diphtheria; or they may carry it out, as happens in smallpox or scarlet fever. Considerations of sentiment must often be disregarded in the matter of visitors.

One of the more important duties of the physician is to prevent any particular case under his care from becoming a focus or centre of infection, and this is only to be accomplished by the isolation of the patient and the proper use of disinfectants. A realizing sense of her power to avert suffering will be a great help to the nurse in endeavoring to assist the physician in achieving this result.

The following list includes the disinfectants available for general purposes:

Dry and moist heat.

Fumes of sulphur (sulphur dioxide).

Lime.

Chloride of lime (calcium hypochlorite).
Labarraque's solution (solution of chlorinated soda).
Corrosive sublimate (mercuric chloride).
Sulphate of copper (cupric sulphate).
Carbolic acid.
Formaldehyde.

Disinfection of the Sick-Room.—In the sick-room no disinfection can take the place of thorough ventilation and cleanliness. Complete disinfection of a room while it is occupied is impracticable. Much, however, can be done by washing the floor, window-ledges, and other surfaces with a solution of corrosive sublimate of the strength of one part in one thousand (1 : 1000), or a solution of carbolic acid, two parts in one hundred (2 : 100), or of chloride of lime, one part in one hundred (1 : 100), of sulphate of copper, one part in one hundred (1 : 100). Compressed tablets are sold in the shops for the purpose of making the corrosive sublimate disinfectant solution. Each tablet contains seven and three-tenths grains, and the solution formed by dissolving one tablet in a pint of water is of about the strength of one part in one thousand (1 : 1000).[1] These tablets are extremely dangerous and have frequently caused death by being mistaken for tablets of soda mint, sodium bicarbonate, etc. They must under all circumstances be labelled "POISON" and kept by themselves, away from the "medicine closet."

Corrosive sublimate (mercuric chloride) is a valuable disinfectant. Its advantages are that it is destructive to all forms of germ life including their spores, freely soluble in alcohol, moderately so (1 to 16) in cold water

[1] As suggested by the late Dr. C. M. Wilson.

and readily (1 to 3) in hot water and that it is cheap. Its disadvantages are that it exerts a highly corrosive action upon metals, that it is intensely poisonous and that it enters into chemical combination with albuminous matter, forming inert and insoluble substances, which greatly impair its value as a sick-room disinfectant.

Commercial preparations sold under various names for household and sick-room disinfection, being of unknown and probably of inconstant composition and unduly expensive, should never be employed.

The nurse must bear constantly in mind that nearly all efficient chemical disinfectants are poisonous, most of them intensely so. Care must, therefore, be taken to keep them in large bottles or demijohns suitably and conspicuously labelled and marked "POISON," and in a place entirely apart and away from all medicines, food, and beverages.

At the close of the sickness the room may be effectually disinfected. For this purpose the reliable gaseous disinfectants are the fumes of sulphur (sulphur dioxide) in the presence of moisture, chlorine, and formaldehyde. The agent first named is very commonly used. The fire-place, windows, and doors are to be closed, the cracks being packed with paper, or covered with paper pasted on, or strips of adhesive plaster. The walls and floor are to be freely sprinkled with water and dripping sheets or towels hung up on lines stretched across the room. Roll sulphur broken fine or the flowers of sulphur (sulphur sublimatum) may be used. A little fine sawdust mixed with the latter causes it to burn more freely. The sulphur may be placed in a shallow iron vessel or an earthenware pie-dish, which, to avoid the

danger of fire, should be set inside upon the bottom of a high tin wash-kettle or on tongs laid across a tub of water. It is ignited by a live coal or by first pouring over it a little alcohol. Three pounds of sulphur is required for every thousand cubic feet. A room fifteen feet long by twelve wide, with a ceiling ten feet high, contains eighteen hundred cubic feet ($15 \times 12 \times 10 = 1800$). It must be borne in mind that the inadequate use of the most effectual disinfectant is as bad as none at all, and that in all cases the disinfectant must be used far in excess of the quantity indicated by rule. As the fumes cannot be breathed even in diluted form, the doors must be immediately and tightly closed. The following day all windows are widely opened, and allowed to remain so for twenty-four hours.

Sulphur dioxide has the advantage of being cheap and easily procurable, an effective surface disinfectant, very destructive to forms of animal as well as of vegetable life and therefore available in the case of disease germs carried by rats, mice, flies, fleas, mosquitoes and other vermin. The objections to it are that it bleaches fabrics colored with vegetable or some of the analine dyes, it rots cotton and linen fabrics and corrodes metals. These effects are due to sulphurous and sulphuric acid developed in the presence of the necessary moisture. Metal utensils must be taken from the room and metal fixtures smeared with vaseline or oil.

Chlorine is not employed as a gaseous disinfectant. Its suffocating and disagreeable odor, even in dilute mixture with the atmosphere, and its bleaching properties render it unavailable for use in sick-room, household or hospital disinfection ordinarily.

Formaldehyde, as generated from formalin (paraform) pastils by the Schering lamp or by the permanganate method, constitutes the most efficient gaseous disinfectant available for household use. It has the advantages of a high degree of effectiveness as a germicide, some power of penetration, and of being at the same time neither poisonous nor destructive to fabrics or metals. It is a very energetic deodorizer, not masking foul odors, but destroying them by the formation of new chemical combinations. It does not destroy insects.

The commercial substance known as Formalin is a 40 per cent. solution of formaldehyde.

The following, extracted from the "Circular of Information," is the method of formaldehyde disinfection used by the Chicago Department of Health:

"The room to be disinfected is sealed and prepared as usual for sulphur disinfection, by pasting strips of paper over cracks of doors and windows. All its surfaces are exposed as much as possible; closet doors are opened and their contents, together with the contents of drawers, are removed, scattered about and the drawers left open; mattresses are set on end; pillows, bedding, clothing, etc., are suspended from lines stretched across the room or spread out on chairs and other objects so as to expose all sides; books are opened and the leaves spread—in short, the room and its contents are so disposed as to secure free access of the gas to all parts as fully as possible.

"For every 1,000 cubic feet of space in the room, suspend, by one edge, an ordinary bed-sheet (2 by 2½ yards) from a line stretched across the middle of the room.

Properly sprinkled this will carry, without dripping, 8 ounces of liquor formaldehyde—the 40 per cent. solution of formaldehyde gas—which is sufficient to disinfect 1,000 cubic feet of space. As many sheets as necessary are used, hung at equal distances apart. The ordinary rather coarse cotton sheet should be used in order to secure rapid evaporation. The house should remain sealed not less than eight hours.

"A rosehead sprinkler used by florists can be used for sprinkling the sheets.

"After the disinfection soak all sheets, pillow slips, towels and other washable articles in the sick-room in the strong disinfectant and remove them while wet to the laundry, to be boiled at least thirty minutes. Sprinkle thoroughly all the surfaces of pillows and of the mattresses with the strong disinfectant and then carry into the open air, to be exposed to sunshine for at least six hours—frequently turning the articles. Mattresses and pillows should be burned or sterilized by heat if soiled by discharges from the patient. Consult the physician on this point."

Directions for the Use of Schering's Formalin Lamp.

The lamp should be placed upon a table or on the floor in the middle of the room, the doors, windows, and other openings being closed. The cup *e* should be removed, as it is used only for deodorization and inhalation, then the glass chimney *a* with the globular container *r* is taken off from the lamp *b*, and the container *r* filled with Schering formalin pastils. For the destruction of the less resistant disease organisms, such

as the bacilli of diphtheria, typhoid fever, and tuberculosis, forty one-gramme pastils will suffice in a medium-sized room, two thousand cubic feet. Then the reservoir of the lamp *b* is about half filled with alcohol; the wick is lighted and so regulated that it projects about one-twelfth to one-eighth inch *above* the tube. If wood alcohol is used as a fuel the wick should be about even with the tube (burner), as a too large flame will produce more heat than is required. More than two ounces wood alcohol should not be placed in the reservoir, which holds four ounces. The chimney *a*, with the filled container *r*, is then replaced upon the lamp. No one should remain in the room, and the doors should be tightly closed, since the large amount of formalin vapor that is developed is very penetrating, and may be unpleasant, in that it causes lachrymation in the occupants of adjoining rooms. Nevertheless, it is expressly to be remarked that the inhalation of formalin vapors is in no way injurious to health.

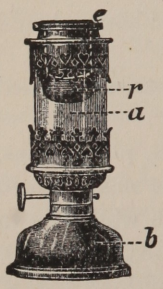

Fig. 1.

The apparatus once started, it may be left entirely to itself. The light need not be extinguished, since the lamp burns out with perfect safety. According to the flame, two ounces of alcohol or wood alcohol will burn from four to eight hours. After twelve to twenty-four hours the room should be aired, and the formalin vapors will quickly disappear. If the room is to be thoroughly disinfected, and the most resistant spores

killed,—a procedure that is not necessary under ordinary circumstances,—two lamps should be employed, or a larger apparatus can be used.

Various other formaldehyde disinfectors are in use. Some of them, as Lister's, may be placed in the room, or the vapor may be led in by way of the key hole; others may be used in both of these ways.

Formaldehyde fumigators are sold in the shops and are more convenient and economical. They consist of solidified formaldehyde in the form of a candle which burns from the bottom upward with a limited supply of air. The fumigator is placed in a shallow dish of earthenware and left to itself in the sealed room. It does not splutter and is free from the danger of setting fire to the room. About ten ounces of formalin are required for every 1000 cubic feet of air space.

The Permanganate Method.—Formalin is poured upon the needle shaped crystals of potassium permanganate in a suitable container, such as a large ordinary dishpan. For the disinfection of 1000 cubic feet of room space use sixteen and a half ounces of permanganate and twenty ounces of formalin. The solution should be poured quickly and the room which has been previously sealed should be immediately closed. A violent chemical reaction occurs with the development of great heat.

Spraying. Formalin is sprayed upon the objects to be disinfected and upon sheets hung in the room. The gas is slowly liberated by evaporation and permeates the atmosphere. This method is available only for small apartments. Ten ounces are required for

every 1000 feet and the room should remain closed for at least twenty-four hours.

After the room has been exposed some days to the air and sunshine, the walls must be scraped and repapered or painted.

Disinfection of Clothing.—Boiling for half an hour will destroy the vitality of all known disease-germs. Clothing may be disinfected by immersion for two hours in a solution of corrosive sublimate of the strength of 1:1000; or of sulphate of copper, 1: 100; or of carbolic acid, 1: 50; or of chloride of lime, 1: 100. The bleaching properties of chloride of lime must not be overlooked. The clothing of the sick-room should not be allowed to accumulate, but should go to the laundry as promptly as can be arranged. As an additional measure, and to lessen the risks of the laundry-women, it should be at once freely sprinkled with one of the above solutions by the nurse. Articles of clothing that would be injured by boiling or by immersion in a disinfectant solution may be disinfected by formalin or by exposure to dry heat in a properly constructed "oven," such as are arranged in the hospitals of our large cities, and which may be used by the public. The separate articles must be freely spread out, as the penetrating power of dry heat is feeble. A temperature of 230° to 284° F. and an exposure of three hours are necessary. This heat is injurious to woollen fabrics. Steam under pressure in specially constructed apparatus is employed for the same purpose in institutions. Finally,

we must not forget the purifying effect of fire. Articles not readily disinfected by ordinary measures can be destroyed by burning.

Disinfection of the Person.—The hands of those who nurse persons sick of infectious diseases should be occasionally washed in a solution of corrosive sublimate, 1 : 2000 ; or of carbolic acid, 1 : 50 ; or of Labarraque's solution, 1 : 10. This should invariably be done before taking food. If a solution of corrosive sublimate be employed, the hands must be afterwards rinsed with fresh water running from the spigot or sterilized by recent boiling as a safeguard against mercurial poisoning.

The above solutions are to be employed for washing instruments and utensils that are exposed in the sick-room, except those used for eating and drinking purposes, which should be washed in very hot water, and may, if necessary, be also rinsed with alcohol.

Carbolic Acid.—Phenol is a useful disinfectant. It occurs in commerce as a whitish crystalline mass which gradually acquires a red color and upon exposure to air undergoes liquefaction. It has a peculiar, penetrating odor, a burning taste and is a corrosive poison. It is soluble in water at ordinary temperature (1 to 15 parts) and is used 2 to 5 per cent. solutions. Except in strong solutions and upon prolonged exposure it does not destroy spores and is therefore not available for disinfection in cases of tetanus, anthrax, malignant edema and other infections caused by spore-producing bacteria.

The advantages of carbolic acid as a disinfectant are effectiveness in destroying bacteria which do not contain spores; the very slight formation of insoluble enveloping coverings in albuminous substances; the absence of destructive action upon metals, fabrics, colors and wood in ordinary solutions (2 to 5 per cent.) and the ease with which it can be obtained. Among its disadvantages are failure to destroy the spores of certain disease-producing bacteria, its intensity as a poison and its relatively high cost.

The Cresols. These substances are closely related to carbolic acid chemically and like it are derived from coal tar. They enter into the so-called crude carbolic acid of commerce and contribute largely to its disinfecting power. They are not readily soluble in cold water and should be dissolved in hot water and a complete solution made before using. The following commercial preparations of cresols are available and efficient in the strengths recommended in the directions which accompany the vials in which they are dispensed; tricresol, compound solution of cresol, creolin, lysol, saprol, solveol and solutol.

The advantages of this group of disinfectants consist in their greater cheapness than carbolic acid, a 2 per cent. solution of cresol being as effective as a 5 per cent. solution of carbolic acid; their efficiency being not diminished in the presence of albuminous substances; their harmlessness to metals, fabrics and colors in ordinary solutions (2 per cent.) and their destructive action upon the spore-bearing bacteria such as those of anthrax and tetanus.

Their chief disadvantage is a lower degree of solubility in water and the consequent danger of a solution weaker than required unless great care is taken to see that complete solution is effected.

For bathing the patient's body weaker solutions must be employed,—corrosive sublimate, 1 : 5000 ; carbolic acid, 1 : 250 ; Labarraque's solution, 1 : 30. As a rule, however, pure water or water with alcohol added in the proportion of one to five or six is preferable for this purpose. The bodies of the dead should be wrapped in a sheet wet with a strong disinfectant solution,—corrosive sublimate, 1 : 500 ; carbolic acid, 1 : 20 ; or of chloride of lime, 1 : 25.

Disinfection of the Stools.—Lime is a very valuable disinfectant for the discharges from the bowels, especially in privies. In one or another of the following forms it must be thoroughly mixed with the mass :

Quicklime is a very caustic substance highly destructive to organic matter and especially to the germs of disease.

Slaked lime (calcium hydrate) may be made by the addition of one pint of water to two pints of lime. This preparation must always be prepared immediately before use.

Whitewash is prepared by the addition of an excess of water to slaked lime. It is used for brightening the walls of cellars and outhouses and the destruction of moulds and disease germs which are lodged upon such surfaces.

Milk of lime consists of freshly slaked lime incorporated with about four times its bulk of water and

is of the consistency of cream. It must be freshly prepared and shaken in the vessel before using.

Unslacked lime has been used from early times as a disinfectant for the bodies of those dead of virulent infectious diseases.

Chlorinated lime (chloride of lime; bleaching powder) when freshly prepared has about the same value as a germicide and disinfectant as unslaked lime.

The preparations of lime have the advantages of being efficient and cheap; the disadvantages of being very uncertain in disinfecting power, rapid deterioration upon keeping and exposure to the air and destructiveness to metals and fabrics.

Dissolve chloride of lime in water in the proportion of six ounces to the gallon; use one quart of this solution for the disinfection of each liquid stool in typhoid fever or cholera. If the discharge be very copious it is advisable to use even a larger amount. For the disinfection of solid fecal matter the above solution should be of double the strength. The matter to be disinfected must be exposed to the action of the solution for four hours, and solid masses are to be broken up by agitation of the vessel. Solutions of carbolic acid, 1:20; or of sulphate of copper, 1:25; or freshly slaked quicklime, may also be used for this purpose.

Corrosive sublimate is not available for the disinfection of fecal matter because of its combining with albuminous substances and forming an inert, insoluble covering to the masses which may subsequently undergo disintegretion and liberate active pathogenic organisms.

Formalin may be used for the disinfection of fecal

discharges in one-to-three-per-cent. solution in water, a sufficient quantity of the dilute mixture being poured over the stool and allowed to stand one hour.

Disinfection of the Urine.—Drop one of the corrosive sublimate tablets, mentioned on page 24, into the urine and allow it to stand an hour before emptying; or add one-fourth the volume of a mercuric-chloride solution 1:500. This solution must, for safety against accidental poisoning, be colored by the addition of potassium permanganate and conspicuously labelled.

Disinfection of Bed-pans, Urinals, etc.—Place the utensil, after it has been carefully washed, in a bath of corrosive sublimate solution, 1:1000, and allow it to stand until again required for use. It must then be rinsed in warm water. It may be placed in an especially made sterilizer, and subjected to boiling for half an hour.

Disinfection of Water-Closets, Privy-Vaults, etc.—No stool from a case of typhoid fever, cholera, or dysentery should be thrown into a closet without having been previously disinfected as above. Great care must be taken to prevent the contact of the discharges with the woodwork of the seat. The closet is to be thoroughly flushed several times a day, and in the intervals of its use a quantity of carbolic acid or chloride of lime solution should be allowed to remain in the hopper.

A privy-vault requiring disinfection may be treated with fresh, unslaked lime in dry powder, or milk of lime in liberal quantities slowly poured into the vault. During an epidemic of enteric fever, cholera, or dysentery, chloride of lime should be freely sprinkled over the surface of the contents of the vault every day.

Fever patients should, as a rule to which there are few exceptions, receive no visitors until convalescence is fairly established. This is a rule the observance of which is conducive alike to the welfare of the patient and of his friends. On the one hand, visitors excluded from the sick-room escape the risks of contracting the fever and the danger of conveying it, without themselves contracting it, to others outside. On the other hand, the patient is delivered from disturbance and excitement, which, whether it be pleasurable or otherwise, is almost certain to act injuriously upon him, and for which in any case he is in no condition. Visits to persons very sick of a fever, except such as are absolutely necessary, are an infringement of the discipline of the sick-room, and ought to be discountenanced by those in authority.

Practical regulations for an efficient quarantine of cases of the acute infectious diseases, most of which are attended with the manifestations of fever and frequently occur in school children:

A correct differential diagnosis is indispensable. Febrile rashes or exanthemata of local or individual origin—urticaria, erythema, and roseola—must be discriminated from the exanthemata which are specific infectious diseases.

The object is to "quarantine the public out and quarantine the patient in" by an isolation which inflicts no unnecessary hardship upon either the one or the other.

Three conditions are to be considered:

a. *Isolation with a Trained Attendant.*—If the patient and trained attendant can be safely isolated in one or two

rooms and supplied with food and other necessaries and no article or utensil be handed out without previous efficient disinfection, the other members of the household may go and come without restraint, except that children in an apartment or dwelling where the patient is quarantined must not be permitted to attend school, Sunday-school, or other places of public meeting or to use public conveyances, and that teachers and those employed in the sale or distribution of milk must not engage in such occupations during the maintenance of the quarantine.

In the case of diphtheria, cultures of the nose and throat of such persons must yield regular results every fourth day in order that they may be permitted to leave and enter the house without restraint.

The door of the apartment must be placarded "For Patient and Attendant Only."

The attendants may be permitted to leave the house for exercise and fresh air for two hours once a day under the following conditions:

1. They must thoroughly wash their face and hands and change their outer clothing.

2. They must, if possible, avoid all contact with other members of the household in going and coming.

3. They must not enter stores, business offices, or places of amusement, nor enter any public conveyance.

b. *Isolation without a Trained Attendant.*—The arrangements may be similar to those of Rule *a*, except that one member of the household shall be designated as the attendant upon the patient, and shall rigidly comply with the regulations given above as to bathing, changing clothing, coming into contact with other members of the household and going into public places or vehi-

cles. Always provided also that no other member of the household be permitted to enter the sick-room or receive from it any article or utensil not previously thoroughly washed and disinfected. Under these circumstances the room must be placarded, "For Patient and Attendant Only," as above.

c. *Isolation not Practicable.*—The patient must be sent to a hospital for contagious diseases or other suitable public institution.

Such modifications of these regulations may be made in the case of chicken-pox, mumps, German measles, or other mild infections as the physician in charge may determine; but they must be rigidly enforced in small-pox, scarlet fever, typhus, diphtheria, and all other grave and readily communicable febrile infections.

The duration of the quarantine will in every case be fixed by the physicians, acting under the rules of the local health authorities.

The duties of the sick-room should be performed with as much regularity and method as possible. Nourishment should be administered at regular intervals; the bathing of the patient, the changing of his clothes, and the arrangement of his bedding should, so far as possible, be done about the same hour every day. As a rule, and a very good rule it is, the doctors will come in about the same time each day, with now and then an unexpected visit to see how things go at odd times. All things must be done decently and in order. Quietness and gentleness are very soothing. Above all things, let there be no fussiness. As for the light, consult the patient's wishes. Darkness is unwholesome; the sunlight a healer.

If there be two nurses, the time must be divided

about equally between them. Very often one takes the day, the other the night. This arrangement gives to each ample time for rest and exercise. If there be one nurse only in a severe case, some member of the family or some friend of the patient must relieve her for several hours daily. It is not right for a nurse to undertake the continuous charge of a bad fever case. The nurse should not take her meals in the sick-room.

She must, in so far as possible, avoid "taking the breath" of the patient, or allowing him to cough in her face; putting to her lips any food, drink, or utensil that has been in the sick-room; wearing any wrap that he has worn, or coming into unnecessarily close contact or exposure with his garments or belongings.

The directions of the physician should be written down by the nurse either during or immediately after his visit. A record should be made at the time of its administration of the food, its quantity, of medicines, etc., and the events of the sickness, the temperature, pulse, and respiration, and movements of the bowels; the frequency and amount of urine voided must be duly noted. Many of these things may be recorded on charts prepared for the purpose. These records are to be submitted to the physician at his visits.

The study of the temperature is of the utmost importance in all cases of fever.

The art of taking and recording the temperature of the body is called Medical Thermometry. The instruments used are known as Clinical Thermometers. As they are familiar to all nurses, no extended description is here required. They are marked off in the degrees upon the glass, and each degree is subdivided into fifths,

so that the readings may conveniently be recorded in fractions of the decimal system.

The thermometers commonly used in the United States and Great Britain are marked in degrees of *Fahrenheit's* scale; those used in Europe are graduated according to the *Centigrade* scale. The scale of *Réaumur* is rapidly going out of use, but is still employed in some parts of Europe. On the scale of Fahrenheit the distance through which the mercury rises from zero to the boiling-point of water is divided into two hundred and twelve degrees, of which the thirty-second marks the melting-point of ice. Between the melting-point of ice and the boiling-point of water there are one hundred and eighty degrees (32° + 180° = 212° F.). The melting-point of ice is taken as zero in the Centigrade scale and in that of Réaumur, but in the Centigrade the boiling-point of water is at one hundred (100° C.), while in Réaumur's it is at eighty (80° R.).

The relation of the three scales to each other is, therefore,—

F.	C.	R.
9	5	4

To convert recordings of the Fahrenheit scale into Centigrade degrees,—

Subtract 32, multiply by 5, and divide by 9; thus: 98.6 — 32 = 66.6 × 5 = 333.0 ÷ 9 = 37. That is, 98.6° F. = 37° C.

To convert Centigrade degrees into Fahrenheit degrees,—

Multiply by 9, divide by 5, and add 32; thus: 37 × 9 = 333 ÷ 5 = 66.6 + 32 = 98.6. That is, 37° C. = 98.6° F.

The Centigrade scale is better than that of Fahrenheit, and many physicians in this country prefer to use it. The following table of equivalents may therefore prove of use:

F.	C.
96.0°	= 35.55°
96.8°	= 36.00°
97.0°	= 36.11°
98.0°	= 36.66°
98.6°	= 37.00°
99.0°	= 37.22°
99.5°	= 37.5°
100.0°	= 37.77°
100.4°	= 38.00°
101.0°	= 38.33°
101.3°	= 38.5°
102.0°	= 38.88°
102.2°	= 39.00°
103.0°	= 39.44°
103.1°	= 39.5°
104.0°	= 40.00°
104.9°	= 40.5°
105.0°	= 40.55°
105.8°	= 41.00°
106.0°	= 41.11°
106.7°	= 41.5°
107.0°	= 41.66°
107.6°	= 42.00°
108.0°	= 42.22°
108.5°	= 42.5°
109.0°	= 42.77°
109.4°	= 43.00°
110.0°	= 43.33°
111.2°	= 44.00°

As thermometers are liable after a time to give readings that are slightly too high, in consequence of the gradual contraction of the glass of which they are formed, it is necessary at long intervals to carefully compare them with a standard instrument. This is done as a matter of business at the public observatories, to which any instrument-maker will send them.

This contraction of the glass is called "seasoning," and goes on very slowly. After two or three years it practically comes to an end, and the thermometer is then seasoned.

Clinical thermometers as at present made are of the kind known as maximum, or self-registering; that is, a small portion of the mercury is separated from the

main bulk of it, or separates itself from it as it contracts, by reason of a device in the twist of the tube, in such a way that it remains in position in the tube, when the temperature falls, until shaken down, and thus indicates the highest temperature reached during the observation. The separated portion of the mercury is known as the "index." The reading is taken from the upper end of the index, which is then shaken down by a quick motion of the wrist, such as is made in cracking a whip, the thermometer being held by its upper end. Before taking the temperature the index should be below 95°. The best clinical thermometers are now made with a curved surface, which, acting as a lens, magnifies the width of the mercury; and with a flattened back, which lessens the danger of breakage from rolling. Aseptic thermometers have an outer glass tube encasing the engraved scale, so that the outer surface is perfectly smooth. The nurse should possess her own thermometer.

Surface thermometers are clinical thermometers of a special shape, designed for measuring surface temperatures. They are not often required in fever-nursing.

The object being to measure the internal temperature or the blood-heat, the thermometer must be placed in such a position that the tissues of the body completely surround its bulb. The positions available are the armpit, or axilla, the mouth, the vagina, and the rectum. The fold of the groin, when the thigh is bent up or flexed over the abdomen, is in infants also occasionally used; but this locality is less satisfactory than any of the others.

The axilla is usually selected. If very moist, it should be dried with a towel before the instrument is

introduced ; or, if dry and harsh, it must be bathed with warm water, and then dried. There is no difference in the temperature of the two armpits under ordinary circumstances. The bulb of the instrument must be placed deeply in the hollow and the arm brought well across the chest. Care must be taken that no fold of clothing interfere with the contact of the instrument with the skin. Some thermometers are more sensitive than others ; that is, they act more quickly. The mercury rises rapidly at first, then more slowly. Thick thermometers require five minutes to record the maximum temperature, but the best instruments now made reach the highest point in about two minutes. In the rectum or vagina less time is required. Time may be saved by rolling the bulb of the thermometer briskly between the palms of the hands, or with a piece of cloth or flannel, until the mercury reaches 95° or 96° ; but the rule often given to warm the thermometer to within a couple of degrees of the *suspected* temperature is a bad rule. It subjects one to the risk of error in case of an unlooked-for fall in the patient's temperature.

In taking the temperature in the mouth the bulb must be placed under the tongue and the lips closed about the stem, the patient breathing through his nose. It is an excellent plan to dip the instrument in water and wipe it with a clean napkin in the presence of the patient both before and after using it in the mouth. It may then be wiped off with alcohol before being returned to its case. In fever cases the thermometer may be kept in a glass in the bottom of which there is a thick layer of cotton and alcohol enough to

cover the lower third of the instrument. It is not safe to take the temperature in the mouth either in young children or in conditions of delirium. When the patient is in an insensible state, or when doubts arise as to the correctness of an axillary observation, the rectum or the vagina may be used for applying the thermometer, and with self-registering instruments this plan involves no exposure of the person. In European countries the common custom is to take the temperature in the rectum.

In restless children care must be taken to prevent the instruments being broken, and in all cases to prevent a short thermometer from slipping entirely into the bowel, from which it might be difficult to extract it. The temperature may be rapidly taken in unmanageable children by means of an old-fashioned thermometer which is not self-registering, by cautiously warming it until the mercury reaches a very high point, say 108°, and then quickly placing it in the armpit. The mercury falls rapidly to the temperature of the patient's body and then stops. After remaining stationary for half a minute it may be read off.

The human body in health, like that of all warm-blooded animals, has a temperature of its own, which is nearly constant at all periods of life, in all seasons, and in every climate. This is known as the normal temperature, and as measured in the axilla is about 98.6° F. (37° C.). In the mouth it is about the same, but in the vagina and rectum it is fully half a degree F. higher. The surface temperature, being influenced by external causes, is lower and varies in different

parts of the body, the exposed and distant parts being coolest. The temperature of infants and children is a fraction of a degree higher and much more easily disturbed than that of adults, and after middle life the average temperature is somewhat lower than before that period. A diurnal variation independent of food or exercise, and amounting to one or one and a half degrees F., is observed in health; the lowest point (minimum) being reached between 2 A.M. and 6 A.M., and the highest (maximum) being attained, after a gradual rise, between 5 P.M. and 8 P.M. This daily rhythmical fluctuation of temperature takes place not only in health, but also when in disease the whole range of the temperature is either abnormally depressed or elevated.

The temperature is usually elevated a fraction of a degree after taking food. Alcoholic drinks have a tendency to lower it. Very active exercise causes it to rise a degree or more, but when muscular exercise is carried to exhaustion a fall below the normal may be noted.

In sickness it is desirable to take the temperature at least twice daily, the best time being between seven and eight in the morning, and about eight in the evening. The observations must be repeated at the same hours each day. In cases characterized by great or sudden variations of temperature, by very high temperature, or when the influence of treatment upon the fever is being closely watched, observations must be made at shorter intervals of time, and it may become necessary to take the temperature as often as every hour.

The temperature in disease may range below or above the normal. Sudden falls of temperature in fever are very significant; just as are abrupt rises from the temperature of health. The following terms are used to indicate the general condition of the patient in abnormal ranges of temperature:

Below the Normal.	*a.*	Temperature of collapse	Below 96.5° F.
	b.	Subnormal temperature	96.5°—98° F.
	c.	Normal temperature	98°—99.5° F.
Above the Normal.	*d.*	Sub-febrile temperature	99.5°—100.5° F.
	e.	Moderate febrile temperature . (Mild pyrexia)	100.5°—102° F., A.M. 102.2°—103° F., P.M.
	f.	High febrile temperature . . (Severe pyrexia)	102°—104° F., A.M. 104°—105.8° F., P.M.
	g.	Intense febrile temperature . . (Hyperpyrexia)	105 8°—110° F.

The range of deviation from the normal within the limits of which life can be well maintained is comprised between 92° F. and 110° F. A temperature of 95° on the one hand or of 106° F. on the other, already indicates great danger, especially if it be prolonged, and beyond these limits in both directions the danger to life speedily becomes extreme.

a. *Temperature of Collapse, or Shock.*—A considerable and rapid fall of temperature attends the collapse which sometimes occurs during or towards the close of some of the essential fevers. In enteric fever this condition may be produced by hemorrhage from the bowels, or by sudden peritonitis due to perforation of

the wall of the bowel at some point of ulceration, or in consequence of sudden failure of the heart. The last of these accidents is liable to occur in any very grave case of fever, and occasionally follows the critical fall of temperature which occurs in pneumonia, relapsing fever, and more rarely in other febrile diseases.

Very low axillary temperatures are met with in the stage of collapse in the algid or cold stage of cholera, the internal temperature as indicated by the vagina or rectum remaining extremely high. Great depression of the general temperature occurs in the collapse produced by various poisons, and especially by large quantities of alcohol. The temperature is apt to fall considerably below the normal in ordinary deep alcoholic intoxication, especially if the patients have been exposed to cold and wet.

b. *Subnormal Temperature.*—This condition attends considerable losses of blood; starvation from any cause; the wasting of certain of the chronic diseases, such as cancer of various organs; some diseases of the brain and spinal cord and the later stages of chronic diseases of the lungs and heart, especially when attended by dropsy.

The temperature is very apt to reach subnormal ranges in the morning for a few days at the termination of febrile disorders.

c. *Normal Temperature.*—If in the course of a continued fever, as enteric, the temperature, which has been elevated two or three degrees or more, *suddenly* falls to normal or near it, though not below, this in itself is significant of something wrong, and may even

acquire the importance of the "temperature of collapse," as indicating internal hemorrhage, perforation, or failure of the heart.

d. *Subfebrile Temperature.*—Slight elevations of temperature often accompany trifling and transient disturbances of the general health, especially in children. They are also observed at the beginning of gradually developing fevers, as enteric, and at the close of slowly subsiding febrile conditions. In obscure chronic cases they are of importance as indicating the existence of actual disease which may not manifest its ordinary symptoms.

e. *Moderate Febrile Temperature.*—When the morning temperature reaches 101°—102° F. and the evening shows a further increase of one or two degrees, we have to do with actual fever, the nature of which must be investigated by the physician, and which, whether it be symptomatic or essential, calls for treatment. So long, however, as the temperature does not exceed these limits there is no serious danger from the fever process itself.

f. *High Febrile Temperature.*—When the temperature in the morning is above 102°—104° F. and in the evening reaches or ranges higher than 104.5°, the case becomes serious from the intensity of the fever alone, and active treatment becomes imperative. High fever is unattended by immediate danger to life if it be transient, but when prolonged it is ominous. A temperature of 105° or even 107° in the hot stage of an ague, when the whole attack lasts but a few hours, is much less dangerous than the same temperature occur-

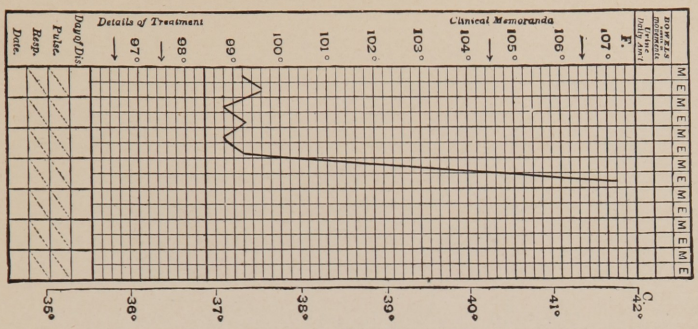

FIG. 2.—Cerebral hemorrhage. Hyperpyrexia. Pre-agonistic rise of temperature.

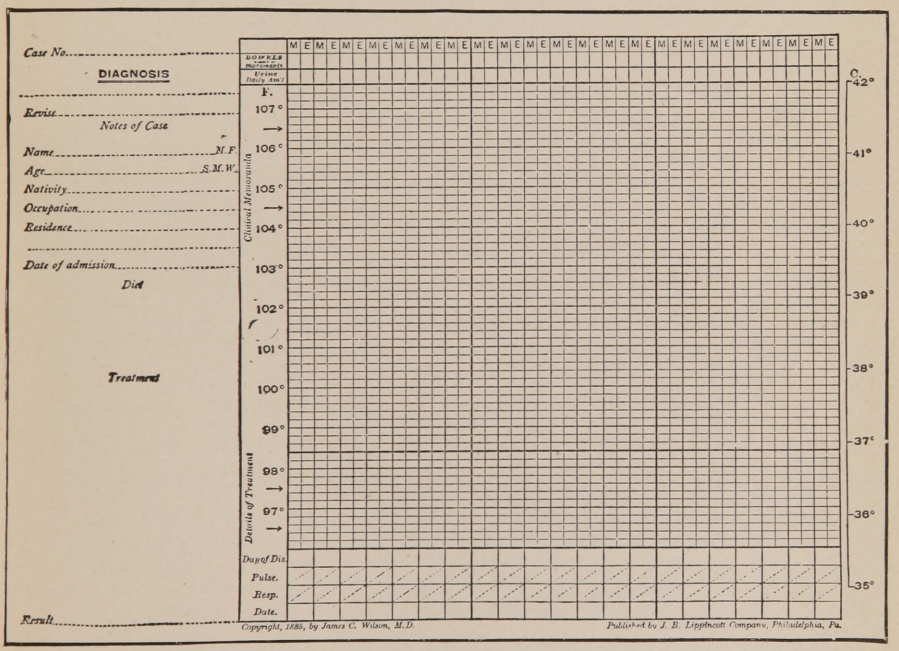

FIG. 3.—Clinical chart. Actual size 28 x 21 cm.

ring, even for a short time, in the course of one of the continued fevers, when the patient's powers of resistance are called upon to withstand some degree of fever for several days or weeks.

g. *Hyperpyrexia, or Intense Febrile Temperature.*— The temperature reaches 105.8° and continues to rise, or at all events does not fall. The condition is one of extreme and imminent danger to life. The resources of the art of medicine are put to their severest test. Hyperpyrexia often supervenes with great suddenness. Not a moment is to be lost. The most prompt and radical measures to reduce the temperature of the body too often fail to avert the fatal result. This condition has been encountered after injuries to the brain and to the upper part of the spinal cord; in lockjaw; in sunstroke, and very often in the infectious diseases, especially scarlet fever and pneumonia. It sometimes occurs in rheumatic fever, especially after the intensity of the symptoms has begun to subside, or even when the patient is apparently almost well. Hyperpyrexia is often one of the indications of approaching death. Hence, in certain cases the futility of treatment. In such cases a temperature of 110° to 112° is sometimes seen. The temperature sometimes continues to slowly rise for an hour or two after death.

The thermometer may be made to indicate a temperature much higher than that of the patient's body, by friction, or by being slipped against a poultice, or hot-water bag, or into a cup of tea, when the attention of the nurse is given to other duties. Very high readings of the thermometer may be caused by enveloping the bulb in the folds of a handkerchief or napkin

and placing it in the mouth for a few minutes. These tricks are sometimes played by hysterical girls. They are readily detected by repeated observations under the eye of the attendant.

A number of cases have been recorded in the medical journals in which excessively high temperatures—120°, 150°, even 170° F.—have been noted and apparently verified by repeated and most careful observations. Many of the patients have subsequently been found to be very clever pretenders and tricksters, but the method by which the high temperatures have been recorded has not been explained. In such cases the temperature should be taken in several different regions, axilla, mouth, rectum, etc., at the same time, and the temperature of the urine when voided.

The temperature of a fever patient may be somewhat affected by excitement, fatigue, or exposure. Hence hospital patients often show for a few hours after admission a temperature higher than subsequently, or, if they have been exposed to cold, lower than really corresponds to their condition.

It is a peculiarity of the state of convalescence from the acute fevers that the temperature, though normal, is disturbed by trifling causes, and may be made to rise two or three degrees by the first visit of a friend, the first solid food, or even by sitting up. Such rises are usually very brief, the temperature quickly falling again to normal. They occasion uneasiness lest they be the beginning of a relapse. On the other hand it occasionally happens that, though all the other symptoms have disappeared and the patient is almost well, the temperature remains subfebrile, and the patient is

for that reason alone kept in bed—the so-called "Bed Fever." In many such cases I have seen all traces of fever vanish upon cautiously allowing the patient to sit up an hour or so each day.

The temperature must be recorded at once. At the same time a record of the pulse-beats and movements of respiration per minute is to be made. They are to be carefully counted while the thermometer is in position.

Ruled sheets, called "Temperature Charts," or "Clinical Charts," are sold in the shops for this purpose. The form here shown will be found very convenient.[1] It may be so kept with little trouble as to preserve in a compact form all the important facts of an acute case, and is equally useful in hospital and in private practice. Reference to the charts further on in this book, which are records of actual cases, will show the reader how simple the process of case-recording may be made.

The space on the left is arranged for the number of the case, for instance, in a series; the diagnosis, with the opportunity of revising it, if necessary; the name of the patient; his sex, the letter M or F being, as the case may be, crossed by a stroke of the pen; his age and social state, whether single S, married M, or widowed W, the two letters not needed being crossed by the pen; his nativity; his occupation; his residence, post-office address, in case it should be desirable to trace his subsequent medical history; the date of his coming under observation; the diet in a general way,

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[1] J. C. Wilson's Clinical Charts. Published by J. B. Lippincott Company, Philadelphia.

space being left for general changes, which may be dated; the treatment, with an allowance of space for the same purpose, and finally, the result, "Recovery," with date of leaving the hospital, or last visit, or "Death," with the date.

The ruled space is arranged for twenty-one days by vertical lines, the weeks being divided by heavy lines. The space for each day is again subdivided for the morning and evening record, as indicated by the M and E. At the left margin the purposes of the spaces formed by the transverse rulings are indicated. At the top the number of movements of the bowels; immediately below the quantity of urine passed, which may be recorded in fluidounces or cubic centimetres; then the scale of *Fahrenheit*, with the equivalent *Centigrade* opposite on the right margin. The coarse horizontal line at 98.4° F. indicates approximately the normal. At the bottom are, first, spaces for each day of the disease, then similar spaces divided by a diagonal line for morning (upper, left triangle) and for the evening (lower, right) pulse rate; below these again corresponding spaces for the respiration-rate, and at the bottom of the chart spaces for the date or day of the month.

Important clinical facts, as "hemorrhage," "convulsions," "suppression of urine," etc., may be noted at the time of their occurrence between the vertical lines on the right or upper side of the chart in the position indicated by the arrows, under the words "Clinical Memoranda." While changes in treatment, and in particular such temporary changes as are made necessary by accidents, like hemorrhage, convulsions, or

suppression of urine, may be noted at the left or lower side under the words "Details of Treatment," as shown by the arrows.

The previous history and the condition of the patient when first seen may be written on the back of the chart.

The spaces corresponding to a degree of the *Fahrenheit* scale are divided into fifths. The temperature, as observed, is designated by a dot in the appropriate position. These dots joined by ruled lines form a zigzag line, called the temperature curve. It is usual to form the general curve of the case by means of the regular morning and evening temperatures, and to indicate the result of observations made at other hours by dots in the appropriate positions, with figures and letters showing the hour at which they were made; thus, *12 noon*, *3* P.M., or *6* A.M.

It is now customary to join the general curve or range by lines drawn with black ink; the hourly or three-hour observations by lines drawn with red ink.

If the fever be prolonged beyond three weeks two or more charts may be pasted together.

These charts thus kept are not only of value for preservation. They are also of immediate use as showing at a glance and with precision the facts of the case at every period from its coming under observation, the course it is running by a comparison of the symptoms day by day, and in a general way the effects of treatment, the changes of which are fully presented. Those only who have used them can understand their value.

Especially are they valuable in fevers in enabling us to watch the course of the temperature, which is an important part of the natural history of the disease and conforms in most of the acute infections to a type not only in its daily fluctations but also in its duration.

The attack of fever may begin suddenly, as in pneumonia, in which the temperature often rises rapidly and continuously to 104° F., or more. Such diseases frequently begin with a more or less violent rigor or chill. Or the access of fever may be gradual, as in typhoid fever, in which the temperature rises little by little from the normal until the fourth or fifth day, when it attains about the height which, in the absence of complications, will be characteristic of the attack, 103°—105° F.

The fever having attained its height, remissions or falls of temperature follow. If these be not more than one or two degrees in extent, conforming to the diurnal variation in health, but at a higher range, the temperature is said to be continuous, or, more properly, subcontinuous, and the fever is a Continued Fever; if, however, the decline is greater than in health, the remissions being marked as compared with the rises or exacerbations, the fever is said to be of Remittent Type; and, thirdly, when the remissions reach the normal or fall below it, we speak of the fever as being of the Intermittent Type.

Remittent and Intermittent Fevers are grouped with the Periodical Fevers. When acute they are usually of malarial origin. The symptomatic fever which accompanies chronic inflammatory diseases, especially

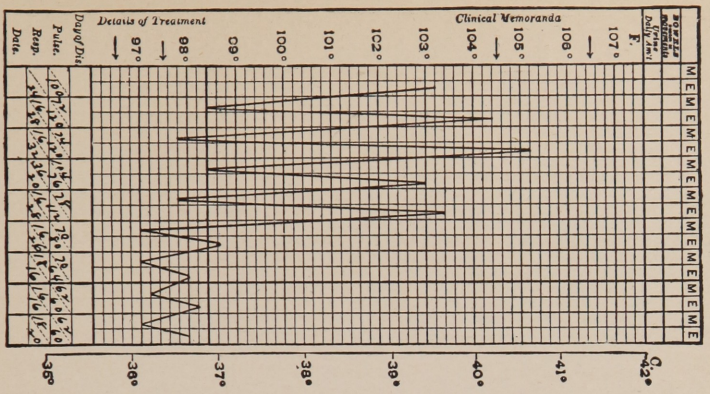

FIG. 4.—Intermittent malarial fever, quotidian type; double tertian infection. Man, aged twenty-nine.

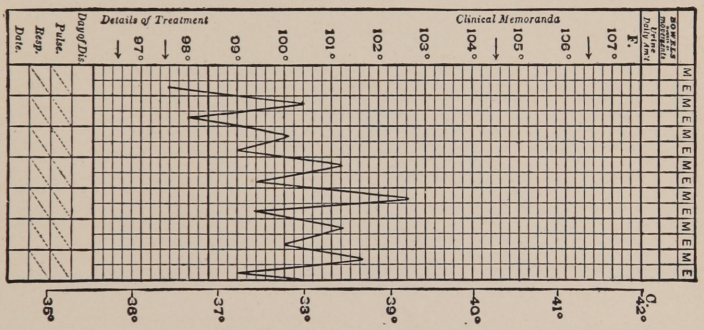

FIG. 5.—Temperature of inverse type.

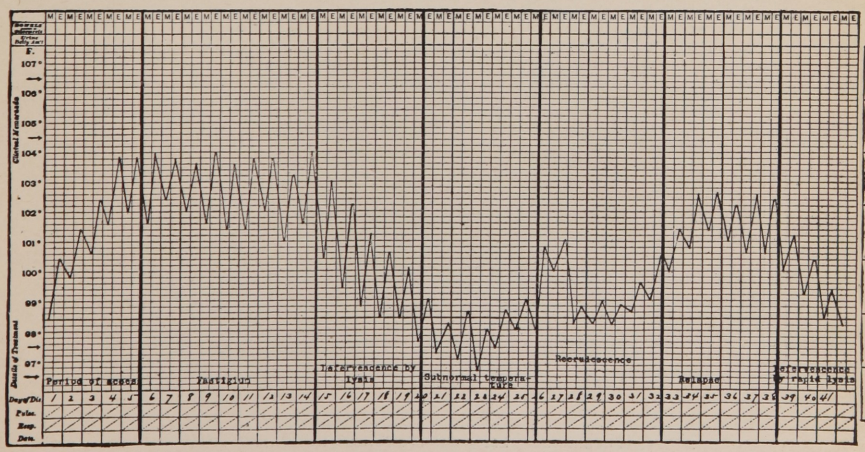

FIG. 6.—Temperature curve in enteric fever, with recrudescence and relapse.

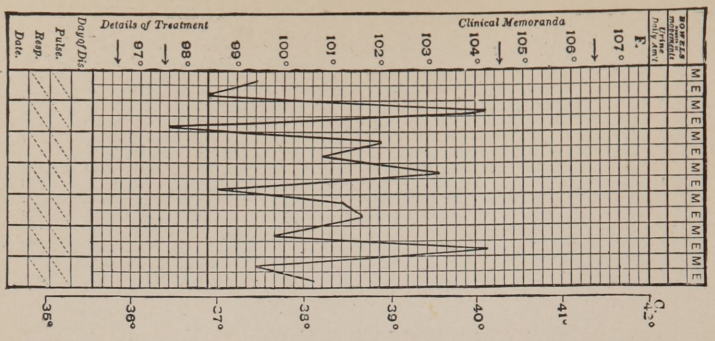

FIG. 7.—Fever of irregular periodicity.

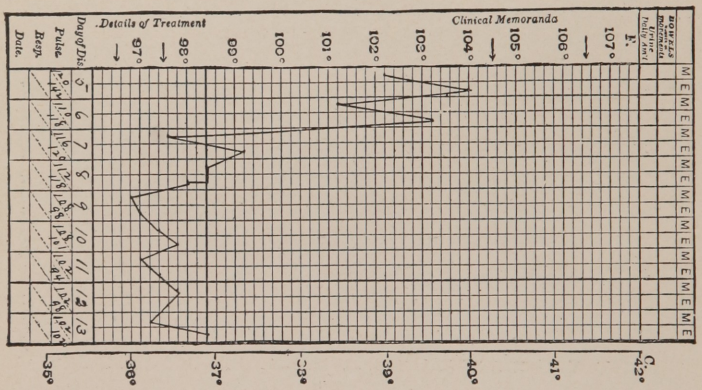

FIG. 8.—Croupous pneumonia in a child three years old. Defervescence by crisis on the evening of the sixth day.

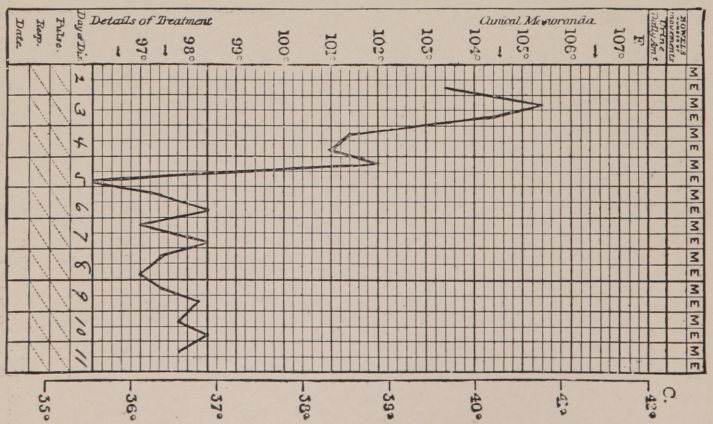

FIG. 9.—Pneumonia. Early defervescence; interrupted crisis.

those of a tuberculous character, as pulmonary consumption, is of well-marked remittent or of intermittent type.

The daily exacerbations or increase of fever occurs, as a rule to which there are very few exceptions, in the afternoon or evening; the remissions or falls in the morning. In rare cases of general tuberculosis and still less frequently in typhoid fever this order is reversed, the rise occurring in the morning and the decline in the evening. The fever is then said to be of "Inverse Type."

The range of the temperature after it has reached its height is called the *Fastigium.*

The decline of the fever is known as the *defervescence.* It is usually gradual, the remissions between the evening and morning exceeding the evening exacerbations until the normal is again established. This form of defervescence constitutes *lysis.* On the other hand, the decline of the temperature is sometimes abrupt, the temperature falling in the course of a single night or in a few hours from a considerable height to the normal or below it. This is known as a *critical defervescence,* or *crisis.* It is very often attended by some critical discharge, as of sweat or diarrhœa, and is sometimes followed by collapse.

Marked irregularity of the temperature curve of a fever usually indicates some disturbance or complication.

A gradual fall of temperature often precedes death; in some cases of fever, however, the temperature rises as death draws near (*preagonistic rise*), and it may

even continue to rise for a short time after dissolution has taken place.

A transient rise in temperature after defervescence has taken place is called *recrudescence;* a recurrence of fever with the other symptoms of the original attack, lasting several days or weeks, constitutes a *relapse.* Recrudescences are due to accidental causes; relapses to reinfection: the former are usually of trifling importance; the latter always serious, sometimes fatal. In order to at once detect these occasional recurrences of fever the temperature ought to be systematically taken for at least a week after it has fallen to the normal range.

Instances of two or more relapses—*multiple relapse*—are of occasional occurrence. That form of relapse which begins before the defervescence from the primary attack is completed is known as *intercurrent relapse.* The reinfection which causes relapse may be from outside the patient's body or from within. In both cases the infecting germ becomes active before immunity is established.

II.

FEVER-NURSING IN GENERAL—*Continued.*

Essential Fevers Infectious Diseases—Classification of Fevers: I. Continued, II. Periodical, III. Eruptive, IV. Fevers with marked Local Manifestations—All Fevers Really Symptomatic—Causation of Symptoms—Symptoms Common to the Fevers—The Nervous System—Organs of Special Sense—The Digestive System—The Circulatory System—Blood-Pressure Estimation—The Respiratory System—The Skin—The Urine—Different Plans of Treatment: I. The Symptomatic, II. The Expectant, III. The Rational, IV. The Specific.

THE Essential Fevers are acute general infectious diseases. The original cause or infecting principle of most, if not all, of them is a specific minute organism or germ, different in character in the different fevers. That such a germ is the cause of most of the fevers has been demonstrated, and it may be assumed to be the case in regard to the others. Upon no other theory is our accumulated knowledge concerning the fevers to be explained. These germs, which are derived either directly or indirectly from a previous case of the same kind of fever in the continued and eruptive fevers, and from a previous case by means of a variety of the mosquito called *Anopheles*, which by its bite transfers the specific blood parasites in the malarial fevers, and from a previous case in yellow fever by the bite of another mosquito, *Stegomyia fasciata*, find their way either by inhalation, or, as

is more probable, along with the food or drink or by the inoculation by insect bites into our bodies. There finding the conditions of warmth, moisture, and nutriment suitable, they undergo rapid and enormous multiplication, invading the tissues of the organism far and wide, and either by their presence directly, or by the action of subtile chemical principles called toxins produced by their presence and growth, they induce wide-spread disturbances of the functions of the body, manifested by symptoms which, taken together, constitute the disease. These symptoms show themselves in a progressive series, and though differing in different cases, particularly in intensity, obviously conform more or less closely to a common type. Among them, that which is almost invariably present and characteristic is fever. Upon close investigation we are impressed with the large part played by disturbances of the nervous system in the production of the symptoms. Not less striking is the fact that these diseases are self-limited; that is, that they tend to come to an end within a definite time; or that they are self-protective; that is, that a person once having suffered from a particular fever becomes immune, that is to say, is not likely to be attacked by it again. The malarial fevers are neither self-limited nor self-protective.

Certain of the fevers, differing in themselves, possess prominent features in common. They are, therefore, arranged together in groups. Thus we have

I. The Continued Fevers, characterized by the sub-continuous range of the temperature, as Typhoid or Enteric Fever;

II. The Periodical Fevers, characterized by the completeness and long duration of the remissions or intermissions, as the Agues;

III. The Eruptive Fevers, characterized by a well-marked eruption on the skin, as Scarlet Fever, Measles, Small-pox; and

IV. Fevers with marked local manifestations, as Rheumatic Fever and Pneumonia.

This classification is not scientific. Enteric or typhoid fever is looked upon as the very type of a continued fever. Yet it presents an eruption which though slight is very often seen, and when present is very significant. Typhus, another of the continued fevers, is accompanied by a very marked eruption. Cerebro-spinal fever, which I have classed among the fevers with marked local manifestations, is sometimes grouped with the continued fevers and sometimes with the eruptive fevers, as "spotted fever." The difficulty in classifying the fevers arises from the fact that there is no common principle of division applicable to them all. The classification above given is convenient, and in many respects the best at present available.

Certain diseases, as small-pox, measles, and typhus, are wholly contagious; that is, they are only caused by material derived from the bodies of those suffering from them. It is not to be understood that direct contact of person with person is necessary, though this is a very frequent method by which transmission is effected. Transmission takes place by indirect contact in a thousand different ways, and the corpses of those dead of such diseases may become a source of contagion to the living.

The articles of clothing and other innumerable substances by which contagion may be conveyed are spoken of as *fomites*, or carriers of the infecting principle.

Other diseases, of which the malarial fevers, yellow fever, and vaccinia or cow-pox are examples, are only inoculable. They are not transmitted from the sick to the well by the ordinary means of contagion, but by the insertion of the virus by the lancet of the operator in vaccination or by the sting of the mosquito in malaria and yellow fever.

A third group of diseases, which includes enteric or typhoid fever, cholera, and dysentery, are neither directly communicable from person to person by ordinary contact on the one hand, nor are they propagated by inoculation on the other hand. In these diseases the infecting principle is eliminated from the body by the bowels and urine, retains its power of infection, and under favorable circumstances even may undergo an increase for a longer or shorter time outside of the body. To the accidental contamination of drinking-water or of food by the evacuations of the patient is to be attributed the spread of such diseases, the germs which occasion them having a continued existence, sometimes within the bodies of the victims of the disease, sometimes outside of them, in drains, sewers, cesspools, dung-heaps, and the adjacent moist soil into which their contents may have leaked, and in wells, cisterns, or even running-streams, accidentally contaminated, as well as in mattresses, bedclothing, and apparel that have been soiled by the evacuations of the patient and not subsequently subjected to effectual disinfection.

For these reasons this group of diseases is sometimes spoken of as "water-borne" diseases. This term is misleading because it falls far short of the truth. They very often are "milk-borne and food-borne" and borne by dirty hands and by "house flies," in and upon which the germs of cholera and of enteric fever have been discovered during recent epidemics of these diseases.

The results of modern antiseptic surgery and of antiseptic midwifery show that when foreign matters, and in particular the disease-causing germs which abound in and around our dwellings, can be excluded by strict surgical cleanliness and disinfection, serious wounds and lacerations of the tissues heal without fever. The so-called surgical or septic fevers which otherwise occur are symptomatic fevers. But we have seen that the fevers spoken of as essential are made up of the symptoms produced by the presence and working of certain germs. As a matter of fact, the division of fever into essential and symptomatic is an artificial one, the distinction between them from the stand-point of causation being rather apparent than real.

The attendant upon the sick, who understands the nature of contagion and the mode of communication of the different diseases, will not regard the details by which the spread of such diseases is prevented as irksome, nor discharge her duties in this respect in a half-hearted and time-serving manner. On the contrary, these will be among the most satisfactory of her labors, and their thorough performance will find its reward in the knowledge that in it lies the prevention of untold

suffering and sorrow. The importance of effectual isolation and disinfection in cases of those infectious diseases in which the infecting principle is developed only in the bodies of the sick and communicated by direct or indirect contagion, becomes evident when we reflect that in theory it would be possible by the universal application of these measures to utterly "stamp out" such scourges to the human race as small-pox, scarlet fever, and enteric fever. The art of preventing diseases is not only more certain in its working, but it is also vastly more beneficent in its results than the art of curing diseases. Whether or not preventive medicine will ever in its practical workings realize the theoretical possibility of wholly stamping out any contagious disease, remains for the future of our civilization to show. When such a possibility is universally understood, and when it is regarded as an attainable goal towards which public and private efforts are to be steadfastly directed, then and not till then will its realization be near.

The symptoms of a fever are not all due to the direct action of the infecting principle upon the organism. Certain, perhaps many, of them are the result of the febrile process itself. Others are the result of derangement of the nutritive processes, caused in part by the infective matters, in part by the fever. Yet others are caused by the absorption of disordered and decomposing secretions, which produce a secondary infection or blood-poisoning quite different from that proper to the original cause of the disease, but serious in itself and often sufficient, in the already enfeebled state of the patient, to turn the scale and bring about

the fatal result. Thus, for example, the sore throat, the chill, and vomiting at the beginning, and the sudden rise in temperature in scarlet fever are due to the direct action of the germs or infecting principle of the disease, or the poisons—toxins—which they produce; the pallor, which is so striking after the rash has faded, the rapid loss of flesh, and extreme weakness are due to the derangement of the functions of the body by which its nourishment is carried on, and are, in fact, the result of the action of the infecting principle on the blood and tissues, and in part the result of the derangement by the fever of the glandular apparatus by which the fluids necessary to digestion are secreted. Finally, in certain cases of scarlet fever there is retention, then decomposition, of the morbid secretions of the throat and nose, and, as a consequence, secondary blood-poisoning, or septicæmia, with prolongation of the fever, the formation of abscesses, and still greater wasting and prostration.

It is not always possible for us to say what symptoms are due to one, what to another, of these causes, but it is the duty of the physician to investigate each symptom closely, and to diligently seek out the cause of every unusual or excessive symptom. It is the part of the nurse to observe and report to the physican at his visits changes in the symptoms of the case and the recurrence of new symptoms. Habits of close observation and a little experience will enable her to recognize the symptoms which are characteristic of the disease and those which are unusual, and to distinguish between those which are important and those which are trivial.

The following are among the symptoms of the fevers

which are important. They are arranged in groups which refer to the physiological systems, as the nervous system, digestive system, and so on, but it is not to be forgotten that these bodies of ours are marvellously complex organizations, and that arrangements of topics and divisions of subjects that are convenient for description and the purposes of teaching are largely artificial. At the bedside, it is not always possible to tell at once what system or organ is at fault in causing a given symptom. For example, vomiting may be either caused by a fault in diet or by medicine or by some condition of the stomach itself, or it may be the result of disease of the brain or of the kidneys, or indeed of other organs; or retention of urine may be caused by spasm of the neck of the bladder or by paralysis of its walls, or simply by such a dulness of the whole nervous system that it fails to appreciate the ordinary sensation of a full bladder and to act upon the suggestion.

The fever itself has already been sufficiently considered.

THE NERVOUS SYSTEM.

Headache is one of the earlier and more constant symptoms of fever. It is most severe in the early days of the attack, and often abates or disappears entirely upon the advent of delirium. The seat of the pain is usually in the forehead and temples; sometimes it is general; less frequently it is most severe in the back of the head. The character of the pain is described by patients as being dull, heavy, binding, throbbing, or

bursting. It varies in degree from slight heaviness or dulness to an indescribable agony.

Vertigo, or *Giddiness*, is very often associated with headache in the early days of fever. It is aggravated by sitting up. Giddiness may also occur in attempting to sit up at the close of an attack. It is then due to weakness and anæmia.

Pains in the Back and Limbs are present in the early days of many fevers. They are sometimes very severe, and are likened to the soreness of bruises or to cramps. They sometimes recur during convalescence.

Chills, or *Rigors*, are common at the onset. They are accompanied by a rise of internal temperature and marked, often distressing, coldness of the surface and extremities; by sensations resembling streams of cold water running down the back, by shivering, chattering of the teeth, pallor of the countenance, blueness of the lips and finger-tips, and feelings of distress.

A chill may occur during the course of a fever in consequence of some sudden change or complication. It is an important, sometimes a serious symptom, and should at once be reported to the physician.

Impairment of the Mental Faculties is a usual accompaniment of the fevers. It varies in intensity from mere indifference or dulness to maniacal delirium or stupor from which the patient cannot be aroused. The nature of the mental disturbance is much influenced by the habits and character of the patients. Persons of refinement and cultivation, brain-workers, those who have been subjected to mental anxiety or fatigue, and

the intemperate are especially liable to early and severe mental disturbances. The character of the fever and the severity of the attack also exert an influence in determining the severity of this group of symptoms. Other things being the same, the severity of the mental disturbance is a measure of the gravity of the sickness. Mental impairment is sometimes rapidly developed: as a rule, however, it comes on slowly, and reaches its height at the height of the attack.

Delirium is among the more frequent of the mental symptoms. It is sometimes among the first manifestations of an attack of fever, and it has happened that patients ill of fever have, from the early appearance of delirium, been supposed to be insane. More commonly it is developed in the course of the disease, and in the low fevers, as typhus and enteric, delirium comes on at the end of the first or the beginning of the second week. The general derangement of consciousness, with incoherence of thought and action, which constitutes delirium, is manifested in many ways. Three forms are in general described: a. *Low, Muttering,* or *Wandering Delirium.* The patient lies motionless, or simply moves his hands or fingers, fumbling at the bedclothes, taking little or no notice of the objects around him, and muttering or mumbling in a low voice, for the most part unintelligibly and always incoherently. He is not difficult of restraint, but is liable to start up suddenly or even to leave his bed in obedience to a momentary influence. It is not to be forgotten by the nurse that occasionally violent maniacal delirium is suddenly developed in the midst of this form. b. *Wild* or *Raving Delirium.* The

patient is maniacal. His utterances are noisy and incoherent; his actions violent and fantastic; both are determined, not by external impressions, but by the fleeting and purposeless phantasies of a disordered brain. Yet both speech and action may for a moment be made subservient to a clear design, as when in the delirium of fever the attendant has been asked to go out of the room on some plausible pretext, and the patient has in her absence jumped headlong from the window or cut his throat with a razor. The patient is often violent in demeanor and restrained with difficulty. c. *Delirium Tremens.* This form is encountered in alcoholism. It is also seen in fevers which have attacked persons addicted to alcoholic excesses, but it may occur in fever patients who have led temperate or even abstemious lives. The patient is restless and agitated; the hands, arms, and lips tremble incessantly, a symptom which is increased by movement; hallucinations of sight and hearing of a terrifying and loathsome character occur; and the whispered, muttered, and often startled ravings betray the fears and terrors by which the patient is possessed. It is very rare that in this form of delirium the phantasies of the patient assume, even momentarily, a pleasing or agreeable shape.

When delirium first appears it is transient, occurring at intervals during the night, or it may last throughout the night, ceasing in the morning, to return again at night. Persons quite rational during the day are often very delirious at night. In the course of a day or so the delirium becomes continuous, but as a rule it is worse at night; or the patient may be wakeful and

delirious at night, stupid and drowsy during the day. Active delirium may pass into stupor, or into the low muttering form, and it gradually passes away as the patient's general condition improves.

Somnolence.—The patient lies upon his back with the eyes closed, quiet and motionless; if spoken to, he opens his eyes, sometimes utters a laconic reply, more frequently none at all, and quickly relapses into his former lethargy. This condition is usually preceded by and alternates with delirium.

Stupor is the term applied to the state of unconsciousness from which the patient may be aroused, but with difficulty.

Coma.—A condition of profound insensibility. In fever cases coma may be followed by death in some hours or days. Patients, however, occasionally recover after having been for several days in a condition of insensibility from which it is impossible to rouse them.

Coma-Vigil.—A peculiar condition, in which the patient lies with his eyes wide open, gazing at nothing; his mouth partly open, his face pale and expressionless. He is evidently awake, but absolutely insensible to all that is going on about him. At the same time there are all the evidences of profound depression of all the forces of life. This condition almost always ends in death.

Prostration.—Loss of strength is a prominent symptom in the fevers. It is often early shown, almost always as the fever passes off. The patients suffer from sensations of feebleness and lassitude. The mus-

cular weakness may be masked by the activity of delirium. It is a sign of this weakness that the patient lies motionless upon the back with the hands crossed over his body and the head sunk into the pillow, and that the whole body gravitates towards the foot of the bed.

Tremor.—Trembling of the hands and tongue is often observed in the low fevers. This symptom always indicates great prostration. It is apt to occur in aged or previously infirm persons and in those habitually given to the abuse of spirits.

Other movements that occur in conditions of great depression and are of grave import are *spasmodic twitchings of the muscles, picking* and *fumbling at the bed-clothes,* and *obstinate hiccough.* The twitchings affect especially the face and wrists, and are called *subsultus tendinum;* the fumbling or *corphologia*—literally the picking of chaff—is sometimes associated with curious grasping motions at the empty air, and the hiccough, which is produced by spasmodic movements of the diaphragm, or midriff, may continue, despite treatment, for hours or days.

Convulsions.—General convulsions may occur during an attack of fever, and are very common at the beginning of the eruptive diseases of childhood. In adults they occur late in the course of the disease, and are usually either hysterical or uræmic in character. In very rare instances they are due to disease or inflammation of the brain or its membranes.

Uræmic convulsions are associated with failure of the kidneys to perform their functions properly. They are of unfavorable import, and require prompt atten-

tion. Suppression of urine often precedes uræmic convulsions. A specimen of urine must be submitted for examination. It may be necessary to procure it by the use of the catheter.

THE ORGANS OF SPECIAL SENSE.

The Eyes are apt to be bright and moist at first, dull and dry at the edges of the lids later. There is often intolerance of bright light—*photophobia.* The condition of the pupil varies.

Ringing and other Noises in the Ears are common in the early stages of fever, and again in convalescence. *Deafness* is not uncommon, especially in enteric fever. Inflammation of the middle ear is a frequent complication in the fevers of childhood. In such cases there is apt to be a discharge from the affected ear, at first of a watery fluid tinged or not with blood, as the case may be; later of pus. If neglected, these discharges soon become offensive. They are attended with the danger of the development of mastoid disease.

Bleeding of the Nose occurs in enteric fever with great frequency. It may occur spontaneously or it may be brought on by the patient picking his nose. It is sometimes copious, oftener scanty. It occurs also with more or less frequency in other fevers.

The Sense of Taste is almost always perverted in fevers, sometimes it is for a time wholly lost. Nearly everything tastes bad. Sweets are especially unpleasant, acids are preferred; cold water is always relished.

THE DIGESTIVE SYSTEM.

The Tongue.—This organ denotes the disturbance of the organs of digestion. It is at first coated with a

whitish or yellowish, sometimes pasty, fur or it may be of a brighter red than normal. Afterwards it usually grows dry, and may become hard and leathery. It is sometimes in severe cases contracted into a ball and cannot be protruded. It is then usually covered with a dry, dark-brown or black cracked crust. With convalescence the tongue becomes clean and moist at the tip and edges, and gradually cleans off.

Sordes.—Collections of brown or black material, consisting of accumulated débris from the epithelial layer of the mucous membrane of the mouth, darkened by drying or by admixture with blood which oozes from the edges of the gums, form upon the teeth and lips at the height of severe cases of fever.

Thirst is constant and often extreme.

Loss of Appetite is one of the earliest and constant symptoms of fever, and usually lasts till the disease takes a favorable turn. A demand for food may generally be regarded as a favorable sign, although no improvement may yet have taken place in the other symptoms.

Nausea and *Vomiting* are not common in the fevers. Scarlatina often begins with vomiting in the night.

Persistent vomiting is an unfavorable sign. It may occur in enteric fever as a symptom of peritonitis, and is frequently associated with complications involving the kidneys.

Tympanites.—Distention of the abdomen is common in enteric fever and in grave cases of pneumonia.

Constipation is the rule in fevers; diarrhœa the exception. In enteric fever and measles, diarrhœa is a common symptom.

THE CIRCULATORY SYSTEM.

The Pulse varies in frequency and force. It may be in enteric fever even slower than in health. As a rule, it is much more rapid, varying from 100 to 120 in the adult, and running up to 180 in children. Its frequency increases with the severity of the general symptoms. A pulse exceeding 120 in the adult is an indication that the case is severe.

A gradual fall in frequency is a favorable sign. The pulse sometimes, like the temperature, falls below the norm in early convalescence. A decided increase in frequency after a fall denotes the advent of some complication. The pulse is much accelerated by movement, and especially upon the patient first resuming the upright or sitting posture. In taking the pulse-frequency, therefore, it is important that the patient be in the recumbent posture and have for some time lain quiet.

The pulse is in some fevers full and bounding in the early days of the attack; in others soft and compressible from the beginning. Later in the course it is usually soft in all. In the second week of typhus it is often undulatory or irregular in force or actually intermits—*arrhythmia.* Both very rapid pulse and very slow pulse occasionally occur after severe febrile illnesses in nervous persons.

Blood-Pressure Estimation.—This procedure becomes necessary in certain cases of the acute infectious febrile diseases. The instrument used is called the sphygmomanometer—*measurer of the pulse.* There are many varieties constructed upon two essentially different principles. As observations at fixed inter-

vals may be required, the nurse should have a knowledge of the mode of application and the readings. In enteric fever hypotension or low systolic pressure occurs with great constancy—120 to 100 or below. A gradually progressive fall indicates increasing failure of vaso-motor tonus; a sudden fall actual collapse or hemorrhage. A sharp rise of pressure attends the occurrence of perforation. In the peritonitis that follows, the pressure falls and as death approaches hypotension becomes extreme.

In pneumonia subnormal pressures are common; in severe cases they are the rule. A rapid fall may precede collapse or the fatal issue.

When arterial pressure expressed in millimetres of mercury does not fall below the pulse-rate expressed in beats per minute, the fact may be taken as of excellent augury, while the converse is equally true (Gibson).

THE RESPIRATORY SYSTEM.

The Respiration is often hurried, especially in complications which implicate the lungs.

Cough is usually present in cases complicated by bronchitis or congestion of the lungs. In severe cases of the low fevers grave pulmonary disease may develop without the occurrence of special symptoms.

THE CUTANEOUS SYSTEM.

The Skin is, as a rule, hot and dry; in rheumatic fever, it is often bathed more or less copiously in perspiration.

General Hyperæmia of the Skin.—There is often in the fevers, and especially in children and others whose skin is naturally soft and actively supplied with blood, a general redness or flushing of the surface, quite independent of any rash or eruption. This redness, which disappears on pressure with the finger, leaving a white streak, which remains for some minutes, usually shows itself early in the attack, and lasts but a short time. A similar redness often precedes the appearance of the rash in the eruptive diseases.

Sudamina.—Little clear water blisters, resembling minute pearls, often crop out in great numbers over the surface of the body, and particularly over the belly, in the sweating stage of the fevers. They are unattended by inflammation and have no significance whatever.

Desquamation, or Peeling.—The outer layer of the skin is apt to scale off in minute particles or shreds after the fevers, especially after those attended by eruptions. This process is very complete after scarlet fever.

The various eruptions will be described in the proper place in connection with the descriptions of the different fevers.

THE URINARY SYSTEM.

The Urine in fever undergoes important changes.

The Quantity varies with the amount of fluid taken into the body and the quantity gotten rid of by way of other channels, such as liquid discharges from the bowels and perspiration.

During the first week of the continued fevers and

the early days of the fevers of shorter duration, the quantity of urine is usually less than the normal by as much as one-third or one-half, notwithstanding the large quantity of water which the patient takes and the absence of perspiration. The quantity of urine voided is usually increased in the later stages of the attack, but occasionally there is suppression. During convalescence the quantity is almost always greater than normal.

The Color is usually dark during the early stages of the attack, and especially while the amount is small. Later, or whenever the quantity is increased, the color becomes lighter and clearer. The urine in fever, though clear when passed, is apt to deposit on cooling a cloudy sediment, varying from a light dust color to brick-red. This sediment consists of urates, and is one of the results of the excessive waste of the tissues of the body. The urine presents other very important alterations in its physical and chemical properties during fever, which require its systematic examination by the physician.

THE TREATMENT OF FEVERS.

Although the nurse is in no way concerned in determining or arranging the treatment, it may not be without value in rendering her work more intelligible to her to explain the different plans by which the fevers are treated by physicians. No one of these plans is usually strictly adhered to throughout. Modifications may become necessary in any case, and must then be unhesitatingly adopted. But the wise physician has a plan, and although he may not explain it in so many

words to the nurse, it quickly becomes evident from his directions. The better the plan is the more obvious it will always be, and usually the more simple.

Notwithstanding the great number of methods and the innumerable drugs employed in the treatment of the fevers, they may all be referred to one or another of five general plans:

I. The Symptomatic.

II. The Expectant.

III. The Rational or Expectant-Symptomatic.

IV. Hydrotherapy.

V. The specific, including the therapeutic use of serums, bacterins, phylacogens, tuberculins, glandular extracts, toxins, cultures, antigens, and other agents of a similar nature, all of which are the outcome of animal experimentation and are prepared in biological laboratories.

I. *The Symptomatic Plan.*—In the early days of knowledge of diseases and among those imperfectly informed concerning their causes and natural history, the treatment of symptoms is the only reasonable method. If the patient be chilly, to warm him; if he have fever and thirst, to cool his burning temples and place water to his parched lips is not only humane, but is the one course open to the physician who can no longer place dependence upon supernatural methods. To relieve constipation by purgatives; to control diarrhœa by appropriate remedies, and so on throughout the series of symptoms which taken together constitute the fever, is to act in accordance with this plan.

But even in the absence of exact knowledge concerning the causes and nature of diseases, the symptomatic plan does not work well. To be sure, the control of a

symptom may be absolutely necessary to save life, as when the heat of the body reaches that intensity which of itself speedily kills, or when hemorrhage threatens to prove fatal, or diarrhœa is reducing the patient's strength beyond the limits where recovery can take place.

But the ordinary symptoms are not easily controlled. If checked for a time, they return, or other symptoms assert themselves with renewed violence, and when all is done by this plan, the patient remains as sick as before until the fever runs its course. When this came to be fully understood, a new plan arose.

II. *The Expectant Plan.*—The fevers being self-limited and running a definite course, which is little or not at all modified by treatment directed against symptoms, and the tendency being to recovery in all uncomplicated cases in which the patient's strength holds out long enough, it is evident that a proportion of the cases will recover if well nursed, properly fed, and protected from unfavorable influences. This is the expectant or waiting plan. Under this treatment a majority of the cases of all fevers would probably recover, the proportion being determined by the virulence of the infection, the powers of resistance of individual patients, their proneness to complicating diseases of particular organs, the presence or absence of previous chronic diseases, and the efficiency with which the hygiene of the sick-room, the feeding and the nursing in general, may be carried out.

But we have already seen that certain symptoms must be treated at times because they threaten life. Moreover, those who have most closely studied the fevers know that in large numbers of cases a

majority will recover under the expectant plan, a few will die under any plan, and a considerable number that would certainly die under the expectant plan may be saved by the prompt and judicious treatment of symptoms. To adopt the expectant plan in all cases would be simply to fold our hands and let a certain number of patients who might be saved die. Furthermore, by the proper treatment of certain symptoms it is in our power not only to occasionally save life, but also to very often mitigate suffering.

III. *The Rational Plan.*—This consists in a combination of the symptomatic and the expectant plans. It is based upon a recognition at once of the value and the defects of both, and is the plan at present in vogue. We know that a fever will run its course. Therefore we take the best possible care of the sick man till his sickness has spent itself. At the same time we are on the alert for unfavorable symptoms. If he is restless, we soothe him; if the fever runs too high, we cool him off; if his heart flags, we give stimulants; if excessive diarrhœa is present, we seek to check it. But we do not place much reliance upon the mere treatment of symptoms, and we know that in doing so we cannot cure the fever or even shorten its duration. So long as the ordinary symptoms of his fever are of moderate intensity we let them alone.

IV. *Hydrotherapy.*—As fever is the chief symptom, a plan of treatment at first energetically directed against the fever, and really capable of modifying that symptom, would appear to have much in its favor. Hence the employment of cold water both internally and ex-

ternally, according to the rules formulated below. But it has been found that the judicious use of water in the treatment of these diseases produced favorable effects other than the temporary reduction of the temperature, and hydrotherapy has now assumed an important place in the management of fever cases. The method of treating enteric fever cases by systematic cold bathing, originally formulated by Ernest Brand, of Stettin, in Germany, is now in use in many of the larger hospitals in this and other countries.

V. *The Specific Plan.*—The tendency of modern thought in medicine is to pay increasing heed to the causation of disease. Out of this tendency has grown up the whole subject of Preventive Medicine. From the study of diseases we have gone on to the study of their causes. The medical profession has cast off superstition. No longer is the anger of the gods, or the possession of demons, or an offended Providence invoked in explanation of a pestilence.

We know that the causes of the fevers, whether occurring in single cases scattered among the people,—*sporadically*, as the doctors say; or here a few, there a few, throughout a community,—that is, *endemically;* or in great numbers at once so as to constitute *epidemics*,—the causes of fevers are actual substances; and we further know that in many of the fevers these substances are minute organisms or germs, and this leads us to suspect, with very good reason, that germs of a similar kind produce them all. As these germs multiply enormously in the body of the sick man, each case of fever becomes directly or indirectly a focus or centre of

infection, and the cases thus caused become in their turn centres of infection. In this way the disease spreads. But the germs cast off from the bodies of the sick lose their vitality under unfavorable conditions and become incapable of causing sickness. Among the conditions unfavorable to them are cleanliness, fresh air, and sunshine. They are, as we have seen, at once destroyed by disinfection. By such measures is the spread of disease arrested. It has been thought that what Preventive medicine does outside the body, Curative medicine might do, to some extent at least, after the germs have found their way into the body and commenced to do their evil work there. The disinfectants and germicides are poisonous. It is obviously impossible to destroy the germs of disease in the body without causing at the same time the death of the body itself; that is, by our ordinary means of disinfection. But our experience with quinine in the malarial fevers and arsenic in the form of salvarsan in syphilis warrants the hope that remedies may yet be found that will act in a like *specific* manner upon other fever-producing organisms inside the body itself. It is quite reasonable to hope that the means may yet be brought to light by which, without risk to the human organism, its fluids may be rendered less favorable to the nurture and growth of particular disease-germs. This is constantly done in regard to small-pox by vaccination. Like results have been worked out in diphtheria, in hydrophobia, and the plague. These achievements belong to Preventive Medicine. Curative medicine is seeking the specific means by which the fevers, even when they

cannot be cut short, may be rendered less severe and fatal than at present. Treatment having this end in view is known as the Specific Plan. Its most brilliant results have been accomplished in the use of the blood-serum of animals artificially rendered immune to particular diseases. They are both curative and preventive. The property by which curative serums destroy the organisms which cause disease is spoken of as bactericidal; that by which they counteract the poisons produced by bacteria, as antitoxic. This method is comprehensively known as Serum-therapy. It is directed not against the symptoms, but against their cause. It does all that is done by the expectant plan; it stands ready to do all that the symptomatic plan can possibly do. It is more rational than the rational plan, because its efforts are directed at causes rather than at effects. Allied methods are Preventive and Curative Vaccinations, which have proven especially valuable in enteric fever, influenza, whooping-cough, pneumonia, rabies, some forms of septic infection, and other febrile and afebrile affections; and Organo-Therapy, which has shown remarkable results in diseases arising in consequence of disorder of the functions of certain glands which produce an internal secretion, as, for example, the thyroid gland, deficiency of absence of its internal secretion giving rise in the infant to a form of idiocy—cretinism, and in the adult to myxœdema. In this connection we do not for an instant overlook the fact that it is the sick man, not the disease, who is to be treated, and that under no circumstances is actual harm to be done in the hope of doing possible good.

III.

FEVER-NURSING IN GENERAL—*Concluded.*

Duties of the Nurse in regard to Various Symptoms—The Patient's Bed, Clothing, Room, Toilet—The Fever—External Antipyretics: Sponging, Compresses, Ice, the Cold Pack, Cold Baths, Cold Affusions, Iced-Water Injections—Nurse Management of the Nervous Symptoms—Of Symptoms relating to the Organs of Special Sense; to the Digestive Organs—Drinks, Fever Foods, Alcohol — Pulse-Taking—The Respiration — Cough—The Urine.

THE duties of the nurse in the sick-room now demand our attention.

The physician determines the general plan of treatment and arranges the details. The nurse reports to him the course of the case during the intervals of his visits, especially any changes that may have taken place, and carries out his directions. Their work is mutually interdependent; their responsibility separate and distinct. No amount of skill or experience will warrant the nurse in assuming a responsibility which does not belong to her. The best nurses are among those who recognize most fully the line which separates their duty from that of the doctor. The doctor who protects the nurse in this respect by telling her beforehand what to do in possible emergencies is wise. But the unlooked for happens at every turn. In what follows I speak of things that every nurse must know. It is

knowledge that trenches in no way upon the province of the doctor. How far the nurse may go in interrupting a prescribed plan, or in acting, without previous explicit directions, upon the occurrence of an emergency against which no provision has been made in the doctor's instructions, the nurse herself must decide. The welfare of the patient is immeasurably above all other considerations. To know how, without knowing when to do, is a poor kind of blundering knowledge.

GENERAL CONSIDERATIONS.

The fever patient should lie upon a moderately firm but elastic mattress, which is protected against involuntary discharges by a strip of oiled-cloth or mackintosh and a draw-sheet across the middle. The head should be rather low than high, a single large pillow or bolster being more convenient than two. In severe or prolonged cases a single bed is more desirable than a wide bedstead, and a well-made iron hospital bed better than any other. The covering should be light and often renewed, except in highly contagious fevers, such as scarlet fever, small-pox, and typhus, when infrequent changes lessen the danger of disseminating infection. The patient may wear his ordinary night-dress, unless he has been accustomed to wear drawers or pajamas, in which case he should have a long night-shirt slit down at the back. This kind of garment should also be provided for children instead of night-drawers.

In changing the clothing and bedding, the precaution of having the fresh articles well aired and warmed

must be observed, and where the condition of the patient requires it, the night-dress may be slit up in front and secured with tapes, and the bed may be made up one side at a time, and the patient lifted over, as in obstetrical cases.

The room should be large, airy, and well lighted. It ought to have little or no furniture in it except that required by the patient and the nurse. Hangings, pictures, and ornaments must, in contagious diseases, be removed. An open fire-place, in which even in warm weather a stick or two may be occasionally burned, promotes ventilation. Much trouble is saved if there be a bath-room and water-closet near at hand.

The medicines, with the cups, spoons, and other utensils of the sick-room, must be neatly arranged in proper and convenient places; the disinfectants in a place by themselves; everything must be washed and restored to its proper place as soon as possible after having been used. No dirty dishes or soiled vessels of any kind are to be allowed to stand about the sick-room. Ice should be cracked before being brought into the room; it is best kept in the hollow of a flannel, tied over the mouth of a deep bowl or large mug, so that the water drips away as it melts. Convenient jars, with covers, for keeping ice in the sick-room are sold in the shops.

Disagreeable odors are gotten rid of by cleanliness, ventilation, and sprays of Labarraque's solution or the formalin lamp. Direct disinfection of the patient's person may be necessary. Cologne-water is only to be used when it is grateful to the patient. It is often

objectionable. All discharges are to be at once disinfected and removed.

The patient's toilet should be made morning and evening. His face and hands are to be washed; his mouth rinsed or washed: the tooth-brush used if he desires it; his hair gently brushed.

The long hair of women should be plaited and laid up over the pillow. Severe cases of fever are usually followed by loss of hair. It is often desirable to cut it off during the sickness; occasionally it is necessary to do so. As a rule, the hair lost after an acute sickness grows in again.

A sponge-bath once a day with tepid water, to which may be added a little alcohol or bay rum, or Labarraque's solution, is always useful and usually grateful to the patient. The feet should be regularly bathed.

If the patient be permitted to rise, the commode should be brought to the side of the bed. Due precautions against taking cold must be taken. Patients weak enough to require support ought to use the bed-pan. Most persons at first object to using this vessel; many declare that it is impossible for them to use it. There are very few who cannot use it if they will. The urinal ought to be regularly used. It saves much wearisome getting up and down. The person and the bed must be kept dry.

THE FEVER.

In mild cases the fever as a symptom demands very little attention on the part of the nurse. A temperature range not exceeding in the morning 102° F., or

103.5° F. in the evening, in an acute case, may well take its course. When higher temperatures occur, the fever itself, as a symptom, may call for action. Treatment directed against fever is called *antipyretic* treatment; the means employed are called *antipyretics*. Among them are a number of drugs which possess the property of lowering febrile temperatures with great promptness. When drugs are used for this purpose the nurse is usually informed of it beforehand. Her duty is to closely observe and record the effects of the medicine. The temperature should be taken at intervals of an hour after the drug is given, or sooner if required. The fall is usually rapid; its extent varies from two or three to several degrees. It is associated with free sweating, and occasionally with a tendency to collapse. The drenching sweat may be dried by slipping the hand wrapped in a towel under the night-dress and thus mopping the surface. Dry towels can be slipped up in the same way and removed when wet. The prostration at times calls for restoratives, such as brandy, ammonia, hot bottles, hot blankets, and frictions. After a time the temperature rises again.

External antipyretics consist in the use of cold water and ice for the purpose of reducing high temperatures. This mode of treatment is carried out by the attendant in accordance with the orders of the physician, who selects the special application.

External antipyretics (measures to reduce fever),—

a. Cold Sponging.

b. Cold Compresses.

c. The Application of Ice.

d. The Cold Pack.

e. The Cold or Gradually Cooled Bath.

f. Cold Affusion.

g. Iced-Water Enemas.

a. *Cold Sponging.*—The water may be of the temperature of the room or cooled with ice. A little alcohol or vinegar may be added to it, or Labarraque's solution. A sponge or wash-cloth may be used, fully charged with water and more or less moderate friction, according to the sensations of the patient. In all use of water great care must be taken to protect the bed.

Every part of the body is in turn bared, washed, dried, and again covered. The spongings may be repeated at intervals of two or three hours. In the hands of a skilful nurse they not only add greatly to the comfort of the patient, but also exert a favorable influence upon the nervous system and circulation of the blood, by causing it to flow more freely in the vessels directly under the skin. They lower the temperature only slightly, unless the water be very cold and the spongings frequently repeated.

b. *Cold Compresses.*—For this purpose three or four thicknesses of old table linen or towelling, which is sufficiently loose woven to hold a good deal of water, is most useful. The compress is wrung out of water of the required temperature and reapplied as it becomes warm; or two compresses may be used alternately, each being cooled in turn by placing it on a block of ice in a basin or pan at the bedside. Cold compresses are often used for the head, and are commonly very acceptable to patients. They are without

appreciable effect upon the general temperature. Very large cold compresses extending over the entire thorax and abdomen and frequently renewed exert a decided effect upon the internal fever. The compresses are sometimes allowed to remain continuously in position, a small quantity of cold water being from time to time sprinkled over them to replace that lost by evaporation.

The flexible coils of pipe sold in the shops, known as Leiter's coils and made of lead-pipe or rubber, which may be fitted to the head, applied over the heart, or to other regions of the body in such a manner as to reduce local temperature by means of cold water flowing through them from a reservoir over the bed, exert an analagous but not exactly the same influence as the cold compress.

c. *The Application of Ice.*—Ice may be applied directly to the surface of the body, being rubbed gently over the skin. This is sometimes done in case of intense hyperpyrexia. Ice is more commonly applied by means of a bladder or gum ice-bag. It must be cracked into pieces the size of a walnut and introduced into the bag with a little water, the bag being about half or two-thirds full. The air is then squeezed out and the stopper adjusted. If the bag be filled, or air enough left in it to distend it, it will not conform itself to the part to which it is applied. A much more effectual method of applying ice to the abdomen or over the heart consists in spreading a thick layer of finely cracked ice between the folds of a coarse towel, which is then placed directly over the skin. This method requires constant watching, and is almost sure to wet

the bedding unless proper precautions are taken. It is not available for prolonged use.

d. *The Cold Pack.*—A blanket is spread evenly over a couch or cot, protected by a rubber sheet or mackintosh; over this blanket is laid a coarse sheet wrung lightly out of water of the prescribed temperature and folded once. The patient is lifted upon the bed thus prepared and quickly wrapped in the wet sheet by the attendant in such a manner that it lies as smoothly as possible over every part of the body except the head. If the extremities feel cold before the packing, they must be warmed by friction, or else not included in the packing.

So soon as the damp linen is everywhere in contact with the body, the attendant folds the blanket over the patient in the same way, first drawing over and tucking one side smoothly under and then the other, seeing that the chin is free and that the blanket is folded evenly, but without tension at the neck. Finally, the long end is drawn down and folded smoothly under the feet.

Three or even four thicknesses of wet sheets spread first upon the blanket are necessary to effectively reduce the temperature.

The reduction of temperature from a single pack is usually transient, and repeated packings, even to the number of five or six, are often administered, the rise of temperature being slower after each. When the temperature does not rise above normal, or when shivering takes place, the packing must not again be renewed. When repeated packings are necessary, two

beds or cots are used side by side, and the patient is lifted directly from one pack on to the other. The same effect is produced, but less completely, by unfolding the blanket and sprinkling the sheet afresh with cold water.

The patient is allowed to remain in the last pack from three-quarters of an hour to an hour and a half; at the expiration of this time the skin generally becomes pleasantly warm, and in many cases outbreaks of perspiration take place.

During the packing the pulse is felt at the carotid or temporal artery and the temperature taken in the mouth.

e. *The Cold or Gradually Cooled Bath.*—The use of baths in the treatment of fevers is extensively practised by the physicians of Germany, a majority of whom regard it as the most effectual plan yet devised. It is an old treatment, but was for a long time forgotten, and has been recently revived. It has not, however, been generally adopted in England or America. It is very extensively practised in Philadelphia, and as it is regarded with favor by many competent physicians, and as systematic cold baths may become necessary as the only means of saving life in cases of hyperpyrexia, a knowledge of this treatment is essential to the skilful fever-nurse. The gradually cooled bath is generally employed. The quantity of water used should be sufficient to wholly immerse the body of the patient. The tub must stand if possible at the bedside. In hospitals it is better to roll the patient's bed into the bath-room. Patients who are severely ill should be lifted into the bath and there held and supported. During

the bath the skin should be gently rubbed. The temperature of the water should be about 90° F., or even higher than this, at the first bath, and also for elderly, sensitive, and timid persons. As the patient becomes accustomed to the bath it is gradually cooled by the addition of cold water to 80° F., or lower. Under no circumstances should it be cooled below 65° F. It is rarely advantageous to reduce the temperature of the bath below 70° F. The average duration of the bath is ten minutes. But if shivering or great uneasiness occur, the patient is at once lifted into bed, placed upon a sheet previously made ready, and wiped dry, with brisk rubbing of the extremities and back. The moist sheet is then removed. The patient is covered up, and some hot soup or wine, or brandy and water, administered. The temperature is not always immediately reduced, but—as measured in the rectum—usually falls within an hour from one and a half to four or five degrees. In the course of some hours it rises again, and the bath is then repeated. If cold baths are not well borne, good results in lowering the temperature often follow prolonged lukewarm baths. Sometimes it becomes necessary to repeat the bath four or five times in the course of twenty-four hours. A patient who is quietly sleeping, even if his temperature be high, should not be immediately placed in the bath upon being aroused.

When young children are treated by this method, the temperature of the bath at the beginning should be warm, and a blanket spread over the tub, in which the little patient is gradually lowered into the water.

Not only is the temperature lowered by this means, but also a very favorable influence is exerted upon the state of the nervous system. In enteric fever the intellect clears up, the dulness diminishes. Under this treatment bed-sores are less frequent.

Instead of the bath gradually cooled down, a cold bath of 65° F. to 80° F. is sometimes employed.

In cases of hyperpyrexia, such as are sometimes seen in rheumatic fever, a still bolder use of this method of cold-water treatment is necessary to save life. The baths must be then colder, more prolonged, and repeated at shorter intervals.

f. *Cold Affusions.*—While the patient is in the tub, cold water—60° F.—is thrown from a pail, or by means of an ordinary garden-sprinkler, over his head, face, neck, shoulders, and chest. This is repeated once or twice just before he is removed from the bath. It is done rather for the sake of its good effects upon the nervous system in cases of great stupor and other evidences of serious nervous derangement than merely as a means of reducing high temperature. In severe cases of croupous pneumonia, with a tendency to coma, cold affusions are often practised with good result.

g. *Iced-Water Enemas.*—Copious rectal injections of iced-water are sometimes followed by a prompt fall of temperature. They are, when carefully administered, rather grateful than otherwise to patients. They are best given by means of the fountain syringe, the water being introduced into the bowel slowly, and the flow stopped for a few minutes by pressure upon the tube without withdrawing the nozzle, whenever a sense of

pain or of desire to evacuate the bowel is experienced. In this way a large quantity of fluid may be injected. It is not often necessary to exceed three pints. This method of applying cold constitutes a useful addition to those in ordinary use, and may be advantageously employed in connection with them under suitable circumstances.

The patient's head and face must always be well bathed with cold water just before and during applications of cold to the general surface of the body. The occurrence of chill or rigor may be delayed by more or less vigorous rubbing or chafing of the body.

Sudden spontaneous falls of several degrees in the course of a fever are commonly significant of danger. The physician should be at once notified. Meanwhile, especially if the pulse be feeble and there be evident faintness, the patient's head is to be placed low, the foot of the bed slightly elevated by blocks, hot-water bags put at the patient's feet, hot blankets over him, and twenty to forty drops of aromatic spirit of ammonia or a little brandy or whiskey administered. If signs of collapse continue, the legs and arms should be chafed in the direction of the body and sinapisms (mustard-plasters) of full strength applied over the pit of the stomach and the region of the heart.

Such spontaneous sudden falls of temperature at the close of certain fevers, although sometimes attended by the same symptoms and demanding similar prompt treatment, are usually critical, and therefore rather favorable than otherwise. When there is any indication of a crisis about the time of the expected defervescence,

as, for example, in relapsing fever or pneumonia, the nurse must be upon her guard lest a tendency to collapse occur, and prepared to combat it with appropriate treatment.

The fall may extend scarcely to the normal, or much below it; its extent is, however, less important than the symptoms of depression which attend it.

The occurrence of hyperpyrexia must be met by prompt measures to reduce temperature, and the physician must be summoned without delay. When the temperature suddenly mounts up to 105.8° F. and continues to rise, the nurse should proceed to use cold compresses, cold sponging, or even to administer an iced-water enema, while waiting for the arrival of the physician, and may make ready a full bath in case its use should be considered necessary.

Whenever sudden unlooked-for rises or falls of several degrees occur in the course of a fever, the nurse must carefully repeat the observation in order to be quite sure she is right before taking action upon it.

THE NERVOUS SYMPTOMS.

Much can be done by the nurse to allay the minor nervous symptoms of the fever patient. Quiet and order in the sick-room, a light touch, a low voice, a gentle manner, even the fine art of letting the patient alone at times, go far towards saving him from worry, excitement, and headache. To turn his pillow and smooth his bed at the right time *for him*, to regulate the light without asking, to guard successfully against things that annoy him, to step noiselessly, to see everything and say little, and that little well and to the point,

to cheer, encourage, and to calm by one's very presence, are the gifts of the fortunate among you. To those who have such gifts it is useless to speak of them; to those who lack them they cannot be taught. They are of the largess of nature, not of the learning of schools.

Headache is often soothed by cold applications, sometimes by hot. That temperature should be selected which is found to do good. Patients who suffer from vertigo ought to keep the recumbent posture. They must not be allowed to stand up without assistance lest they fall and injure themselves. This precaution is especially to be heeded on first rising after a long sickness. It is a good plan to allow the patient to sit up in the bed once or twice for an hour; then to move him into an easy chair at the bedside without letting him stand up; after a day or so he may walk a few steps.

Pains in the back and limbs are relieved by gentle frictions or massage, and by the application of anodyne liniments. Persistent gentle chafing is very useful.

Shivering, chills, or rigors call for extra covering, hot dry applications to the feet, hot spirits and water, chafing the limbs under the covers with hot dry flannels. When reaction occurs and the patient becomes warm again, the extra coverings must be removed.

Delirium demands the closest attention of the nurse. The delirious patient should never be left alone. It is important that this rule should be literally understood and acted upon. On several occasions I have known valuable lives sacrificed through neglect of it. The delirium of fever often takes the form of suicidal mania. The milder forms of delirium, such as occur at night,

require no special treatment. The more severe cases are often much benefited by alcoholic stimulants, coffee, cold applications to the head, and by the external use of cold water by the various antipyretic methods above described. Transient paroxysms of maniacal delirium sometimes occur in the fevers, of such violence that the strength of several attendants is required to restrain the patient. Such outbreaks are, however, very rare. As a rule, the exercise of a certain amount of authority and much tact will enable a single attendant to control the patient in any outbreak that is likely to occur in the ordinary course of the fevers. If the patient insists upon getting out of bed, it may be convenient, and it is perfectly safe, to restrain him by a sheet folded lengthwise, broad enough to extend from the armpits to the hips, passed around him, and tucked under the mattress or fastened under the bed by large safety-pins. This band must in no case be at all tight, lest free respiration be interfered with ; its great breadth makes it difficult for the patient to get out of it, even when it is comparatively loose. The patient's hands and feet should under no circumstances be tied to the frame of the bed.

Prostration is often extreme. The patient requires to be lifted and turned in his bed. It is now that, by elevating the foot of the bed two or three inches, the circulation of the blood is favorably influenced, and the constant tendency to sink down in the bed, that is so distressing, is obviated.

The vitality is so lowered in these conditions of extreme prostration that there is great danger of the formation of bed-sores in parts exposed to pressure, espe-

cially the back at its lower part, the hips, and the heels. These parts must be carefully watched from day to day, and regularly bathed with spirit of camphor or alcohol. The minutest bed-sore, or even deep circumscribed redness of the skin, must be reported to the doctor, and systematically dressed according to his directions. To lessen the dangers of bed-sores the very sick should be laid upon air-cushions, and in some cases a water-bed is to be procured if possible.

In all cases attended by great disturbances of the mental state, the nurse and, it is permitted me to add, the physician must, as a matter of routine, see to it that water is administered in small quantities and frequently, and that the bladder does not become overdistended.

Hiccough is sometimes relieved by hot applications, or pressure over the pit of the stomach or over the nape of the neck, or by prolonged holding the breath, as in counting one hundred, or taking twelve or fifteen sips of water without breathing, or by hot tea or aromatics, as ginger-tea or spirits of camphor in doses of five or ten drops. Severe cases require active medicinal treatment, and once in a while tax the resources of the physician to their utmost.

Convulsions are, aside from their significance, which in adults is often very grave, among the most distressing of the incidents of the sick-room. During the seizure all clothing around the chest and neck must be freely loosened; the patient should lie on his back with his head slightly raised. His movements should not be forcibly restrained beyond seeing to it that he does not

knock or injure himself. Any suitable thing that is at hand may be held between the molar teeth to prevent his biting his tongue. A thick tooth-brush handle around which are wrapped a few folds of surgical gauze to prevent its slipping is as good as anything.

Children may be placed in a warm bath,—100° to 105° F.,—especially when we have to do with a succession of convulsions quickly following one another. Beyond these simple measures the less that is done during the actual continuance of the fit the better. The physician should be at once notified.

ORGANS OF SPECIAL SENSE.

The sick-room should not be darkened; sunlight ought to be admitted during part, at least, of every day. If the eyes are intolerant of bright light, it may be intercepted by a dark screen placed at the bedside; if very intolerant, the light of the room must be so regulated as to be comfortable. At night the light must be dim and shaded. The eyes should be gently bathed with tepid water, and whenever there is a disposition for the lids to adhere together or to be dry and irritated, they should be lightly anointed once or twice a day with white vaseline, cold cream, or a drop of sweet oil. The eyes should be used very little and with caution during convalescence, and the patient should not be allowed to read lying down.

The sense of hearing in the early stages of fevers is sometimes very acute, and noises of all kinds distressing. The ordinary noises of the household should then be hushed, and, if necessary, tan spread upon the

street to deaden the sound of passing vehicles. There should be little conversation in the sick-room, and that in a low tone. But avoid whispering, which is almost always annoying to the patient. The occurrence of earache or of discharge from the ear must always be at once reported to the physician. Pain is to some extent mitigated by hot dry applications, as of flannels, or a bag made of flannel partly filled with salt and well heated in the oven. A menthol pencil may be passed over the surface in front of and behind the ear, and when the pain becomes excruciating the ear may be gently syringed with hot water at short intervals. Poultices may be applied around the ear, but never over it, nor is it right to drop oil into the ear without the consent of the doctor, who will not often sanction it, or to introduce the core of an onion or any other similar substance into the ear. Discharges from the ear must be removed by dossils of absorbent cotton or borated gauze, frequently changed. Careful physicians no longer neglect ear-inflammations arising in acute diseases.

Crusts of hardened mucus collect in the nose, and often cause excoriation of the edges of the nostrils, or even deep ulcerations of the septum or dividing structure of the nasal passages. The patient should therefore be roused up to the effort of blowing his nose now and then, and sprays of listerine, one part to four, or of Dobell's solution, half strength, or of weak Labarraque's solution, should be introduced by means of the hand atomizer three or four times a day. The nostrils ought to be anointed with vaseline or cold cream. Picking the nose should be prevented: it increases the

soreness and often causes epistaxis, or nose-bleeding. Slight bleeding from the nose is often rather salutary than otherwise, and requires no treatment; severe or very prolonged bleeding may prove exhausting, and attempts should be made to control it by iced-water compresses over the forehead, nose, or neck, or by the gentle instillation of water as hot as can be borne, by means of a small syringe. The head and shoulders should be elevated.

THE DIGESTIVE SYMPTOMS.

The mouth should be regularly washed and moistened. For this purpose water in small amounts, weak mixtures of tincture of myrrh, a teaspoonful to a half-tumblerful of water, or solutions of borax, are useful. If sordes collect, they are to be removed. Occasionally the gums and tongue should be pencilled with glycerin, and now and then a very thin slice of lemon may be placed for a few moments upon the tongue.

Thirst must be relieved by little bits of ice or small draughts of water at intervals. The quantity of water that may be taken by a fever patient is only limited by his ability to absorb it. It is useless, nay, more, it is harmful, to distend the stomach with water, to the detriment of its already enfeebled powers of digestion. Such a course simply results in discomfort, increased repugnance to nourishment, and in vomiting. The best drink is pure water, either of the temperature of the room or iced. Other beverages may be occasionally substituted. Apollinaris, seltzer, or other similar mineral waters, weak lemonade, weak iced-tea with lemon-juice, thin barley-water, or water commingled

with jelly, are all grateful for a time, and and are also soon tired of.

The water acts as a solvent for the rapidly accumulating waste of the body and for the toxins circulating in the blood, helping to get rid of these substances in its elimination by way of the skin and kidneys.

The distaste for every kind of food is very great. It becomes necessary to administer all nourishment methodically at regular intervals as medicines are given. These intervals may be extended to two or even three hours if the amount taken at these is fair, but when it is small, the feedings must be frequently repeated. The total quantity of food-substances taken in twenty-four hours will be much less than is consumed in health; it should be as much, however, as can be well digested. Notwithstanding the truth of the doctrine that fevers must be fed, I believe the evil results of overfeeding are more disastrous than those of slightly underfeeding. If gastric disturbances, distress at the pit of the stomach, flatulence, nausea, and vomiting occur and persist, despite a carefully-regulated and varied dietary, all foods by the mouth should be temporarily withheld, and nourishment given solely by the rectum. Life is sometimes saved by this procedure. In order to avoid disturbing the patient too frequently, it is a good plan to administer food and medicines at equal intervals and within a few minutes of the same time. Which is to be given first in order will depend on the direction of the physician.

In arranging the intervals for the administration of nourishment, medicines, and other treatment, it is

most important that they should be regulated by corresponding multiples of the hour. Thus, if nourishment is given every two hours, the medicines should be given every two or four hours or alternately every four hours, so that the nourishment and medicines fall due about the same time and may be given close together, considerable undisturbed intervals for rest being in this manner secured. In the management of enteric fever by systematic cold bathing according to the method of Brand, which has been very carefully worked out, the baths are given every three hours, the stimulants being administered before and during the bath, and the nourishment after the patient has been put to bed. The temperature observations are made before and after the bath, and the patient rests undisturbed between the baths. Practitioners are sometimes very careless in this respect, and I have seen cases in consultation in which one drug was ordered every two hours, another every three hours, a third every four, and nourishment of different kinds at similar irregular intervals—a want of plan most annoying te the patient and perplexing to the nurse, and quite unnecessary. There are, it is true, cases which in emergency, or where prompt and repeated medication is required, demand especial treatment for the time being, but in the routine treatment of an ordinary case overrunning of the intervals is highly objectionable.

The diet must be liquid. Solid food, being imperfectly or not at all digested, acts as a source of irritation to the stomach and intestines, and aggravates the sufferings of the patient.

The articles available in therapy and useful in practice are milk, whey, junket, koumiss, kéfir, matzoon, zoolak, eggs, meat-juice, broths of beef, mutton, lamb, veal, or chicken, chicken- and calves'-feet jelly, and beef- or chicken-tea.

Milk may be given fresh or boiled. I regard it as more palatable and more digestible in its fresh state; but on this subject there is much difference of opinion. When there is any doubt as to preserving it fresh during the day, the whole quantity should be boiled at once in the morning.

In very hot weather, or under circumstances in which the supply of milk is uncertain, or delays may arise, the milk must be sterilized or pasteurized.

Sterilized milk is milk treated for the purpose of the destruction of germs which it contains. The ordinary methods employed do not render the milk sterile in the sense in which the bacteriologist uses the term. By these processes the germs present in the milk are to a great extent destroyed so that fermentative changes are delayed. Sterilization by boiling (temperature of 212° F.) for an hour and a half as originally suggested by Soxhlet is efficient. Milk thus treated will keep at ordinary room temperature for a week or more. But this process gives rise to changes that are objectionable. The taste undergoes a change not agreeable to many persons: a portion of the sugar is converted into caramel. The casein becomes less digestible and the continuous employment of milk thus treated has shown that its nutritive properties are impaired.

Pasteurized milk is milk heated to 167° F. for twenty minutes. It undergoes no change at ordinary tempera-

tures for two or three days and will keep upon ice for several days. The germs of cholera, enteric fever, diphtheria, tuberculosis, the bacterium coli commune, and ordinary pus producing bacteria are destroyed by this process, while the objectionable changes caused by sterilization are obviated. Various forms of apparatus may be bought for this purpose and milk pasteurized at the dairy may be obtained of reputable dealers.

An adult will usually take three or four pints in twenty-four hours, six or eight ounces at a time. To avoid the formation of large, firm curds in the stomach, milk should be taken slowly in sips. To secure this result lime-water or barley-water is also added. The occasional addition of a small quantity of brandy or rum or of coffee serves to vary the wearisome monotony of a milk diet. Equal parts of milk and seltzer-water will often be taken when milk alone is refused.

It is frequently necessary to peptonize the milk; that is, to subject it to partial artificial digestion. This is done by means of the peptonizing tubes of Fairchild Brothers and Foster, each of which contains five grains of the extract of pancreas and fifteen grains of bicarbonate of soda, the quantity required to peptonize one pint of milk. The process is as follows:

"Put the powder contained in one of the tubes into a clean quart bottle, and along with it a small teacupful of cool water; shake. Add a pint of fresh, cool milk and shake again.

"Place the bottle in water so hot that the whole hand can be held in it without discomfort for a minute, and keep the bottle there for twenty minutes. At the

end of that time place the bottle on ice to check further digestion and keep the milk from spoiling.

"It is not meant that the pitcher or pail of hot water containing the bottle of milk should be set in a warm place with the purpose of maintaining the same heat as started with. It is meant that the water-bath should stand in any convenient place at ordinary temperature of the room.

"The degree of digestion is very simply regulated by the length of time in which the milk is kept warm.

"When the milk is digested so long that it acquires a slightly bitter taste, it is because the casein has been entirely digested into peptone. It is the taste of the peptone.

"Do not peptonize the milk so much that it tastes bitter. Partially peptonized milk has no bitter taste,—has, indeed, little apparent evidence of any change.

"Put the milk promptly on ice after taking out of warm water, because the peptonizing goes on till the milk has become thoroughly chilled.

"Remember that the peptonizing powder keeps acting on the milk as long as it is in any warm place. Milk varies in richness; therefore if it peptonizes too much in twenty minutes, take less time.

"After the contents of the bottle get warm, then every moment lessens the amount of the casein,—the ingredient which is the obstacle to the use of the milk.

"The degree of peptonizing necessary in each case is best determined by the readiness with which it is assimilated by the patient.

"Great heat destroys, or cold stops, the digestive action.

"It must be borne in mind that this is not a cooking or chemical process. The object is to subject the milk to the action of the digestive principle (the Extract Pancreatis) at a temperature similar to that of the body.

"Always use fresh sweet milk.

"Peptonized milk may be sweetened to taste, or used for punch, with rum, etc., or made into jelly; also in the preparation of such foods as ordinarily require the use of milk: according to the instructions of the physician."

Modified Milk.—The establishment of the first Walker-Gordon milk laboratory in Boston in 1891, at the suggestion of Dr. Rotch, may well be said to have marked an era in preventive medicine and dietetics. Such laboratories are now in operation under the same scientific management in many of the larger cities of the United States and in Great Britain. They are operated in connection with dairy farms conducted in accordance with the strictest hygienic requirements.

(1) The cows are maintained at all times in health, and are constantly subjected to veterinary examination. They are all tested against tuberculosis. They are clean, properly housed, intelligently fed, and are surrounded by those sanitary conditions which have been enumerated as necessary.

(2) The milkers are under the constant supervision

of a physician; they are intelligent and instructed; they are clean in person and habits. They use sterile pails and other utensils for milking. They have clean hands and wear freshly sterilized clothing during this operation. They are subjected at all times to the strictest sanitary requirements compatible with their occupation.

(3) The dairymen are employed specially for the care of the milk. They are well supervised and well paid. The dairy-house is well equipped for its purpose. No one is allowed to enter the dairy-house except the dairymen. Everything that touches milk is sterilized, and all milk is put up in sterile bottles. The greatest precaution is taken to prevent infection from returned packages; all these are sterilized before they are readmitted to the milk-house. Bottles are also sterilized again after they have been washed and rinsed. In these, and other ways, everything practical is done to prevent the possibility of danger.

These laboratories were instituted for the purpose of preparing milk for the prescription-feeding of infants and of supplying milk fit for use in the nursery and at the table. They have kept pace with the scientific progress of the times, and, among other requirements of the day, supply pure milk modified for the special needs of the sick, and especially for fever cases.

The normal proportions of fat, proteids and sugar are modified, according to prescription, to suit special cases.

Whey.—Whey is thus prepared: Put one pint of cold fresh milk into a clean saucepan and heat it lukewarm (not over 100° F.); add two teaspoonfuls of

Fairchild's Pepsencia and stir just enough to mix ; let stand till firmly jellied, then beat with a fork until finely divided ; now strain, and the whey (liquid part) is ready for use ; keep in a bottle or glass jar near ice.

Junket.—Put a half pint of cold fresh milk into a clean saucepan and heat it lukewarm (not over 100° F.) ; add one teaspoonful of Fairchild's Pepsencia and stir just enough to mix ; divide quickly into small cups or glasses and let stand until firmly jellied, when the junket is ready for use, just as it is, or with sugar, grated nutmeg, etc.; or it may be placed on ice and taken cold. Junket may be made with the addition of egg, cocoa, or coffee or various flavors.

Koumiss is milk fermented by means of yeast. As prepared in the shops it is highly effervescent, slightly acid, and of an agreeable, faintly alcoholic flavor. Many patients like it as an occasional substitute for milk : others who cannot take milk enjoy koumiss. It is a useful member of the group of fever-foods.

Kéfir, which is made by fermenting milk by the addition to it of a species of minute dried fungus collected in the mountains of Caucasus near the snows, and called kéfir, resembles koumiss, but is less acid and less alcoholic. It is prepared in the shops by those who manufacture koumiss.

Matzoon, now called for commercial reasons zoolak, a form of fermented milk used in Asia Minor, and prepared in this country on a large scale for sale, is a valuable addition to the list of milk-foods. It contains only a trace of carbon dioxide, and the casein is very minutely divided. It is agreeable to the taste, slightly acid, and well borne by irritable

stomachs. It may be used as an acceptable modification of the diet in fevers.

The expressed juice of meat is an easily digested and highly nutritious aliment. A pound of juicy beef-steak, from which the fat has been carefully removed, is slightly broiled, then cut into pieces the size of a walnut, which are subjected to pressure in an iron lemon-squeezer or a little screw-press, such as is sold in the shops for the purpose. The quantity of juice thus obtained does not exceed two or three ounces, but it forms a highly concentrated food.

In preparing broths as much of the fat as possible should be removed from the meat, which should be cut into small pieces. Rather more than a pint of water should be used for each pound of meat. It should cook slowly, or simmer for four hours. It is then strained and put on the ice; when cold, the fat which collects on the top is removed. Chickens should be skinned and the bones broken. Prolonged cooking converts these soups into jellies when cold. They may be taken hot or cold. Jelly made of calves' feet is slightly sweetened and flavored with sherry wine. The broths are rendered more palatable by the addition of a pot-herb, a *soupçon* of onion, a bay-leaf, celery-seed, and "seasoning"; they are rendered more nutritious by the addition of a little rice or barley, baked flour, or Mellin's, Ridge's, or Eskay's food.

Beef-tea prepared by boiling has a low value as a food. The albumen is coagulated at a point not very far above the heat of our bodies, and long before the boiling-point is reached. The fluid is merely a solu-

tion of the salts and extractives of the meat. It is a palatable, refreshing drink, that sits well upon the stomach, and is rather a mild stimulant than a food in the ordinary senses. It is a wasteful preparation, as nearly the whole food-value of the beef is lost with the residue that is thrown away, and should never be more concentrated than a pound to the pint. The popular notion that the stronger beef-tea is the better for the patient is an error. Upon some individuals beef-tea has a laxative effect, and it ought not to be given when there is a tendency to diarrhœa.

Beef-tea may be prepared by cutting the meat, freed from fat, into dice or mince, and allowing it to soak for four hours in tepid water in an earthenware vessel at the back of the stove. It may then be heated, but not boiled, strained, and seasoned with a little salt and pepper if desired. Or the meat may be treated for four hours in cold water, to each pint of which ten drops of hydrochloric acid have been added. A pound to the pint is the proportion for these preparations.

To this list must be added oyster- and clam-juice, prepared either by stewing the shell-fish in their own liquor, or by roasting them in the shell and draining off the liquor as they are opened,—not a very nutritious article of diet, but palatable and useful as convalescence begins. Strange to say, clam-broth is not only often relished when other food is distasteful, but is very well borne by feeble stomachs, unless, indeed, there be an idiosyncrasy against shell-fish. Such articles as these are, of course, only for occasional, not for regular,

use. But the nurse must be fertile in resources; and the French have a proverb that "Appetite comes with eating."

It would not be in accordance with the scope of this book to discuss the relative merits of the commercial beef extracts. In fact, a mere enumeration of them would occupy more space than is here at my disposal. All of them possess some food value, many are highly nutritious, few are palatable. If milk and other home foods can be procured and taken, they are to be preferred.

If there be a great craving for solid food, as is sometimes the case, stale bread or toast, or zwieback softened in milk, may in the absence of any special objection be occasionally given. With the oncoming of convalescence the diet may be more varied, and, except in typhoid fever, the cravings for solid food may be cautiously gratified, care being taken that the articles are at first easy of digestion. Malt extracts constitute a most useful addition to the dietary. In regard to malt extracts, I cannot do better than to quote from the writings of my former colleague in the Philadelphia Hospital, the late Dr. Bruen: *

"Medicinal malt preparations may be divided into the thin and thick varieties. The former are well represented by Hoff's or Genois' malts, the latter by Tromner's malt, or Reed and Carnrick's maltine. The thin malts usually contain a small percentage of alcohol and hops, and should be regarded as possessing

* Outlines for the Management of Diet. Philadelphia, 1887.

sedative and tonic properties, and they are useful when these general effects are required. They also contain diastase, which possesses the power of facilitating the digestion of starch. The thick malt extracts are even more rapid and complete in their action upon starch. Their employment is indicated when the action of diastase upon starchy food is required in cases of indigestion or of slow digestion. The thick malts can either be mixed with the starchy elements of diet, or a mixture of equal parts of malt extract and warm water may be beaten up and given with plain or aërated waters."

In fact, the most pleasant way of taking the malt extracts is in dilution with the effervescing waters.

When it becomes necessary to administer nutriment by injection into the bowels, certain precautions must be taken. First, the bowel having little or no digestive power, the food-substances must be in a form available for absorption, as peptonized milk or beef, or egg albumen, well diluted; second, the amount must not exceed six or eight fluidounces, and must be warmed and injected slowly; third, the intervals between the enemas must be as long as possible, and should in no case be less than four hours. It is a good plan to wash out the rectum by a large enema of warm water once a day just before the administration of the nutritious enema.

Alcohol does not form any necessary part in the routine treatment of fevers. In a considerable proportion of the cases it is undoubtedly useful; in a certain number,—and these include persons of feeble constitution, the aged, and those previously addicted to drink,

—it is absolutely necessary; but in a large proportion of all fever cases alcohol may be wholly dispensed with. The form in which it is to be administered and the amount and frequency of the dose must be exactly prescribed by the physician, whose duty it also is to see that the habitual taking of drink *by his order* is stopped before the patient passes from under his care. The food value of alcohol has been over-estimated.

For emergencies and as a stimulant its usefulness can neither be denied nor ignored by those who cannot bring themselves to sanction it as a beverage. In the sick-room the internal use of alcohol in any form should be properly regarded as a medicinal rather than as a dietetic measure.

When vomiting occurs, the nurse must carefully examine the vomited matter, and if it present any unusual appearance, and in particular if it contain blood, it must be preserved for the inspection of the physician.

Tympanitic distention of the abdomen may become so great as to interfere with respiration. It is favorably influenced by turpentine stupes, made by wringing a square of flannel of sufficient size out of hot water, sprinkling upon it a tablespoonful of turpentine, clapping it together between the hands to equally distribute the turpentine, applying hot, and covering with a layer or two of dry flannel. If its action upon the skin is painful, the stupe must be at once removed and the surface wiped and smeared with olive oil. Ice-bags may be applied to the abdomen.

The constipation of fevers is, as a rule, best treated by simple internal medication; when injections are

used to overcome it they should, except in enteric fever, be large, a pint or more, and thrown into the bowel rather quickly so as to excite it to act; when used in enteric fever they should not exceed eight ounces, and are to be very gently thrown in.

THE CIRCULATION.

The nurse must learn to count the pulse and study its characters at the temporal and carotid arteries as well as at the wrist. It is well to count a whole minute before recording the result. The pulse is a good index of the general condition and of the effects of stimulants.

Very rapid, feeble, or irregular pulses are of importance, and must be reported to the physician whenever observed.

RESPIRATORY SYMPTOMS.

It is not well while counting the number of acts of breathing per minute to let the patient observe what you are doing. It may therefore be done with the eye while the finger is yet on the wrist, after the pulse has been taken. Very rapid breathing often, but not invariably, indicates lung-trouble; very slow breathing usually indicates brain-trouble or opium-poisoning.

Cough is a symptom of varied significance. A tickling cough, such as is produced by dryness of the throat and accumulations of phlegm, is relieved by simple measures like a draught of water or of flaxseed tea, by a non-medicated lozenge, or even by change of posture; cough that does not bring up expectoration is

best relieved as promptly as possible; the expectorated matter may be saved for inspection either in a vessel containing water or dry. Such vessels require frequent disinfection. When required by the physician, the expectorated matter (sputum) is to be collected in a sterilized vial and sent for bacteriological examination. Persistent violent cough, such as is not uncommon in measles, often causes soreness across the epigastrium. An efficient remedy is the application of a belladonna-plaster.

THE SKIN.

The functions of the skin should be kept up by daily sponging: gentle frictions with the hand are useful and usually agreeable and soothing; when the skin is very dry and harsh, inunctions with sweet oil or vaseline are to be recommended. The various eruptions which occur in the course of fevers require ordinarily no special treatment; the scales, usually very fine and bran-like, that are thrown off after the eruptive diseases, are to be collected and burned, as they are carriers of contagion.

THE URINE.

The urine is to be systematically inspected by the nurse, who must estimate its quantity from day to day, and carefully measure it when required to do so. She must report also its color, the presence or absence of deposits when first passed and after cooling, and as often as necessary prepare specimens for examination. These specimens, usually taken early in the day or from the total quantity in twenty-four hours, are

put into new, carefully washed vials with new corks, and are labelled with slips of paper, on which are stated the name of the patient and the date and hour at which passed. Any marked diminution in the quantity passed or unusual prolongation of the interval may be a sign of danger and must be promptly reported.

When, owing to the state of the nervous system, the patient cannot void his urine, catheters must be used. Whether this operation be performed by the nurse or by the doctor, the former must look after the instruments. Flexible catheters are to be preferred to silver for males and glass catheters for women. They should be kept in a solution of corrosive sublimate, 1 : 2000, or other efficient disinfectant solution, and be well washed in recently boiled water and anointed with vaseline containing two per cent. carbolic acid before being used. Unless catheters are kept scrupulously clean and constantly disinfected, the frequent catheterization necessary in a case of low fever is very apt to result in septic inflammation of the urinary passages or of the bladder,—a very serious complication.

IV.

THE CONTINUED FEVERS.

Enteric, or Typhoid Fever—Paratyphoid—Typhus Fever—Relapsing Fever—Influenza—Yellow Fever—Dengue.

THE temperature in the Continued Fevers remains high throughout the course of the fever. Remissions occur, but in extent they approach or conform to the diurnal remissions of health. The fever-range is in fact subcontinuous.

This group includes

Enteric, or Typhoid Fever.
The Paratyphoid Infections.
Typhus Fever.
Relapsing Fever.
Influenza.
Yellow Fever.
Dengue.

Relapsing Fever, Yellow Fever, and Dengue are fevers which show with varying constancy a tendency to recur after the first or primary outbreak has subsided. But these recurrences are neither indefinitely repeated nor do they observe the rhythm of the Periodical Fevers, properly so called. While they constitute, as will be seen, a striking feature in the course of these fevers, they are not of such a character as to prevent us from regarding the three fevers named as belonging to the group of the Continued Fevers.

ENTERIC, OR TYPHOID FEVER.

Definition.—An acute, endemic, infectious disease, lasting from twenty-one to twenty-eight days; characterized by fever of subcontinuous type; by gradual and usually insidious commencement; dull headache, followed by stupor and delirium; a red tongue, often becoming dry and brown; in most cases tympany, abdominal tenderness, and diarrhœa; an eruption of isolated, slightly elevated, rose-colored spots, disappearing on pressure, and developed in successive crops; a tendency to bleeding at the nose; much wasting and weakness, and tardy convalescence. Ulceration of the lymph-glands of the intestines found on examination after death.

Synonymes.—Low Fever, Nervous Fever, Gastric Fever, Brain Fever; in children, because the fever-range tends to the remittent type, Infantile Remittent. It was called Typhoid first by Louis, because he thought it was like Typhus, and by this name it is most widely known. Enteric Fever is the best of all terms for it, because it suggests the inflammation and ulceration of the bowel which is always to a greater or less extent present, and which has so much to do in causing the abdominal symptoms.

History.—Enteric Fever has probably prevailed from a remote period. It was first clearly recognized as a disease distinct from the other fevers early in the nineteenth century. It is the great fever of the present historical period in the civilized world, as Typhus was of the seventeenth and eighteenth centuries, and the Plague

in the Middle Ages. It is to-day endemic the world over, wherever the European races have made their home. It is often seen in single or sporadic cases, and every now and then it breaks out as a local epidemic. Enteric Fever may well be taken as the very type of the continued fevers, and the rules laid down for its management may, with modifications hereafter to be pointed out, be equally well applied to the nursing of the other fevers of this group.

Causation.—The primary cause of Enteric Fever is a specific micro-organism or germ, known as the *bacillus typhosus*, or, from the name of its discoverer, the bacillus of Eberth.

This germ is invariably derived from a previous case of enteric fever.

When introduced into the human body it is capable, under favorable circumstances, of indefinitely reproducing itself.

It is eliminated with the discharges from the bowels and in the urine.

It retains its activity, when it finds its way into favorable situations, for a lengthened period after it has passed out of the body, the requirements to this end being decomposing animal matter, especially fæcal discharges and moisture. Therefore cesspools, sewers, drains, dung-heaps, and wet manured soils favor its prolonged existence.

It is capable of indefinite multiplication in these situations.

It remains suspended in, and may be conveyed by, water and milk. Such fluids used for drinking become

the means of access for the enteric fever germs to the body.

It is probable that these germs also float in the atmosphere, adherent to the atmospheric dust, and thus occasionally find their way into our bodies by means of the inspired air.

The germs have been demonstrated upon the legs and wings of ordinary house-flies caught in the neighborhood of the latrines of camps in the Spanish-American and South African wars, and these insects have undoubtedly played a large part in the causation of the frightful epidemics of enteric fever which prevailed among the troops by carrying the germs from the undisinfected excrement in the latrines to the uncovered food upon the mess tables.

A case of enteric fever is incapable of infecting persons in the same house or neighborhood if the dejections are at once disinfected and swept away into well-constructed sewers; but when the excrement is neglected and allowed to lie on the ground or to soak into wells or streams or into the structure of the house by leaky pipes, the patient becomes a focus of contagion. Hence local epidemics are common in villages and small towns, while sporadic cases are constantly present in crowded neighborhoods and large cities. A single isolated case is liable to become the means of infecting persons at a distance, who drink the water polluted with the outpourings of the sewer into which the stools are thrown. It is not uncommon for the disease to arise on board vessels lying in rivers at points where the sewers of large cities empty, the polluted

water being used by the sailors for drinking purposes. The bacillus typhosus grows in oysters and other shell-fish laid out to plump in water in which the germs are present, and many epidemics have been traced to the eating of raw oysters that were *plumped* in sewer-contaminated waters. It is in this sense that the sewer is sometimes spoken of as the continuation of the intestine. All possible danger of the dissemination of the disease, either around the home of the patient in rural neighborhoods or at a distance in cities, is at once and absolutely prevented by the immediate and efficient disinfection of every typhoid stool. The lesson is too obvious for comment: too familiar, alas, to be rightly heeded. The specific cause of enteric fever is of the widest distribution and readily transported. Yet it lurks by choice in dark, neglected corners and about the foul ways of men's dwelling-places, and creeps along with oozing filth, crawling into wells and springs, and hiding itself in the ground, choosing here a victim and there a group of them, but never giving rise to general epidemics as do the poisons of typhus, cholera, or relapsing fever. The most extended epidemics of enteric fever spread over certain quarters of a city or a large town, or a limited section of country, and are always made up of a number of distinct, local, circumscribed outbreaks in the line of a tainted water-supply or milk route, or in the outlying points to which patients sick of the fever or about to sicken of it, have gone from an infected place.

Enteric fever prevails at all seasons, but it is most common in autumn ; no period of life can be said to be wholly exempt, but the age of greatest susceptibility is

youth and early adult life; in infancy and beyond fifty it is rare. Both sexes are alike liable; occupation and habits of living exert no special influence upon the liability to contract it. Severe mental disturbances, fear, sorrow, care, and great fatigue, doubtless render persons less able to withstand morbid influences of every kind, and, therefore, exert an accidental predisposing influence, but that they can in themselves give rise to enteric fever, as was held by the physicians of a previous generation, is a view wholly at variance with modern knowledge of the causation of this disease.

Course and Symptoms.—The period of incubation—that is, the time elapsing after infection by the enteric fever poison has taken place until the symptoms appear—is usually between two and three weeks. It may exceptionally, however, be shorter or longer. For a few days before the fever shows itself the patient feels languid, disinclined to exertion, loses appetite, has headache, which grows worse towards evening, and complains of aching in his back and limbs. The onset is so gradual that it is usually impossible to say exactly in what way the sickness began. In rare instances enteric fever begins abruptly with a chill.

The whole course of the fever may be divided into the three stages: the development, the height or fastigium, and the decline. It is customary to reckon according to the week of the disease: the first week corresponding to the stage of development, the second in mild cases, the second and third in severe, to the stage of fastigium, and the third in mild, the fourth in

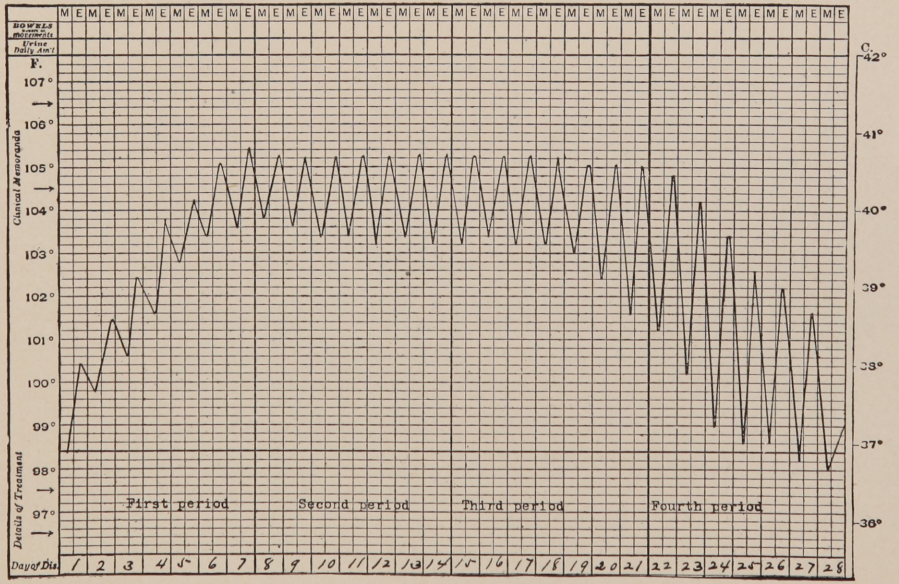

FIG. 10.—Temperature range in enteric fever.—Wunderlich.

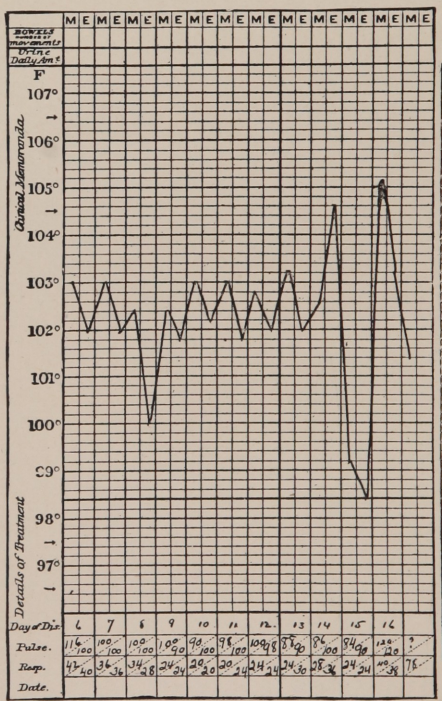

FIG. 11.—Enteric fever. Signs of perforation, 14th day; operation refused; death two days later.

severe, cases corresponding to the stage of decline. There are many variations from this typical course.

First Week.—Increasing weakness; complete loss of appetite; severe headache; great thirst; occasional nose-bleeding; restless nights; augmenting fever, the evening exacerbations exceeding by a degree and a half to two degrees the morning remission. There is usually constipation, but diarrhœa follows the use of even mild laxatives. Other abdominal symptoms are commonly absent. Generally the fastigium is attained by the fourth or fifth day.

In the *second week* the severe general symptoms continue or even increase: the fever remains high; mental disturbances increase; stupor by day alternates with delirium by night; the abdomen becomes more or less swollen, and there may usually now be discovered at the lower part of the chest or on the belly or back groups of scattered, small, pale red, slightly elevated spots, the *rose rash* of enteric fever. The constipation of the first week is replaced by diarrhœa, which amounts to two or three or even six or eight painless, liquid bright yellow movements in the course of twenty-four hours.

The Third Week.—In mild cases the fever during the course of the third week begins to assume the remittent instead of the subcontinuous type, the morning fall of temperature becoming greater day by day until it passes to and very commonly below its normal line; at the same time the evening rise is shortened from day to day until the gradual defervescence is complete. The general symptoms improve. The mind becomes clearer; sleep is calmer and more refreshing; the tongue

cleans off; appetite returns; diarrhœa ceases, and convalescence gradually begins.

In severe cases the symptoms of the second week continue, and it is in this period that the severer accidents and complications of the disease usually show themselves. This is the period of active ulceration of the bowels. The belly is often swollen; diarrhœa severe; hemorrhage from the bowel and perforation, accidents of the gravest character, occur with greatest frequency at this period. Even slight hemorrhage is to be regarded with anxiety, since it may be the precursor of more serious bleeding. Intestinal hemorrhage is usually accompanied by a sudden considerable fall of temperature, which sometimes takes place before the blood has been voided by the bowel. If the blood loss be large, great prostration or even collapse attends it. Severe nervous symptoms are usually relieved in a remarkable manner after intestinal hemorrhage, the patient coming out of deep stupor or delirium into complete consciousness. Not rarely hemorrhage is followed by a steady improvement to complete recovery.

Perforation of the intestine is an accident of the gravest possible order. Peritonitis, almost invariably diffused, results. Perforation is often attended by a sharp pain in the belly; sometimes its oncoming is insidious. The abdomen is distended and tender; collapse follows, with fall of temperature; haggard, pinched face; retching and vomiting; small and very frequent pulse. Unless the condition be promptly recognized and relieved by immediate operation, death terminates the scene in the course of a very few hours or days.

Bronchitis, congestion of the lungs, and pneumonia are very common in enteric fever. As the more serious lung-complications are apt to occur in cases showing marked mental disturbance, the patients make little or no complaint of pain in the chest or oppression.

Irregular or rapid breathing, shortness of breath, or panting after being moved, and even slight cough, acquire peculiar significance, and must be promptly reported to the physician. The signs of lung-complications are often discovered in the course of systematic routine examinations in the absence of any lung-symptoms whatever. Bleeding at the nose, which is usually slight early in the disease, and followed by mitigation of headache, becomes a troublesome symptom later, and is then often difficult to control.

The secretions of the mouth are perverted; the tongue, coated at first, becomes dry, harsh, and red; ulcerations of the tongue and mouth may occur.

The condition of the mouth is the index of changes that have taken place in the stomach and other organs of digestion. The secretions are no longer normal, hence digestion is impaired and delayed, and only such foods as are easy of digestion can be taken throughout the course of the fever.

The frequent use of the term "nervous fever" to designate enteric fever, shows how common and severe are the disturbances of the nervous system in this disease. Cases of even moderate severity are almost always attended by more or less dulness of intellect; the patients are apathetic and drowsy; delirium is frequent in severe cases. It is worse at night; frequently it is "muttering" or "wandering"; sometimes it is

noisy and restless; rarely it is wildly maniacal. The headache of the first week almost always subsides upon the advent of delirium. The pulse is usually rapid, but not in proportion to the elevation of the temperature. It ranges between 90 and 120. A continuous pulse of 140 is an unfavorable sign. In some cases the pulse is not accelerated, or it may even be slower than normal. Its frequency is always increased by mental excitement or by exertion, as in rising up in bed. Slight irregularity in force or frequency is very common; great irregularity of the pulse in enteric fever is a bad omen. The heart undergoes changes that greatly enfeeble it. Hence it is dangerous for patients to suddenly assume the upright posture. Fainting or even death may result. One of the results of the weakness of the heart and enfeeblement of the circulation is œdema, or dropsy of the feet and ankles. It is not uncommon when the patient first sits up.

The height attained by the temperature during the fastigium in cases of moderate severity is 102°–103° F. in the morning and 103.5°–104° F. in the evening. A temperature of 105°–106° indicates great gravity. Marked morning remissions are favorable. The typical temperature curve is subject to many and great variations from a variety of causes, including complications. During convalescence the temperature is very easily disturbed, and may run up one or two degrees from trifling causes, such as constipation, the taking of solid food, the visits of friends, or the exertion of sitting up.

Bed-sores are apt to occur in severe or neglected cases. Their most common situation is the buttocks and the heels. An extensive bed-sore undermining

the skin is a dangerous, and may even become a fatal, complication. Cystitis, or inflammation of the bladder, is of rare occurrence. Inflammation of the urethra, or urinary passage in the male, is also a rare complication. When present it may be attended by secondary inflammation.

Menstruation occurs when due, or about due, early in the attack, and is usually free. Later, and during convalescence, it is commonly absent. Pregnant women are liable to abortion in enteric fever.

Fourth Week.—The defervescence takes place and convalescence sets in, but complications may indefinitely postpone recovery.

The course of the disease as a whole presents many variations.

Very light cases do not last more than a week or ten days. The symptoms are mild; the fever tends to assume the remittent type; but the true nature of the attack is shown by the appearance of the rose-spots, and by the fact that such light cases often occur side by side with well-marked or severe cases in local outbreaks.

Abortive cases are those which begin with severe symptoms and high fever, but after a few days sudden improvement takes place and convalescence is speedily established.

"Walking typhoid" is the term applied to a group of cases in which the symptoms are for a time very mild, so that the patient goes about and attends to his ordinary affairs. In the third week the nature of the sickness suddenly shows itself by a change for the worse, or some severe complication. Many cases are

recorded in which peritonitis has suddenly taken place without previous symptoms that have attracted the attention of the patient or his friends, and perforating ulceration of the bowel, due to enteric fever processes, have been found on examination after death.

In children the extent of the intestinal ulceration is, as a rule, much less than in adults. Hence intestinal hemorrhage and perforation are less frequent. Nervous symptoms are equally severe. Even in mild cases there is apt to be great mental dulness or drowsiness in children. The type of fever is in most cases remittent throughout—*infantile remittent.*

In elderly persons the course of the disease is very irregular; the fever is not very high; the eruption scanty or absent altogether. It is often difficult to recognize enteric fever in the aged. Fat persons are apt to suffer severely.

Intemperate persons almost always have this, as other fevers, severely. They are peculiarly liable to grave nervous symptoms, and there is great feebleness of the action of the heart.

The clinical picture of enteric fever is much modified by treatment, and especially by systematic cold bathing. Under this method, begun early in the course of the attack, the course of the disease is favorably modified and the mortality reduced one-half.

True relapses are frequent after enteric fever. A typical relapse is like the first attack, except that it is of shorter duration. The interval between the completion of defervescence and the beginning of relapse is usually from seven to ten days; sometimes it is longer; often shorter. It may even happen that as the fever of the first attack is subsiding, and before defervescence

is completed, the relapse sets in. It is then called *intercurrent relapse.* The gravity of the symptoms in relapse bears no relation to the severity of the first attack. The relapse may be mild or severe according to circumstances; it is sometimes fatal.

Typhoid "carriers"—Chronic typhoid infection. In a very limited number of cases the typhoid bacilli persist within the body of the patient for an indefinite period after an apparently complete convalescence, and are from time to time discharged in the stools or in the urine. Such individuals are known as typhoid carriers, and are a constant source of danger to the public, since they may spread the infection without giving rise to suspicion. Sporadic cases and limited groups of cases, the causation of which has been involved in obscurity, are now attributed to these "carriers."

No method of treatment is known by which enteric fever can be cut short.

The treatment of mild cases is expectant; of severe cases, symptomatic or rational.

The successful treatment of enteric fever is largely dependent on the attention which is given to the general management and nursing of the patient.

As we know that the disease is communicated by infectious matter contained in the discharges from the bowels and kidneys, and practically in no other way, we prevent its spreading by the immediate and complete disinfection of every stool, and all the urine voided. The patient's person, clothing, and bed are to be kept scrupulously clean. The minutest fleck of fæcal matter is actually capable of producing the fever in other persons; its infecting power must be at once and finally destroyed. It is not enough that the discharges

be swept away into the sewer and gotten rid of. It is our duty to render them harmless to others along the line of, and at the other end of, the sewer—a duty of which, and of the means of accomplishing which, no nurse should to-day be ignorant.

In hospitals enteric fever patients are generally treated side by side in the same wards with patients suffering from other diseases. This practice is not attended with the danger of infection if proper measures be taken to disinfect and remove the dejections and to keep the patient's person and bedding clean.

Of late there has been a more general use of special wards for enteric fever cases. To obviate the danger of transmission by flies the doors and windows of these wards are screened, and especial attention is given to the protection of milk and other articles of nourishment, as well as to the proper disinfection of the feces and urine.

The course of the disease is more favorable in those cases which are treated from the beginning of the attack than in those who do not come under medical care until the disease is fully developed. Some of the worst cases of enteric fever occur in those who have struggled against the early symptoms of the disease, and continued to go about and to perform their daily duties, until forced to betake themselves to bed by the intensity of the fever, the urgent diarrhœa, or sheer weakness. The fatigue of long journeys exerts a most injurious influence upon the subsequent course of the attack in those who, after its commencement, undertake such journeys in order to reach home.

Under ordinary methods of treatment rest in bed from the beginning of the attack is of importance.

The patient is not to be allowed to rise from the beginning of his sickness until some days after complete defervescence. The use of the urinal and the bed-pan must be insisted upon. Children, as a rule, cannot use the bed-pan and may be taken up to the commode.

The room should be large and airy. The temperature ought to be maintained at 60°–70° F. It is sometimes advantageous to use two communicating rooms, between which the doors are kept open, and from one to the other of which the bed of the patient may be from time to time transferred, a window of the unoccupied room being kept constantly open. This arrangement not only secures abundant and satisfactory ventilation, but the change also often favorably influences the mental condition of the patient. Thorough ventilation must in all cases be secured both day and night.

Mental quietude is no less important than bodily repose. The general directions in regard to visitors, business matters, and annoyances of all kinds are to be strictly observed.

Among the various duties of the nurse are the occasional changing of the position of the patient's body, moistening his mouth, cleansing his tongue, the prevention of the accumulation of sordes, and the most untiring care of his person in other respects. When the evacuation of urine and fæces in the bed cannot be prevented, the discharges and soiled clothing are to be removed without loss of time. In such cases it is sometimes necessary to use two beds, the patient being rolled or lifted, in the horizontal position, from one to the other. Fluid is to be administered without stint.

It often happens that patients, even when apparently fully conscious, fail to partake of the needful amount of drink unless it is proffered them. Drink in moderate quantity must be offered at short intervals.

The diet must be rigidly restricted. The directions of the physician as to its kind, quantity, and the intervals at which it is to be given will be definite and explicit. A record of the amounts given, as well as of the intervals between the administration of food, is to be kept. Neither general directions nor general reports are sufficient.

The diet throughout must be nutritious, easily digestible, and liquid. I repeat here that too much food is worse than too little in enteric fever, and especially in the first week. Milk, broths, soups, meat-juice, constitute the diet. Once or twice a day coffee or tea, well diluted with milk, may be administered. If the patient craves it, a small quantity of thickened gruel, or arrow-root, or bread and milk may be given once a day. Some patients do better with an occasional meal of such semi-solid food. It may, however, be said that, as a general rule, starchy foods are objectionable.

Food should be administered at intervals of two or three hours during the day and three during the night, the milks and broths alternating. When the quantity taken at a time is small, or the prostration extreme, the interval must be shortened.

Alcoholic stimulants will be given according to the directions of the doctor. They are not required at all in many cases, are useful in a few, indispensable in some.

Large enemas are not to be given in enteric fever, as they may excite the bowel to energetic contractions, and thus mechanically occasion hemorrhage or even perforation. For this reason, if iced-water injections are employed, they must not exceed in amount eight fluidounces.

Certain forms of constipation in enteric fever are best treated by small injections of strong, warm soap-suds or thin strained gruel, repeated every day or every second day.

Tympanitic distention of the abdomen is present to a greater or less extent in almost all the severer cases. It is due either to deficient power of expulsion or to an excessive generation of gas in the intestines. It reaches its maximum about the end of the third week, for at this period the causes that produce it are fully developed. These causes are, first, sloughing and ulceration of the intestine; second, general prostration, showing itself in deficient tone and feeble contractions alike of the intestinal walls and of the abdominal muscles; and, third, alteration in the character of the digestive fluids, which, no longer possessing the antiseptic properties of health, permit rapid decomposition of the intestinal contents. When the distention is great it is usually treated by turpentine or light poultices, or iced compresses to the abdomen, increased stimulation, and very carefully regulated diet. Extreme distention may be relieved by the cautious introduction of the rectal tube.

Suddenly developing tympany is sometimes a sign of peritonitis.

Intestinal hemorrhages, even when slight, demand immediate attention. A few teaspoonfuls of blood may

be the forerunner of a copious or even fatal hemorrhage. The patient must be kept absolutely at rest; his diet restricted to substances capable of being readily digested and absorbed in the upper intestine, such as meat-juice, wine-whey, koumiss, or peptonized milk, in very small quantities. Food and drink are to be iced, and small lumps of ice may be swallowed. Iced compresses or ice-bags are at the same time to be applied to the abdomen. If the blood-loss be considerable, food is to be entirely withheld for some hours, the pillows taken away, and the foot of the bed elevated by blocks; the patient not allowed to move or talk. Medical treatment will be addressed to the control of the bleeding and to confining the bowels, which must under no circumstances be caused to act for several days, or, in fact, until after some days the tendency to spontaneous evacuation becomes urgent. Then, if necessary, small lukewarm enemas may be cautiously employed.

The general management of peritonitis is, as far as the nurse's duties go, practically the same as that of intestinal hemorrhages. Rapid movement of the body or pressure upon the abdomen must be avoided in enteric fever, because of the dangers of causing perforation or otherwise causing peritonitis, or of rupturing the spleen, which is usually enlarged and frequently very soft in consistence.

The nurse must observe very systematically the urine voided: its amount, color, odor, deposits when passed or on cooling, and report any changes in its quantity or character.

The patient should be when possible gently aroused

from his lethargy at the time of the administration of food; his posture should be changed, or he should be for a while even turned on his side and supported in that position and urged to take a few deep inspirations. Bed-sores are to be prevented by frequent changes of posture, by the removal of pressure, by the arrangement of cold-water bags or air-cushions, and by scrupulous cleanliness and dryness of the patient's person and bed. While the skin remains sound, the parts especially subjected to pressure, and therefore liable to become gangrenous, are to be frequently bathed with equal parts of alcohol and water.

During convalescence the temperature is unstable, and recrudescences of fever are apt to arise from slight causes. It is, therefore, necessary that the patient be well looked after for some time after defervescence is complete. For at least a week morning and evening temperatures should be taken: and during this time the diet is to be restricted to milk, eggs, custards, farinaceous foods, light puddings, and animal broths and jellies. Visits of friends are to be restricted in number and duration. Undue exertion, even within the limits of the sick-room, is to be carefully guarded against, and all conversation upon business affairs or other matters liable to give rise to excitement or depressing emotions, is to be avoided. At the end of a week, solid food, and particularly tender meat or game, roast or broiled, may be taken; but the effect of changes of diet upon the temperature and general condition of the patient is to be carefully watched. For several weeks the diet must be restricted, and all seedy fruits, olives,

nuts, cheese, and other indigestible substances strictly avoided.

In camp, and especially during active warfare, the sick are taken care of in field and regimental hospitals by orderlies. The nursing cannot always be satisfactorily performed. Among the inevitable hardships of war is the deplorable condition of the sick and wounded. Nursing under such circumstances consists in making the best use of such appliances as are at hand. When circumstances are such as to enable trained and competent nurses, as those of the Red Cross Society, to reach the front, much may be done to alleviate the sufferings of the men. The skilful preparation of suitable food when it can be obtained, attention to the clothes and bedding, bathing and cleanliness, and even the administration at short intervals of water to the thirsty, are duties that devolve upon the nurses, and which can only be properly performed by those who are wholly without other cares or responsibilities.

Surgeon-General Sternberg at the time of the Spanish-American War sent a communication to the chief surgeons of the troops in the field, commending it to their careful consideration and as of value to them in their efforts to limit the spread of typhoid fever in their commands. In his letter transmitting this communication he says that where the conditions are not entirely satisfactory for digging sinks of the proper depth, the recommendations of the Board of Medical Officers should be adopted, and water-tight trough, as suggested, be used. He invites special attention to the recommendation of the Board that " every opportunity

should be taken to expose blankets and bedding to the sunlight," and states that infected tents, clothing, and bedding should be disinfected by steam, by boiling water, or by a five per cent. solution of carbolic acid.

The communication and its endorsements read as follows:

"The Board of Medical Officers convened per S. O. 194, par. 40, c. s., A. G. O., Washington, D. C., August 18, 1898, to inquire into the causation and spread of fever in the camps in the United States, beg leave to make the following provisional report:

" Although we are not as yet ready to come to a definite conclusion concerning the causation and means of spread of this disease, we feel quite thoroughly convinced that the fly has been an important factor in its dissemination. We are also convinced that so long as the present method of disposing of fæcal matter in the camps is continued it will be quite impossible to eradicate this disease. We believe that the bacilli are now being daily disseminated by flies, and that the tentage, bedding, and clothing of the soldiers have become more or less infected with the germs of typhoid fever, and we think that radical steps should be taken to destroy this infection. Until this is done we are convinced that changes of camp sites will be of little or no avail. We therefore feel called upon at present to make the following recommendations pertaining to this matter:

" 1. We recommend that the sink be universally and wholly replaced by the following contrivances: Each regiment should be furnished with three wooden boxes, lined with galvanized iron and made perfectly water-

tight. Each of these boxes is designed to serve as a battalion sink; the dimensions of each box should be as follows: Length, fourteen feet; width, two feet; depth, eighteen inches. This box should be set at a slight incline, so that one end will be two to four inches lower than the other end. If possible, there should be placed over the upper end of each box a water-tap; this can only be done when water is piped into the camps. When this is not feasible, water will have to be poured into the trough. The lower end of this trough should have a three-inch opening with a conductor leading outside the house and opening over a pit or well. The box end of this opening should be guarded by a tube of the same diameter and about fourteen inches high, with a curved handle at top, by means of which it can be lifted. For use each of these troughs should be filled to a depth of six inches with a five per cent. solution of carbolic acid, or, to be more definite, there should be placed in each box one hundred gallons of water and five gallons of crude carbolic acid. This mixture should be thoroughly stirred. The fæces and urine of all the men should be received into the trough, the box being provided with a suitable cover having twelve openings. A metallic trough of proper height, leading into this larger trough, may be constructed at each end for urine. Once or twice a day, as may be necessary, the contents of this box should be allowed to run into the sink or well and the material should then be immediately covered freely with earth.

"Where lime has already been supplied to the camps as a disinfectant, milk of lime may be used in these

boxes instead of the five per cent. solution of carbolic acid, and when this is done, one-quarter of a barrel of lime should be mixed with the one hundred gallons of water and thoroughly stirred. A similar privy of less capacity should be prepared for the officers and cared for in the same way.

"The care of these privies should be made a duty of the medical officer of the regiment, and he should be held responsible for their proper condition.

"We are convinced that typhoid fever will not be eradicated until the stools and urine of every man are thoroughly disinfected. Proper utensils, with sufficient soap and water, should be provided at each battalion sink, such as we have described, and every man should be required, in the presence of a sentinel, placed there for that purpose, to thoroughly wash his hands on leaving the sink.

"2. We believe, as already stated, that the tentage, the floors of the tents, and personal clothing of the soldiers are infected and should be thoroughly disinfected. The tents may be boiled. It would be preferable to establish at each of the large plants a steam plant where the tentage and all clothing should be thoroughly disinfected. The flooring of the tents should be scrubbed with a five per cent. solution of carbolic acid and exposed to the direct rays of the sun for at least twelve hours. We have found many soldiers sleeping on old, dirty mattresses; these should be burned. Many infected regiments have been mustered out and their tentage and blankets turned in. Before these are issued they should be thoroughly disinfected.

"Every opportunity should be taken to expose blankets and bedding to the sunlight; our inspection of various camps has convinced us that sufficient attention is not paid to this.

"In the opinion of the Board, no time should be lost in the inauguration and rigid enforcement of these measures. Otherwise we are firmly convinced that typhoid fever will continue to prevail until late fall at least. Moreover, even after the fly is paralyzed by the cold weather, the infected bedding and tentage will cause a continuance of the disease."

This communication is signed by Walter Reed and Victor C. Vaughan, members of a special committee appointed to investigate the subject.

While the matters referred to in no wise fall within the line of the duties of the nurse in camp, they supply many valuable hints bearing upon the prevention of the spread of enteric fever under such circumstances, a knowledge of which will be of great assistance not only to nurses, but also to the officers who have control of the location, arrangement, and policing of camps.

THE TREATMENT OF ENTERIC FEVER BY COLD BATHS.

The method of Brand consists in the following systematic procedure:

Whenever the temperature taken in the rectum reaches 102.2° F. (39° C.), or 101.4° F. in the axilla, the patient is placed in a bath of 65°–70° F. A compress, wet with water about five degrees lower, is placed upon the head, or water at a lower temperature is poured upon the head and shoulders. The patient re-

mains in the bath fifteen minutes, during which time he is systematically rubbed by the attendants and encouraged to rub himself. At the expiration of that time he is removed from the bath and wrapped in a coarse linen sheet, over which a blanket is folded, the extremities being thoroughly dried and rubbed. A little wine or spirits is then given. This is repeated every three hours, unless the temperature remains below 102.2° F. The alimentation is liquid, nutritious, and carefully regulated. No drugs are administered.

Glénard[1] gives the following outline of the technique:

"If the diagnosis of typhoid fever is probable, recourse should be had to the baths, whatever may be the symptoms. The full tub should be placed in the ward or chamber, parallel to the bed at a distance of one or two metres, the floors properly protected by oil-cloth, and a screen placed between the bed and the bath-tub. A sufficient quantity of water should be used to cover the patient's body to the neck. It should be of a temperature of from 64.4° to 68° F. (18° to 20° C.). The baths should be prepared without disturbance or noise. There should be placed on the floor near the head of the tub two pitchers of cold water of a temperature of from 46.4° to 50° F. (8° to 10° C.), each containing four or five quarts (litres). A glass of water should be at hand. The first bath should be given preferably about four o'clock in the afternoon, unless there is some urgent reason for select-

[1] Le Bulletin Médical, February 26, 1888.

ing a different hour, and the physician should be present. The rectal temperature is taken, the urine is voided, and the patient is assisted into the full tub, the screen having been removed. If there is perspiration, the patient is dried before entering the bath. Cold water from the pitchers is poured upon the head and the back of the neck for one or two minutes, the amount being from two to three quarts (litres). Then a swallow of cold water or red wine is given. This being done, the whole surface of the body is briskly rubbed with a sponge or brush, and the patient is made to rub his chest. These frictions stimulate the peripheral circulation, prevent the accumulation of heat at any one point, moderate the sensation of cold, and help to pass the time; they are not indispensable. Shivering appears, as a general rule, in between eight and twelve minutes; this is a necessary evil to which too much attention is not to be paid. Towards the middle of the bath, or at its termination, cold water is again poured over the head and neck. The time occupied ought to be at least fifteen minutes, longer if the head is still warm and the cheeks red, or if the temperature of the patient was very high before the bath.

"The patient should leave the bath without precipitation. He cannot take cold; thoracic complications are caused by typhoid fever and not by chilling. The air of the apartment should be pure and not too warm; the window should be opened in the intervals between the baths; during the bath it ought to be closed. On leaving the bath, the patient should be gently dried with a towel. The bed should be carefully made

during each bath. If, on returning to the bed, shivering takes place, the limbs should be rubbed and a hot bottle placed at the patient's feet. A cold compress, covered with oil-silk or flannel, should be placed over the abdomen, and a little warm nourishment administered.

"Three-quarters of an hour after the bath the rectal temperature should again be taken. If, however, it is found to be below 101° F. (38.5° C.), it is not necessary to take it again for three hours.

"Alimentation should consist of the following articles: Milk diluted with coffee or tea or cocoa (a quarter of a litre at each administration); thoroughly cooked gruel, oatmeal, tapioca, or vermicelli; veal, mutton, or chicken broth, freed from fat when cold, and reheated at the moment of administration. As a drink, pure cold water should be given; the indication for wine or spirits is urgent only in cases that are subjected to this treatment later in their course. If the patient does not sleep, or sleeps badly, he is to have a draught of iced water, and the abdominal compress is to be changed every quarter of an hour. The discharges from the bowels are to be preserved for inspection, and the total quantity of urine may be collected in the same vessel. Neither age, sex, menstruation, pregnancy, nor sweating (except that which occurs at the end of defervescence) in any way modifies the treatment. In women who are weaning their children, cold compresses should be applied to the breasts and be frequently renewed. If diarrhœa persists, it is to be combated by cold compresses, which may be kept cold by the aid of a bladder

of ice. If there is constipation, it is to be treated by cold enemata, and, if these fail, by enemata consisting of one part of cold water and one part of fresh ox-gall.

"When the temperature before the bath is very high, or if the fall forty-five minutes after the bath is less than 1.8° F. (1° C.), the bath must be prolonged to eighteen or twenty minutes. It is very rarely necessary to modify the general formula. After the temperature does not exceed 102.2° F. (39° C.), but yet reaches 101.3° F. (38.5° C.), it is necessary to treat these slight exacerbations by baths of 68° F. (20° C.), and of five minutes' duration, in order to prevent the prolongation of the fever or the occurrence of relapse, and to shorten convalescence. If relapse occurs, it must be treated according to the general formula. When the temperature no longer exceeds 101.3° F. (38.5° C.), defervescence being established, the baths are discontinued, and the patient should be treated as convalescent, but is to be kept in bed until the temperature has not exceeded 100.4° F. (38° C.) for four days. He may then rise and in a short time walk in the open air; he may prolong his promenades according to his strength, and one will be struck by the rapidity with which his strength increases after every outing. Proper precautions are to be taken against cold. As to alimentation, already during defervescence there may be added to his soup, milk, or bouillon, either one or two raw eggs daily, or, a little later, one or two teaspoonfuls of scraped raw meat or a little toasted bread or biscuit; but the aliment must always be given in liquid form.

"The *régime* of the convalescence should be gradually established, and may consist of solid food after the temperature has not risen above 100.4° F. (38° C.) for four days.[1] At this period the intervals between the feedings should be at first three hours during the day; afterwards one regular meal daily may be given; and a little later the patient may have roast beef and fish, morning and evening, and bread in small quantities. The appetite is excellent, and it is necessary to control it. For the first two days of the convalescence the temperature is to be taken as before; after that, for a week, morning and evening. At the end of that time temperature observations may be discontinued.

"During the treatment by baths, one attendant is required for the day and one for the night; these duties may be fulfilled by members of the family. In a hospital one bath-tub may be used for a dozen patients, but it is better to use one for six patients. Two attendants are sufficient for twelve patients. It is not necessary to renew the water of the bath every three hours; once in twenty-four hours is sufficient. [When the conditions are suitable the tub should be emptied, scrubbed with boiling water, and refilled between each treatment.—J. C. W.] The patient treated from the beginning in this manner never suffers from fæcal incontinence. As a rule the patient should pass his water before entering the bath. During epidemics the water of the bath, if it is not soiled, may serve for

[1] Better not until the evening temperature has not risen above normal, say 99.5°, for a week. The unstable temperature of convalescence deprives transitory rises to 100.4° or thereabouts of any great significance.—J. C. W.

several patients, and should only be renewed two or three times a day."

This is the line of treatment to which, if rigorously carried out, the extraordinary results which I have indicated are ascribed. That it seems heroic, thus briefly stated, cannot be denied. That it is heroic to those who see it practised for the first time is more than true. Preconceived notions in regard to the management of typhoid cases are violated. The frequent disturbance for the purpose of taking temperatures and bathing, the fact that the patients are compelled to rise from their bed and, with the aid of the attendants, to step into the bath, the pallor, shivering, and the blueness of the extremities, which show themselves during the course of the bath, and continue for a varying time after the patient is put to bed, demand conviction on the part of the physician and the courage of conviction to continue.

It is only when the favorable effect upon the condition of the patient is seen, and when we reflect that in every hundred cases at least seven lives, which would be lost under the expectant-symptomatic treatment, are saved by strict cold bathing, that we dare to proceed.

What is the effect upon the course of the disease in cases treated from the beginning,—that is, before the fifth day? Brand declares that the classical picture of typhoid fever is no longer seen. It may be objected to this that we do not get our cases before the fifth day; and even if they come under observation so early a positive diagnosis cannot always be made at that time. Only in garrison life and in epidemics will a treatment so radical be justifiable at the onset of a vague

febrile disease. But Brand's statement is true of cases in which treatment is instituted at a later period, even so late as the middle of the second week. After six or eight baths the familiar picture is no longer seen. Delirium ceases, stupor gives way to light somnolence, from which the patient is easily aroused with a bright expression and a clear mind. The tongue becomes moist and clean, and remains so. There is desire for food, and very commonly a complaint of hunger. The abdomen is not tympanitic. Diarrhœa is rarely excessive or troublesome. In short, there remains, in the words of Brand, of the ordinary picture of typhoid nothing more than (*a*) a moderate fever, (*b*) an unimportant bronchial catarrh, (*c*) enlargement of the spleen, (*d*) the rose rash, and (*e*) infiltration of the intestinal glands. Everything else is prevented, and what might have been a severe case runs its course as a mild one if the patients are brought under treatment sufficiently early. Exceptions to this statement occur only when complications develop at the onset. There are rapid wasting and progressive anæmia, as in all prolonged febrile diseases, but severe enteric fever is changed to mild, the mild to a still milder form. This is brought about through the control of the temperature and by preventing disturbances of normal functions. The treatment is directed against the typhoid process as an entirety.

It does, it is true, not only reduce the temperature; the repetition of the bath also *controls* the temperature and keeps it down. But the bath does much more than this. It acts upon the nervous system in such a manner as to enable it to withstand the toxic influences

of the infecting principle and the product of its evolution. This it doubtless does by the action of cold water upon the peripheral nerve-endings, a reflex stimulus being transmitted to the nerve centres presiding over the circulation, respiration, digestion, excretion, and nutrition. This general reinforcement of function is shown by improved action of the heart, the first sound continuing distinct, the pulse being slower and more regular, and the improvement in the arterial tension showing itself by an absence of dicrotism; by persistence of appetite and digestive power, permitting freer alimentation without gastric disturbances; by deepening and slowing of the respiration; and by the absence of nervous symptoms, the increased excretion, the prevention of complications, and the rapid convalescence.

Every attempt to deviate from the routine treatment as above laid down is followed by less satisfactory results. The treatment thus stands by itself as a definite procedure, to be distinguished from treatment by graduated baths, the cold pack, cold affusions, spraying, and other hydrotherapeutic measures. It is especially to be looked upon as something distinct and different from the antipyretic treatment.

During the Spanish-American War, owing to want of knowledge of camp hygiene and faulty arrangements as to the water-supply, disposal of the excretion, and the drainage in the great practice-camps, furious epidemics of enteric fever broke out among the volunteers and regular troops. The military medical service proving inadequate to cope with these outbreaks, the sick

were transported under State and local auspices to the various civic hospitals in the cities. Hospital trains became a necessity in time of war, and the care of the very sick in transit a new requirement of the nurse.

These trains are made up of a baggage-car for supplies, a refrigerator, an oil-stove, a few chairs for the use of those in charge; ordinary passenger coaches from which the seats have been removed and fitted up with canvas cots placed end to end along each side. Spring wire-cots are too elastic, and take up the motion of the cars to such an extent as to become very uncomfortable. Sleeping-cars are unsuitable for the transportation of very ill patients, but on long journeys one or more sleeping-cars, according to the length of the train, and one dining-car should be attached for the use of the officials and nurses. The dining-car may be used also for the preparation of coffee, soups, and other articles to be served hot to the soldiers. A medical officer, with due authority to remove the sick, is in charge. A sufficient number of medical assistants, orderlies, and nurses accompany him. The work is very arduous and trying, and only those who have strength and endurance, and who are not liable to become car-sick, should undertake it.

The following is a list of necessary articles:

Supplies for Hospital Train.—Sheets, shirts, glass-towels, pillow-cases, towels, Turkish towels, blankets, bed-pan covers, hot-water bag covers, bags for breaking ice. The quantity of linen must be regulated by the length of the journey.

For Each Car.—Three clinical thermometers, three

scratch-pads, three pencils or fountain pens, three urinals, two bed-pans, one bucket, one pitcher, two basins, four feeding-cups, two mugs, three medicine glasses, three bent-glass tubes, one minim glass, one medicine dropper, one small dish-pan, one bed-brush (to brush dust off sheets), one piece Ivory soap (cut in half), one roll toilet paper, three ice-caps, two hot-water bags, two hair-brushes, two combs, two pairs scissors, two tumblers, two teaspoons, two rubber sheets.

For One Whole Train.—Clothes-tags (one for each patient, used to list the clothes), one bundle applicators, one hypodermic syringe, one Davidson's syringe, soft catheters (three or four different sizes), one funnel, one roll lint, one roll absorbent cotton, gauze, bandages, antiseptic dressings, pins, safety-pins, flannel, two air-rings, milk, ice, water, hatchet for breaking ice, rope (fastened between cars to steady the nurses in passing, found very useful), needles, and sewing-cotton. For a long journey, clinical charts and treatment sheets.

The nursing staff should consist of one nurse in charge and two nurses for each car. There should be an orderly for each car.

The cots are not made up until the train reaches its destination in order to have them in order and clean for the reception of the patients. The patients are taken care of just as they would be upon entering the wards of a well-regulated hospital. They are bathed, their clothes are listed and tied up. Cards of identification are made out and compared with the official lists supplied. Temperatures are taken and charted. The treatment is begun as soon as ordered by the

doctor in charge. When the train is in motion, cold compresses, for which purpose towels changed in tubs may be used, are more easily managed than sponging. Small tables and chairs are used by the nurses when the journey is long.

Prophylactic vaccination. The following conclusions have received general acceptance:

1. The practice confers a notable immunity against typhoid infection.

2. It reduces by at least 75 per cent. the case incidence of enteric fever in groups of persons treated by this method of immunization.

3. Under like conditions enteric fever occurring in immunized persons shows a death-rate diminished by about 50 per cent. as compared with cases occurring in individuals not so protected.

4. In groups of immunized persons enteric fever is not only much less liable to occur upon exposure to predisposing conditions, but when it does occur its course is as a rule much milder.

These persons should be immunized:

(a) Physicians, hospital internes, students of medicine, male and female nurses and orderlies in hospitals.

(b) Washerwomen and persons working in laundries.

(c) All persons exposed to the disease or who are liable to be brought into contact with patients suffering from it.

(d) Members of families or households among whom typhoid-carriers have been shown to exist.

(e) Persons expecting to travel or to settle in regions known to be infested with enteric or typhoid fever.

(f) All residents in localities in which the disease has become prevalent.

(g) All soldiers, men-of-war's-men and ordinary seamen.

Vaccination as a prophylactic measure against enteric fever is practical in the armies of Europe and is now compulsory in the military service of the United States.

The material is prepared in the biological laboratories and marketed in vials of definitely regulated dosage. For the immunization of one adult individual three doses are required: The first vial containing 500,000,000 bacilli, the second and third 1,000,000,000 each. These doses are administered at intervals of seven or ten days. A convenient hour is 4 P.M., as the reaction will then take place at night, while the subject is in bed. The inoculation is made subcutaneously about the insertion of the deltoid. The skin is prepared in accordance with the general surgical requirements of asepsis. Local and general reaction occur but subside in the course of 10 to 24 or more hours. There is no constant relation between the intensity of the reaction and the degree of the subsequent immunity.

The duration of the immunity varies from two to four years.

So-called negative phase.—The first inoculation has been found to be followed for a period of one or two days by a state of diminished resistance to typhoid infection. For this reason individuals undergoing immunization against enteric fever should for the period

immediately following the first inoculation take strict precautions to avoid typhoid infection, by a careful selection of water and food and by rigorous personal hygiene and cleanliness. Immunization should not be practised upon persons suffering from serious organic or other diseases, especially tuberculosis.

PARATYPHOID.

It has been established that cases of disease presenting the symptoms of enteric fever may be caused by micro-organisms other than the Bacillus typhosus. The true nature of these cases can only be determined by laboratory methods, which show the cultural and agglutinating properties of the bacteria which cause them to differ from those which give rise to enteric fever. There are two varieties—Bacillus paratyphosus A and Bacillus paratyphosus B. The almost universal practice of immunizing against enteric fever among the armies of the present war has, on the one hand, so reduced the prevalence of that disease as compared with previous modern wars that its death-rate has become practically negligible, while on the other hand the paratyphoid infections, not directly influenced by such vaccinations, have come into unsuspected prominence and importance. The necessity of controlling the prevalence of the latter by specific prophylactic vaccination became at once apparent. Immunization with each bacillus separately by means of a succession of inoculations has been superseded by the use of a mixed triple vaccine in which the three micro-organisms are inoculated simultaneously, a method which is followed by an im-

munity against each of the constituent organisms as effective as that secured against any one of the three, employed alone for the first immunizing vaccination.

TYPHUS FEVER.

Definition.—A specific febrile disease of from ten to twenty-one—usually fourteen—days' duration, highly contagious, arising under circumstances of general destitution and overcrowding, and prevailing in more or less extended epidemics. It is characterized by sudden onset; great and early prostration; a dull, flushed face; wakefulness, passing at the end of the week into delirium, which may be active and noisy, but is commonly low and wandering; stupor tending to coma; tremors and involuntary evacuations; a furred tongue, soon becoming dry and brown; in most instances constipation; a copious rash appearing between the middle and end of the first week, the spots disappearing upon pressure at first, but speedily becoming persistent, and often associated with little effusions of blood in or beneath the skin (petechiæ). No local changes after death; the blood is broken down, the heart and voluntary muscles degenerated and softened; the internal organs congested.

Synonymes. — True Typhus; Pestilential Fever; Camp Fever; Jail Fever; Ship Fever.

History.—A history of typhus fever would be the history of Europe for three and a half centuries ending with the Napoleonic wars. During the seventeenth and eighteenth centuries it was the abiding form of continued fever in every country of Europe, among all

ranks and conditions of men, and it everywhere appears, under many different names, as influencing the course of history and the relations of society.

During the present war typhus has become readily prevalent in southeastern Europe, and constitutes a formidable scourge not only among the contending armies but also in the civil populations.

Owing to improved ways of living and more general observation of sanitary regulations, typhus is far less prevalent than formerly. In fact, it has almost wholly disappeared from Central and Western Europe and the British Isles.

On the Atlantic seaboard its prevalence has never exceeded the limits of local epidemics. It is not probable that typhus fever will in the present state of sanitary science gain a permanent foothold in the United States, yet the possibility of limited outbreaks, by importation, gives it theoretical importance.

Tabardillo: Mexican Typhus.—This infectious disease is identical with European typhus. The period of incubation appears to be longer; the onset is less abrupt and the defervescence more commonly by lysis than by crisis. The eruption is less often petechial. The duration of the febrile movement is about the same and the intense headache and backache, prostration, vertigo, gastro-intestinal symptoms, apathy and delirium correspond to the typhus of Europe. McCampbell, who carefully studied the subject, believes tabardillo to be a variety of typhus, the departure from type being due to the influence of temperature and other climatic conditions. It is transmitted by the louse.

Causation.—Typhus fever is caused by an infecting principle—Bacillus typhi exanthematici—communicable from the sick to the well by actual contact and by fomites. It can be transmitted from man to man and by blood inoculation to monkeys and guinea-pigs. This infecting principle is, so far as known, invariably derived from a previous case of the disease, and is probably an organized germ.

Typhus is pre-eminently contagious. When it appears in a community it spreads rapidly among the susceptible persons. Its prevalence in restricted localities is in proportion to the degree of intercourse between the healthy and the sick. When it breaks out in a house, those living in the same room with the person first attacked are usually the next in order to develop the disease. In hospitals the nurses and resident physicians are much more commonly attacked than the attending physicians or students.

Typhus is, in all epidemics, imported into localities previously free from it by infected persons. It is in this way that the disease has made its way to the seaport towns of this country. Hence its names: Irish fever, emigrant fever, and so on. Very often in general hospitals the admission of a single case of typhus is followed by its spread among the attendants and the other patients. The prompt removal of the first cases from the house or locality in which the disease has made its appearance has often arrested its spread, while the neglect of this measure has converted such house or locality into a focus of contagion.

The disease may be and is constantly communicated

from the sick to the well by actual contact. If the room occupied by the patient be spacious, airy, and clean, the risk of contagion is slight. Physicians incur but little liability to contract the disease who visit patients in such apartments with due precaution; but those, on the other hand, who heedlessly come in contact with the patient, or incautiously perform auscultation, or who tarry in his presence, incur great risk. Typhus is never communicated by means of the atmosphere from fever hospitals to the houses in their immediate neighborhood.

Articles with which the patient comes in contact may become carriers of the contagion. It is probable that the germs of typhus may retain their vitality for an indefinite period, in the absence of conditions favorable to their development or multiplication. Not only the bedding and clothing of the patients, but also the apartment in which they have lain, may act as *fomites*. Particular houses, in this way, become hotbeds for the production of the disease; ships used for the transportation of typhus patients become the home of the infection, and vehicles used to convey patients to the hospital may communicate the sickness to their next occupants. Those who handle and wash the undisinfected clothing of typhus patients are peculiarly liable to take it.

Not only may the disease be thus conveyed to a distance by articles of the most varied description, but individuals not themselves sick of the fever may be the means of communicating the disease from the sick, or from infected localities, to the healthy at a distance.

The disease may be contracted by susceptible persons through contact with the bodies of persons who have died of it. There are no facts to prove that it is disseminated from the dejections, as is the case with enteric fever.

Nicolle and others have demonstrated the fact that the common louse *(Pediculus vestimenti)* may transmit typhus to the monkey (*Macacus Rhesus*), in which it causes a febrile infection. It has been established that typhus is thus conveyed to human beings, a discovery fully in accord with most of the known facts in regard to the epidemic prevalence of the disease.

The period of incubation is from five to seven days. There are no reliable facts in support of the statement that it sometimes exceeds three weeks. A number of cases have been recorded in which the symptoms of the disease appeared immediately upon exposure. In these instances the possibility of previous unsuspected exposure is to be considered.

Typhus is but little contagious during the first week; the period in which it is most likely to be communicated is from the end of the first week to convalescence. After the disappearance of the fever and the return of appetite and digestion, the danger of contagion is slight. It is, however, to be borne in mind that the clothing of the patient, and articles in the sick-room, may, even at this period and long afterwards, unless disinfected and exposed to the sunlight and air, transmit the specific cause of the disease.

The contagion of typhus is destroyed by prolonged exposure to moderate dry heat, 204° F.

Immunity from a second attack is enjoyed by a majority of the persons who have suffered from typhus. Nevertheless, many cases of well-marked second attacks attended by the eruption are recorded.

Course and Symptoms.—From the onset of the attack, which is usually abrupt, to the defervescence, which is, in by far the greatest number of instances, critical, the march of the symptoms is progressive; and the stages merge imperceptibly into one another. Even the appearance of the eruption cannot be said to begin a distinct period in the clinical history of typhus fever, for the other symptoms are not modified; they are only intensified.

Prodromes sometimes occur but they are not, as a rule, so severe as to compel the patient to abandon his usual occupations; in some instances, however, he feels so dispirited and his sense of fatigue is so great, that even in this stage he promptly betakes himself to his bed.

In the greater number of cases, and especially in those cases where the development of the fever is rapid and the symptoms are severe, prodromes are wholly absent.

A chill or chilliness marks the invasion of the disease, which is generally so sudden that the patient or his friends are able to designate the day on which the attack began. The chill or chilly sensations are in many cases repeated at irregular intervals during the first two or three days, and, being followed by perspiration, may present a superficial likeness to intermittent fever. In children not infrequently, but rarely in

adults, vomiting, often repeated during the first few days, attends the onset. At the same time there is fever, which rapidly augments; the skin is hot, the face flushed, the eyes injected; headache is constant and severe, and a feeling of dulness and confusion, with vertigo upon assuming the upright posture, and noises in the head, distress the patient. He complains also of pain in the back, and dull, sore pains in his limbs and joints. Catarrhal symptoms are common, such as slightly hurried respiration, a little cough, sore throat, swelling of the edges of the eyelids, and lachrymation.

Muscular weakness and an extreme sense of prostration appear early. The patient's face at first wears an expression of weariness, but soon becomes dull and stupid. He falls into a drowsy state, but passes uncomfortable, restless nights. Wakefulness alternates with brief periods of sleep, disturbed by painful dreams and startings; after three or four days he begins to talk and mutter in his sleep, and between sleep and waking there is slight delirium. When awake the patient is still conscious and answers questions slowly, but generally with correctness, although there is confusion of mind and memory. Already he requires close watching, especially at night, when in his delirium he may leave his bed and wander from the room. In severe cases muscular movements are early unsteady and tremulous, the tongue trembles as it is protruded, and speech is feeble and hesitating.

The tongue is at first large, pale, and coated with a white, later with a thick yellowish-brown fur; it speedily shows a tendency to become brown and dry; appe-

tite is lost, there is thirst, the secretion of saliva is diminished, taste is perverted, and a stale, unpleasant odor loads the breath. Nausea is occasionally present, but vomiting is rare. There is constipation, as a rule, but in some instances slight diarrhœa occurs. The abdomen is soft and painless.

The pulse is increased in frequency; it soon reaches the neighborhood of 110 in the morning and runs up to 120–130, or even higher in the evening, with a much higher rate in children. It is full at first, but compressible,—rarely firm or tense; it soon grows feeble.

As a rule, the temperature rises rapidly, attaining 103°–104° F. by the morning of the third or fourth day, and 104°–105.8° F. the same evening, and remaining nearly stationary at these points until some time in the second week. A decided difference between the morning and evening temperature is more favorable, even when the evening increase is considerable, than a continuously high temperature range in which the morning remission fails.

On the fourth or fifth day, as a rule, less often at the end of the first week, the characteristic eruption appears. It consists of numerous roseola-like spots of irregular outline and varying in measurement from a line to three or four lines across, scattered singly, like the spots of enteric fever, or, as is by far more common, arranged in irregular groups. At first these spots are of a dirty rose-color, very slightly raised above the surface of the surrounding skin, and upon pressure they momentarily disappear. Within the course of a day or two they become darker from the escape of the

coloring-matter of the blood into the tissues; they are no longer elevated, but appear as faint, dirty brown stains, without defined margin, and fading, not disappearing, upon pressure. They closely resemble the rose-rash of enteric fever, differing principally in their numbers and grouping, and in the fact that they appear once for all, and not in successive crops. Their course is typical. They fade during the first half of the second week, and disappear with or without desquamation towards its close. True petechiæ appear about the time the typical rash begins to fade,—that is to say, about the eighth or tenth day. A faintly reddish, ill-defined mottling or marbling of the skin between the spots or groups of spots, which form the characteristic rash, also occurs to a greater or less extent. It is this that has been described, from its appearing to lie beneath the surface, as the "subcuticular" eruption of typhus. The appearance of the rash varies greatly, and the variation is determined by the general abundance of the two eruptions, by the relative preponderance of one or the other, and, in certain cases, by the extent of the petechiæ, which are, however, frequently absent altogether.

The distribution of the typhus eruption is irregular: appearing usually first at the sides of chest or abdomen, it spreads in a brief time to the chest, abdomen, back, and limbs. It rarely appears upon the neck or face, and in these regions is usually faint when present. It has in some instances been observed to appear first upon the backs of the hands. In some cases the roseola-like rash is absent altogether, the faint, subcuticular

mottling alone being present. An entire absence of eruption is very rare.

About the end of the first week the depression becomes profound, headache passes into delirium, and the impairment of the mental powers is extreme. The patient is dull of hearing; he answers questions very slowly and vaguely; drowsiness and stupor are marked, and in severe cases there is a tendency to coma. The character of the delirium is variable. It is commonly low, wandering, muttering; occasionally it is at first acute, severe, boisterous. This excitement usually soon passes away, leaving the patient in a state of the most profound exhaustion, or it gradually subsides into dulness with muttering. With both forms of delirium there is sleeplessness. The tongue is now dry, fissured, and crusted; sordes collect upon the teeth and lips; the conjunctivæ are deeply injected; the flushing of the face gives place to a dusky pallor, most marked about the nostrils and lips, and emaciation progresses. The breath and the skin exhale a peculiar fœtor, and there is annoying cough with mucous expectoration. The heart-sounds and the impulse are faint and indistinct. The state of the bowels varies from constipation to irregular, scanty dejections, or a moderate intestinal catarrh; the urine is scanty, opaque, high-colored, and very frequently contains albumen. In severe cases the discharges are passed involuntarily, or there is retention of urine.

The symptoms deepen. The patient utters no complaint. Neither pain nor headache is felt. Appetite is completely lost; thirst no longer distresses him,

although he swallows with difficulty, owing to the dryness of his throat. He lies upon his back, stupid, lost, utterly indifferent to everything around him, sometimes moaning or muttering incoherently, sometimes quiet. The eyelids are partly closed, the pupils contracted. Deafness is often present. When spoken to loudly he stares vacantly, without attempting a reply. If asked to put out his tongue, he opens his mouth, and leaves it open till reminded to close it. He is unable to raise himself, or even to turn from side to side; from muscular weakness he is continually sliding down in the bed; his hands tremble; he picks at the bedclothes, and feebly grasps at unseen objects in the air; there is subsultus. The pulse is small and weak, often difficult to count, less commonly irregular or intermittent. It ranges from 112 to 140 or over. The portions of the skin subjected to pressure show a tendency to slough. The surface now becomes cooler, and is often moist. If petechiæ are present they become more numerous.

Death may take place at any time after a condition such as has been described becomes fully developed. In very severe cases it may occur in the course of a few days or before the end of the first week. More commonly the fatal termination takes place between the tenth and the seventeenth days. Death at a later period is uncommon, except as a consequence of complications. The mode of death is by coma, or by asphyxia in consequence of sudden pulmonary engorgement, or by failure of the heart, the pulse becoming imperceptible, the surfaces cold, livid, and bathed in sweat.

In abortive cases a favorable termination may take place by critical defervescence at the end of the first or the beginning of the second week.

In average cases the fever comes to an end about the fourteenth day, sometimes as early as the tenth day, sometimes as late as the middle of the third week. The improvement is more or less sudden. The temperature, which in many cases shows a little abatement for some days before the crisis, falls in a single night, or, in the course of twenty-four or forty-eight hours, to the normal, or even a little below it; the pulse becomes much slower and its character improves; the stupor and coma immediately disappear after a prolonged, refreshing sleep, out of which the patient awakes as from an oppressive dream, conscious, but at first bewildered and confused. The eruption fades and gradually disappears; the tongue cleans and becomes moist at its edges; the appetite returns. The crisis is often attended by moderate sweating or diarrhœa, or both, and by an increase in the amount of urine, with the copious deposit of urates and the disappearance of albumin. In the course of a few days the tongue is moist, the appetite eager, strength begins to return, and the convalescence progresses rapidly, so that many patients are able to resume their work within a month from the beginning of the attack.

Temporary loss of hair not infrequently occurs during convalescence, and in many cases a considerable length of time ensues before the body-weight and the original vigor of mind are regained. The deafness in almost all cases gradually passes away.

Relapses occur, but they are much less common in typhus than in enteric fever.

The mean duration of typhus fever is about fourteen days. Mild cases may end in permanent improvement at the close of the first or beginning of the second week. The duration of average cases is from thirteen to fifteen days. Uncomplicated cases rarely exceed twenty days. If the defervescence be postponed to the end of the third week, it is in consequence of some local complication.

Improvement in the sanitary condition of localities formerly infested with typhus fever have led to its disappearance as an endemic disease, while the great epidemics of typhus have become, even in the wars of recent times, almost unknown.

Typhus never makes its first appearance in the cleanly and well-ventilated homes of the opulent classes. If it extends to them at all, it is by spreading from less fortunate localities. Upon the outbreak of an epidemic, the isolation of the first cases in hospital, and the thorough cleansing and ventilation of the houses and rooms from which they are removed, with general sanitary measures to obviate the predisposing causes of the fever in the affected neighborhood, are important. The infected buildings should be thoroughly fumigated with sulphur or formaldehyde, ventilated, whitewashed, and allowed to stand unoccupied for a considerable time. The clothes and belongings of the patients should likewise be disinfected by prolonged exposure to heat or to the fumes of burning brimstone, or by boiling in water containing carbolic acid. The infected bed-

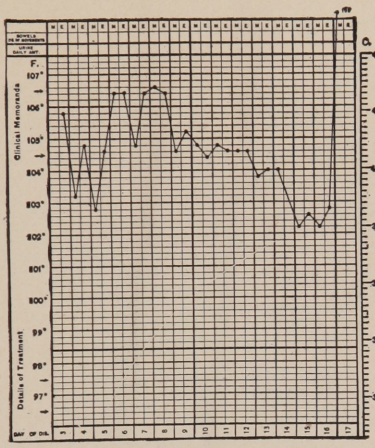

FIG. 12.—Typhus fever—fatal on 16th day of attack.

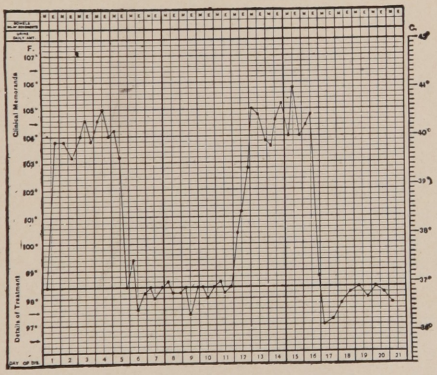

FIG. 13.—Relapsing fever.

ding should be subjected to the same treatment, and the materials used for filling mattresses and pillows should be burned. Absolute cleanliness in the sick-room is to be insisted upon. The excretions should be promptly disinfected. Persons in attendance upon the sick must be allowed opportunities for proper rest and exercise in the open air.

The general management of typhus fever is the same as that of enteric, regard being had to the early and grave prostration which so often characterizes the affection under consideration. As there is no intestinal ulceration, and no danger of hemorrhage from or perforation of the bowel, less caution in diet is necessary.

Hygienic measures relate to ventilation, to cleanliness, and to diet. Typhus cases, when treated in hospital, should be placed in large rooms by themselves, and never more than four or six together; the windows, even in winter, should be kept open, so as to secure careful and thorough ventilation. All observers insist that confined air is more to be dreaded than cold. When cases are treated at their homes, as is necessary in the well-to-do classes, similar regulations are to be observed; and, in particular, all unnecessary furniture, and all curtains and hangings which are liable to interfere with ventilation, on the one hand, and to absorb and retain the contagion, on the other, are to be taken away. Quietude is to be observed, and all visits, except such as are absolutely necessary, are to be prohibited.

Stimulants are very generally required. Most children, and a large number of the adult cases, may, however, be satisfactorily treated without them. Alcohol is

seldom required before the appearance of the eruption; it is most useful in the second week, and often necessary upon the approach of the crisis, even in cases where it has not before been required. Old people, and those previously greatly debilitated, almost invariably require alcoholic stimulants in the beginning of the disease. Persons of intemperate habits also commonly require alcohol from the onset of the disease, and in greater quantities than those unaccustomed to its use in health. Stimulants must be promptly given in cases of great prostration, with low delirium and a tendency to coma; also when the pulse is frequent, feeble, or undulatory. When the prostration is extreme and the patient is unable to swallow, brandy, or whiskey, or ether may be hypodermically administered; and, as will commonly happen in the severest cases, the condition of the patient may render it impossible to give the necessary food by the mouth. Under such circumstances, an endeavor to support the patient's strength and to prolong life must be made by means of rectal alimentation and medication.

It is of the utmost importance that the patient's strength be husbanded from the beginning of his sickness. All mental and bodily effort is to be avoided. It is a common observation that those who struggle against the disease in its early days usually suffer from great prostration later. The patient should betake himself to his bed as soon as the fever appears. If there be marked prostration during the first week, and under most circumstances during the remainder of his illness, the patient should not get out of bed for any purpose.

In typhus it is, in many cases, imperative that the patient do not assume the upright position. Fatal syncope may result. The management of the patient in delirium will often tax the patience and tact of the nurse to the utmost. In most cases restraint by forcible measures is unnecessary; it is always a last resort, and to be deplored.

The disease described by Brill and for a time known by his name has been definitely determined to be a form of sporadic typhus fever. It has been frequently observed in New York, Philadelphia and other cities on our eastern seaboard, chiefly among immigrants from southeastern Europe. The cases are usually admitted to hospital as typhoid fever, and are characterized by intense headache, apathy and prostration, an abundant erythematous maculopapular eruption and subcontinuous fever terminating in crisis or rapid lysis in two weeks or less. The case mortality is low. The explanation of the fact that these sporadic cases do not give rise to epidemics lies in the circumstance that typhus is communicated by the louse, an insect that is comparatively rare among communities in the United States.

RELAPSING FEVER.

Definition.—An acute, contagious fever, rarely occurring except as an epidemic, and in seasons of scarcity of food. It consists of—(*a*) a febrile paroxysm, characterized by abrupt onset, active fever, a moist, white tongue, epigastric tenderness, vomiting, and often jaundice, enlargement of the liver and of the spleen, and the absence of eruption, and terminating suddenly with

free perspiration about the fifth or seventh day; (*b*) an interval of complete apyrexia; and (*c*) an abrupt relapse on or about the fourteenth day from the beginning of the disease. This relapse runs a course similar to that of the initial paroxysm, and comes to an end by crisis on or about the third day. Convalescence usually ensues upon the termination of the relapse, but a second, third, or even fourth relapse has been observed. Fatal termination infrequent; enlargement of liver and spleen, but no specific lesion found upon examination after death.

Causation.—This fever has as its primary cause a minute organism, which from its spiral form has received the name of *spirillum* or spirochæte. It was discovered in the blood of relapsing fever patients in 1873 by Obermeier. These organisms are present in the blood only during the febrile paroxysms. Blood-sucking insects and especially the body louse—*Pediculus vestimenti* transmit the disease.

Upon the appearance of relapsing fever renewed efforts must be made to relieve the sufferings of the poor, and chiefly to provide them with a sufficient quantity of wholesome food. As far as is possible, overcrowding must be diminished in the districts most liable to become pestilential centres of the disease. The drainage is to be looked to, and, if defective, temporary measures to drain away stagnant water must be immediately resorted to. All accumulations of filth and garbage must be at once removed. Especial attention must be given to household vermin, particularly lice and bed-bugs.

Contagious as relapsing fever is, it does not spread, when cases occur in the large and well-ventilated houses of the opulent, nor to any great extent in the roomy and properly-aired wards of well-managed hospitals, except to those whose vocations bring them into close contact with the sick. Physicians visiting from house to house among the poor, remaining only a short time in the presence of the patients, and passing quickly again into the open air, are less liable to contract the fever than the resident physicians of hospitals or nurses who pass from bedside to bedside and are much more exposed to the danger of inoculation by vermin.

Cleanliness of the abode and of the person is scarcely second in importance to abundant ventilation. The contagion is readily transmitted by means of the clothing and bedding of the sick. Soiled clothes should be disinfected and thrown into boiling water as soon as taken off, and carbolic acid or carbolic acid soap used in the water with which they are washed.

If patients be removed to a hospital, or after convalescence has set in, the apartment should be fumigated by burning sulphur or formaldehyde, then thoroughly aired, cleansed, and whitewashed. The bedding should also be subjected to the sun and air, and, if possible, fumigated. The cheaper materials used in filling mattresses, as straw, moss, fine shavings, and husks, should be burned.

No method of treatment has been found to exercise any decided influence upon the course of the disease. It must therefore be treated upon the expectant plan.

The general management of patients ill of relapsing fever must be conducted by the nurse in accordance with the rules already laid down. The temperature is often extremely high, but this condition is not attended with the extreme danger which accompanies hyperpyrexia in other fevers. Nevertheless, energetic antipyretic treatment may become necessary. The defervescence is critical, and attended with great depression of the powers of the organism. This condition calls for the prompt and energetic use of stimulants.

INFLUENZA.

Definition.—A continued fever, occurring in widely-extended epidemics; characterized by early developing catarrhal inflammation of the mucous membrane of the air-passages, and in many cases also of the digestive tract; by quickly increasing debility, out of proportion to the intensity of the fever and catarrhal processes; and by nervous symptoms. There is a strong tendency to inflammatory complications, especially of the lungs. Uncomplicated cases are seldom fatal, except in the very young, the aged, and others much debilitated by previous disease.

An attack does not confer immunity from the disease in future epidemics.

Synonymes.—Catarrhal Fever; Epidemic Catarrhal Fever.

History.—Great epidemics of influenza have been observed and recorded at various times from the earliest history of medicine. Some of them have literally traversed the greater part of the civilized world, not

even sparing domestic animals, as the horse and the dog. Others less extensive have affected in the course of a few weeks or months the greater part of Europe or America, the disease in its milder or graver form overlooking scarcely an individual in the communities which it has visited. These great epidemics have occurred at long intervals, perhaps three or four times in a century. But more restricted outbreaks, passing over considerable areas of country, are of very common occurrence.

Causation.—Influenza is due to infection by a specific micro-organism or bacillus, described by Pfeiffer in 1892. This organism is found in great numbers in the secretions from the nasal and bronchial mucous membrane during the attack. It is readily transmissible; the disease is therefore highly contagious. Its spread in the great epidemics is as rapid as the ordinary methods of travel.

Influenza differs from ordinary catarrhal fever, such as is common enough in sporadic cases or in little outbreaks affecting the members of a household, and usually attributed to "catching cold," in two respects,—first, its general prevalence; second, the severity of the symptoms.

Course and Symptoms.—Influenza presents the greatest variation as regards intensity,—from the most trifling indisposition to an illness of the gravest kind, which may even end in death.

In severe cases the onset is usually abrupt. The attack begins with shivering or a chill, or with fits of chilliness alternating with heat. Fever is rapidly es-

tablished. It is usually moderate; sometimes intense. During the course of the fever chilliness, flashes of heat, and more or less copious sweating occur at irregular intervals. There is headache, pain in the orbits and at the root of the nose. Tickling in the throat, hoarseness, dry, paroxysmal cough, and shortness of breath also occur. Chest-pains, stitches in the side, sneezing, and loss of the senses of smell and taste attend the development of general catarrhal symptoms.

There are also present pains in the limbs, loss of appetite, usually complete, thirst, constipation, and diminished secretion of urine. The pulse is full, but as a rule not rapid. It may be very weak. There is great restlessness and annoying inability to sleep.

The defervescence is attended by an increased flow of urine and amelioration of the general symptoms. Catarrhal symptoms outlast the fever for a few days, but cough and expectoration may not disappear for some time.

There are marked evidences of functional disturbance of the nervous system; great depression; loss of muscular strength; lowness of spirits; mental weakness; sometimes even stupor or delirium. In some cases slight convulsions take place. Areas of burning pain in the skin, or of loss of sensibility, neuralgias, and various pains in the bones and muscles are very common and often severe.

The duration of the mildest form of influenza is from two to three days. In well-developed cases without complications convalescence sets in between the fourth and tenth days. Severe cases with complications last

much longer, several weeks often elapsing before recovery is complete.

In the persistent pulmonary forms the influenza bacilli have been found in the secretions or lesions after many months. We must therefore admit the existence of chronic forms.

During an epidemic aged persons, those enfeebled by chronic diseases, and in particular those subject to chronic bronchitis, consumption, emphysema, fatty heart, and Bright's disease, should be cared for with unusual solicitude and diligence, since they constitute the classes most prone to the graver complications of the disease, and from which its fatal cases are almost wholly derived. Such individuals should be warmly clad; they should shun, as far as possible, the vicissitudes of the weather, even keeping within doors.

The treatment of influenza is expectant and supporting.

The lighter cases seldom require medical treatment. The patients are uncomfortable and dispirited, easily fatigued, and unfitted for business. It is best for them to stay in the house or even to go to bed for two or three days. The diet should be restricted to a few simple and easily-digested dishes. Meat should be avoided. The custom of taking large amounts of hot beef-tea is a bad one; it often increases the headache and languor. Such beverages as are proper for fever cases may be given. Both food and drink, however, should be of very moderate amount. In severe cases alcoholic stimulants are absolutely necessary.

The brows and nose may be freely anointed with

washed lard, cold cream, or goose-grease. The mineral fats (cosmoline, vaseline) are less useful than animal fats. Warm or hot applications to the head usually give comfort, while cold almost invariably adds to the distress. It is a good plan for the patient to wear a flannel night-cap or wrap his head in a silk handkerchief. The air of the room should be rendered moist by the evaporation of water kept boiling in a broad, shallow vessel.

Antipyretic treatment in this disease is neither necessary nor safe.

The pains in the chest may be combated with mustard-plasters, turpentine stupes, or frequent inunctions of fatty substances containing extract of belladonna.

YELLOW FEVER.

Definition.—Yellow fever is an acute specific febrile disease of short duration, prevailing in more or less extensive epidemics in warm weather, and for the most part restricted to narrow geographical limits, though occasionally carried beyond them. It is characterized by sudden onset; fever of moderate intensity, 102° to 105° F.; headache; pain in the back; epigastric tenderness and albuminous urine; defervescence, occurring at the end of twelve or fifteen hours, or not for several days, is followed by the "stage of calm," which lasts some hours. From this point recovery may be rapid and uninterrupted; or the surface becomes mottled and cold; the pulse feeble; vomiting, if not previously present, comes on, and hemorrhages are apt to occur. The vomiting of altered black blood is perhaps the

most characteristic event of this fever. Hemorrhages also occur from the gums, nose, eyes, uterus, kidneys, and under the skin. Lemon-yellow jaundice, from which the fever receives its name, is rarely absent in grave cases. Suppression of urine occurs in the worst cases.

Causation.—The infecting principle is a specific organism, probably a protozoon, which has not up to the present time been isolated.

The recent work of the Yellow Fever Commission of the United States Army, conducted under the most rigid scientific precautions, has revolutionized our views in regard to the modes of transmission of this disease from the sick to the well. It is now established that it is not transmitted by direct or indirect contagion in the ordinary sense. In Cuba during the United States military occupation very few cases occurred among the nurses or doctors in attendance upon the sick. In 1900, in a hospital in Havana, five nurses who had never had the disease nursed more than one hundred cases of yellow fever without contracting it. The remarkable experiments of the Yellow Fever Commission at Camp Lazear, Cuba, go far to establish the fact that this disease is not transmitted by fomites. A frame house was built in such a manner as to shut out the sunlight and prevent the access of fresh air, but was thoroughly screened against mosquitoes. In this house Dr. R. P. Cooke and two privates of the hospital corps, none of them immune, occupied a room for a period of twenty days, sleeping there at night, and regularly each morning packing boxes with sheets,

pillow-cases, blankets, and the like contaminated by contact with yellow fever cases and their discharges, and unpacking them at night. In this series of experiments seven non-immune soldiers lived in contact with articles thus contaminated and did not develop the disease. Another series of experiments demonstrated the fact that yellow fever is transmitted by the mosquito, *Stegomyia fasciata*, previously fed upon the blood of persons suffering from the disease. A third series of experiments established the fact that the disease can be produced in non-immunes by the subcutaneous or by the intravenous injection of blood from yellow fever cases. The results of the labors of this Commission are of far-reaching importance to the world. Its work was laid out and conducted upon strictly scientific lines. It has settled the question as to the extent and nature of quarantine against yellow fever, and has shown conclusively that prevention consists in regulating the local conditions which favor the development of the mosquito, and preventing the access of mosquitoes to non-immune persons. The chief credit is due to Major Walter Reed, who has since died; but his associates heroically shared with him the labor and the risk, and Dr. Lazear died of the disease, a martyr to scientific zeal.

The period of incubation is three to four days; in the experimental cases it varied from forty-one hours to five days and seventeen hours.

In the management of this fever absolute rest and free ventilation are of the first importance. The sooner the patient goes to bed the better. Mustard-plasters

to the epigastrium and bits of ice from time to time swallowed are of use against the irritability of the stomach. High fever is to be treated by cold sponging, packs, baths, or large iced-water enemata. Alcohol, and especially dry champagne, are useful. Food must be given in the most sparing amounts, or not at all for many hours. Rectal alimentation is sometimes well borne, and may be necessary to sustain the patient while quite unable to retain food. It is all-important for the physician to encourage the patient, and inspire him with hope, and the services of a skilful and experienced nurse are of inestimable value.

The patient must be confined to strictly recumbent postures, and all nourishment and drink must be given by tubes or pap-cups. If he cannot void his urine in the recumbent posture, it is far better to use the catheter than to allow him to rise for the purpose. The bed must be changed by moving the patient to one side and then to the other, as the soiled linen is removed and fresh substituted. The night-shirt is to be cut so as to be easily drawn off, and replaced by another cut in the same way and basted after it is put on.

DENGUE.

Definition.—A peculiar febrile disease of short duration, appearing epidemically in tropical and warm countries, characterized by a single paroxysm, with or without remissions, severe pain, stiffness in the joints and muscles, and a peculiar eruption. It is scarcely ever fatal.

Synonymes.—Dandy Fever; Break-bone Fever.

History.—No historical records of any disease resembling dengue are to be found prior to the middle of the eighteenth century, when it prevailed in Spain, and was known as *la piadoso*, or *la pantomina*. It prevailed extensively in Philadelphia in 1780. Many epidemics have since occurred in tropical and subtropical countries. It has of late been prevalent in the Gulf States.

Symptoms and Course.—Dengue begins suddenly, usually at night, without a chill, but with severe pains in back, limbs, and joints. The large and small joints are alike affected, either at once or successively. They are stiff, painful, and swollen. Fever is present from the beginning. It reaches usually 102°–103° F., but may attain 105° F.; the pulse is 80–120. The fever lasts four or five days, with, in many instances, a remission on the third or fourth day. The temperature of the second rise never attains the elevation of the primary febrile paroxysm. The remission is attended by amelioration of the other symptoms. With the recurrence of fever an eruption makes its appearance on the face, neck, and chest, and extends in forty-eight hours over the entire body. This eruption is not uniform in character. It may resemble that of scarlatina, measles, or nettle-rash. The superficial lymphatic glands are now observed to be swollen and tender. The eruption usually fades in the course of the first or second day after its appearance. The average duration of the disease is from three to six days. The pains in the joints and muscles disappear very slowly, and it is often some weeks after severe attacks before the patient fully regains his strength.

Dengue commonly prevails in the summer months, and ceases on the approach of winter. It is highly contagious.

The treatment is symptomatic, and the nursing of the patient must be conducted upon the general principles already laid down.

V.

THE PERIODICAL FEVERS.

Intermittent Fever — Remittent Fever — Pernicious Malarial Fever.

THE temperature undergoes rhythmical or periodical intermissions of much greater length than the febrile paroxysms, or remissions far greater in extent than those of health.

This group comprises the Malarial Fevers, namely,—

The Regularly Intermitting Malarial Fevers.

The Irregular, Remittent, and Continued Malarial Fevers—Æstivo-autumnal Fever—Pernicious Fever.

Malaria literally means bad air. The term gradually came to mean also the disease or diseases supposed to be caused by a peculiar form of bad air associated with certain climates and localities. Many peculiarities of the bad air which was the hypothetical cause of this group of diseases were observed and studied for ages. The chief and most constant of these was that heat, moisture, and decomposing vegetable matter were necessary to its production; hence, that it most prevails in swampy districts and warm and hot climates, and when it occurs in temperate climates it is in the spring and autumn rather

than in the winter or summer. It was found that those passing a short time in malarious districts were much more apt to contract the disease if they were exposed at night than only by day; that the danger was less upon the hills than in the valleys and along the courses of streams; that the attack does not confer immunity against subsequent attacks, and that cinchona bark, and especially its alkaloid quinine, are sovereign remedies. These and many other peculiarities of malaria were long known, but its true nature remained wholly unexplained until Dr. Laveran, a French military surgeon, stationed in Algiers, in 1880 discovered a blood parasite which is constantly present during the attack. Other investigators confirmed this observation and greatly enlarged our knowledge of this protozoon. It was suggested by Dr. King, of Washington, that not air, water, or perhaps articles of food, as had been thought, were the vehicles by which this organism entered the body, but that it might be inoculated by the sting of the mosquito, and this has since been proved to be the case—in fact, it has been shown conclusively that a certain variety of the mosquito—the *Anopheles*—is not only the definitive host of the parasite, *plasmodium malariæ*, of which man is the intermediate host, but that it is also the only source of the malarial infection. These discoveries explain many of the obscure facts concerning the geographical distribution and prevalence of the malarial diseases and place the whole subject upon a scientific basis.

Three forms of malarial organisms have been de-

scribed—the tertian, the quartan, and the æstivo-autumnal; and these correspond to the three different clinical forms of malaria from which they have derived their names. The malarial diseases are not transmissible by direct or indirect contact—that is, they are not contagious by direct approach or by fomites.

The tertian and quartan parasites cause fevers which are regularly intermittent—the agues. The æstivo-autumnal parasite gives rise to forms of fever which are irregularly intermittent, remittent, or continued. When the æstivo-autumnal infection is intense, as in the tropics, the Roman Campagna, and some parts of India, the resulting fever is of pernicious type.

In highly malarious places a single exposure is very often quickly followed by fever; in temperate latitudes, repeated or prolonged exposure appears to be necessary, and the resulting fever may not make its appearance for a considerable time.

THE REGULARLY INTERMITTING MALARIAL FEVERS.

Intermittent Fever.—The paroxysm consists of—1, the cold stage, or chill; 2, the hot stage, or fever; and, 3, the sweating stage.

1. *The Cold Stage.*—Creepy sensations, chilliness of the surface and along the spine, yawning, lividity of the finger-tips, and goose-flesh are quickly followed by shivering, chattering of the teeth, and painful sensations of coldness, not promptly relieved by the hot drinks, blankets, and external hot applications for which the patient asks. Nausea and vomiting are common symptoms.

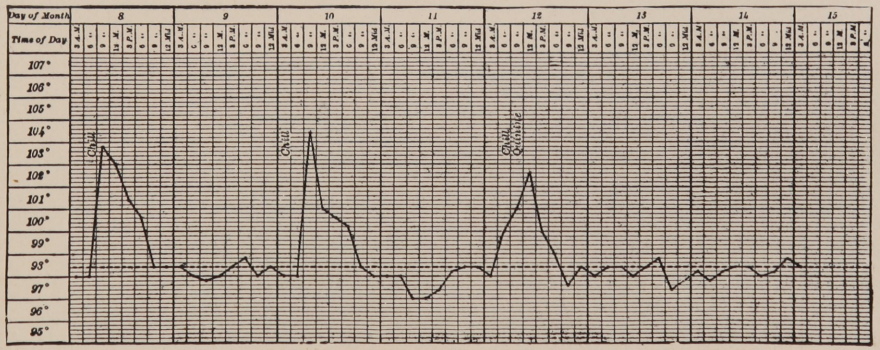

FIG. 14.—Tertian fever.

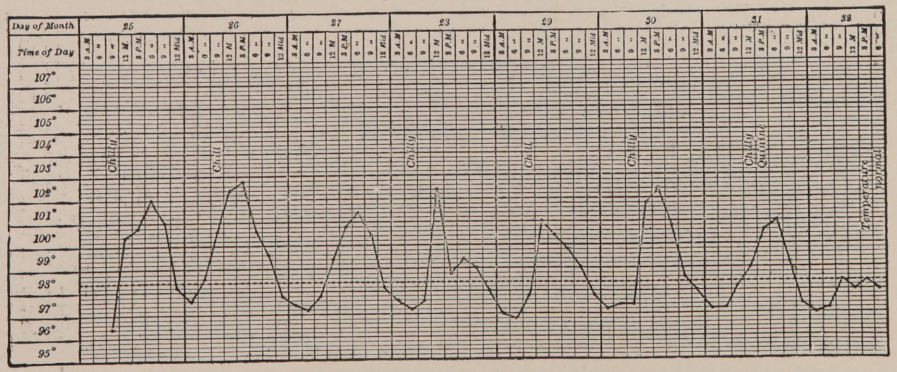

FIG. 15.—Double tertian fever.

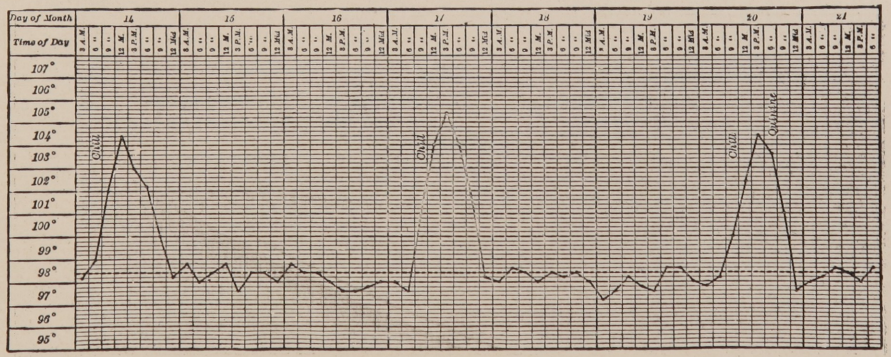

FIG. 16.—Quartan fever.

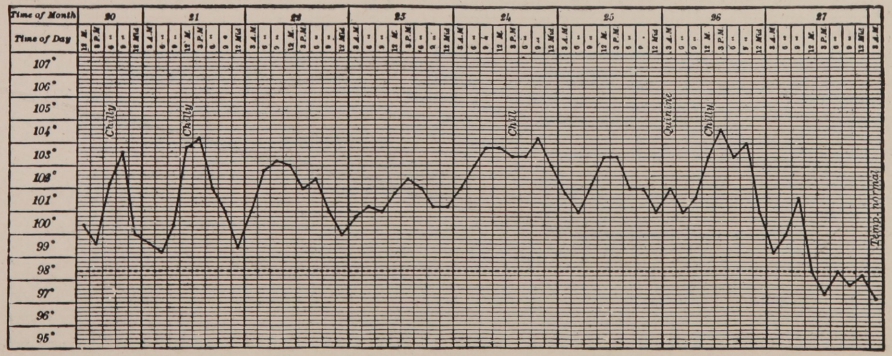

FIG. 17.—Estivo-autumnal fever.

2. *The Hot Stage.*—After a variable time sensations of warmth are experienced; the surface regains its color; the face becomes flushed, the eyes injected, and the patient complains of headache, thirst, and dryness of the skin. The temperature now mounts to 104°–105° F., or even higher. The average duration of the hot stage is from three to eight hours.

3. *The Sweating Stage.*—The face and neck break out into a gentle sweat, which soon becomes general and copious. All the symptoms undergo a wonderful amelioration. The temperature falls to normal or even below it, and though this stage of the paroxysm is usually of brief duration, by the time it comes to an end the patient usually regards himself as restored to his ordinary health.

The intermission now begins, and lasts till the onset of another paroxysm.

Intermittent Fever is known as *Ague.* When the paroxysm occurs every day it is called *quotidian;* every second day, *tertian;* every third day, *quartan.*

Intermittents that are neglected run on indefinitely, but the types gradually become blurred, the paroxysms being by degrees less distinctly marked, till they cease altogether, to be replaced by headaches, neuralgias, or other morbid manifestations of more or less irregular periodicity. After a time there may be developed general failure of health, to which the term *malarial* cachexia is applied.

Ordinary agues seldom require nursing. Hot external applications and warm covering during the cold stage diminish to some extent the sufferings of the

patient. Hot drinks should be given sparingly; hot alcoholic drinks are apt to intensify the discomforts of the subsequent hot stage. The treatment of the latter—high as the fever often is—may be of the simplest kind,—rest in bed, cold sponging, cold compresses to the head, and the like. The brief sweating stage does not require treatment of any sort.

The medicines which exert the most favorable influence upon the cold stage belong to the group which act as nervous sedatives. The physician will often be able to relieve the sufferings attendant upon a prolonged cold stage by morphine hypodermically administered. Quinine and the allied derivatives from cinchona bark act specifically upon the primary cause of intermittent, as well as upon that of the other malarial fevers, and, when properly administered in proper doses, are curative.

THE IRREGULAR, REMITTENT, AND CONTINUED MALARIAL FEVERS—ÆSTIVO-AUTUMNAL FEVER—PERNICIOUS FEVER.

Æstivo-autumnal Fever.—This occurs in temperate climates, chiefly in the summer and fall, as bilious or bilious remittent fever, and is common in our Southern States. The symptoms are irregular. There may be an intermittent fever, recurring at intervals of twenty-four to forty-eight hours, or a daily paroxysm with a tendency to a shorter cold stage and a longer hot stage, or continuous fever without well-defined paroxysms. Many clinical varieties occur. Some of the cases resemble enteric fever. Such cases

have been described under the misleading term typho-malarial fever.

Intermittent and remittent fevers occur in the same districts and under similar circumstances. The medical treatment of remittent fever consists in the free administration of quinine, proper attention to the symptoms which indicate derangement of the stomach and bowels, well-regulated diet, alcohol without stint when symptoms of depression demand it. If the febrile movement be high, antipyretics are necessary.

Pernicious Fever.—The word *pernicious* is here used in its ordinary sense to indicate the extremely dangerous nature of the groups of cases to which it is applied.

These forms of malarial fever are due to the intensity of the action of the æstivo-autumnal parasites. They occur in highly malarious districts, and especially in tropical and subtropical countries. The cases may or may not present the rhythmical periodicity of well-marked intermittents or remittents. Their peculiarity consists in the overwhelming gravity of the symptoms which constitute the paroxysms.

Pernicious malarial fevers may be arranged in three groups,—1, the Algid, or Congestive; 2, the Comatose; and, 3, the Hemorrhagic.

1. *Algid, or Congestive Malarial Fever.*—This is the most common form. There is great intensification of the cold stage. The common belief that death takes place in the third paroxysm has no other foundation than this, that owing to the intensity of the disturbance of the functions of life the patient can scarcely survive the third. The second or even the first congestive chill

may prove fatal. Prompt medical aid is imperatively necessary. Those practitioners who have had large experience in the treatment of congestive chills regard morphine hypodermically as the best medicinal treatment. Cold affusions, followed by friction with coarse towels, covering with hot blankets, and rectal injections of hot beef-essence, with whiskey and strong infusions of coffee, are useful. As soon as the patient can swallow and retain it, quinine must be given with a free hand.

2. *The Comatose Form.*—The patients have usually undergone prolonged exposure to an intense malarial atmosphere without treatment. They have also suffered from some form of malarial fever shortly before the attack in which coma has set in. They are profoundly unconscious, unable to swallow; the skin muddy, often yellowish; the temperature high. Brisk antipyretic treatment, rectal alimentation, and injections of quinine constitute the right treatment. It is often a matter of astonishment that rapid recovery takes place from conditions apparently hopeless.

3. *The Hemorrhagic Form.*—This form occurs, as a rule, in individuals who have suffered for a long time with malarial troubles, and have in consequence become much broken down in general health. The attack usually sets in with a chill followed by high temperature. Hemorrhages take place from the stomach, kidneys, and bowels, and into the structure of internal organs. There is often grave disorder of the functions of the kidneys. The urine is for a time very dark; hence the term Black-water Fever.

The nursing is to be conducted upon general principles.

VI.

THE ERUPTIVE FEVERS.

Scarlet Fever—Measles—Rötheln, or German Measles—Variola, or Small-Pox—Varioloid—Varicella, or Chicken-Pox.

THE Eruptive Fevers, called also The Exanthemata, —singular, Exanthema,—from a Greek root signifying *to bloom, to blossom,* are thus termed because they are attended by characteristic rashes which bear a constant relation to the fever, appearing very regularly on certain days, undergoing definite successive changes as the attack runs its course, and regularly disappearing or beginning to heal about the period of defervescence. A number of the eruptive fevers possess this peculiarity in common,—namely, that they occur chiefly in children.

This group includes

Scarlet Fever, or Scarlatina.
Measles, or Rubeola.
Rötheln, or German Measles.
Small-Pox, or Variola.
Modified Small-Pox, or Varioloid.
Chicken-Pox, or Varicella.

SCARLET FEVER.

Definition.—A highly contagious fever of sudden onset and short duration, characterized by sore throat and a bright uniform scarlet rash, which appears in the

course of the second day, first upon the neck, chest, and face, and soon extends over the entire body; by a tendency to inflammatory swelling of the lymphatic glands, especially those of the neck; to inflammation of the middle ear, and to congestion and inflammation of the kidneys. The subsidence of the eruption is followed by abundant scaling.

Synonymes.—Scarlet Fever and Scarlatina are two names for a single disease. The notion, very widespread among the people, that scarlatina is a different or less serious affection than scarlet fever is wholly wrong. This disease, like all acute infectious diseases, presents wide differences in the intensity of the attack, but the infecting principle is the same in mild and severe cases, and the necessity of isolation and disinfection is equally urgent in all. It is a point of radical importance in the management of contagious diseases that the lightest cases may communicate the disease in its severest form, and become the starting-point of extended epidemics. The sense of security that so often arises from the use of the term scarlatina instead of scarlet fever is wholly false,—nay, more, it is exceedingly dangerous when it leads those concerned to underrate the danger of the sickness or the risks of contagion.

History.—Scarlet fever has been recognized as a distinct affection since the sixteenth century. It is endemic and annually epidemic to a greater or less extent in all large communities, and constitutes a very important factor in the high death-rate among infants and children.

Causation.—The infecting principle of scarlet fever

is a specific germ, which has not as yet, however, been demonstrated. Infection occurs by contagion, which takes place readily. A single approach to a patient ill of the disease often results in infection. The poison is conveyed with great readiness by linen, clothing, furniture, toys, books, to considerable distances and for a great length of time. It is transmitted by milk. The disease may be transported from the sick to the well by persons not themselves contracting it. The patients themselves may communicate the disease during any period of the attack until the completion of the scaling of the skin,—desquamation, as it is called,—and even beyond that period if there be a morbid discharge, as from a suppurating ear, or an abscess not yet healed. The "tenacity" of the scarlatinal poison—that is, its disposition to cling to the articles with which it comes into contact rather than to be wafted freely in the air —renders it, although among the more contagious of the eruptive diseases, one the spread of which is completely within our control by isolation and disinfection. Although it is not always possible to trace the source of infection in particular cases, it is certain that the disease is always derived from a previous case of scarlet fever. This being the case, it is evident that the universal enforcement of effectual measures to prevent the individual cases from becoming sources of infection would ultimately result in the extermination of the pest. This course is with scarlet as with enteric fever, at least theoretically possible.

Personal liability to scarlet fever is far less general than to some other contagious diseases. Many indi-

viduals and a few families appear to possess complete immunity upon exposure. Scarlet fever is very uncommon during the first year of life. The majority of the cases occur between the ages of two and ten years. The liability diminishes with advancing years. Adults, however, occasionally contract the disease. The attack, as a rule to which there are occasional exceptions, confers subsequent immunity.

Individuals suffering from recent wounds and lying-in women appear to be especially susceptible to the contagion of scarlet fever.

Course and Symptoms.—The period of incubation is from four to seven days, in rare instances shorter. Prodromes are wholly absent or very slight. The attack begins suddenly, very often at night, with sore throat, chill or chilliness, and active fever. Vomiting is a frequent early symptom. Headache, often intense, dulness, uneasy sleep, delirium, and convulsions indicate profound disturbance of the nervous system.

The characteristic rash appears about the end of the first, or during the course of the second, day. It consists at first of innumerable minute red points, appearing upon the chest, neck, and shoulders, and soon coalescing into a uniform diffuse general redness of the entire surface, except around the mouth, where the pallor is in striking contrast to the surrounding redness. The rash is apt to be most vivid upon the back and thighs. It momentarily fades upon light pressure, as with the finger. It lasts from three to five days, disappearing first where it was first seen. The severe general symptoms continue. The fever remains high; the

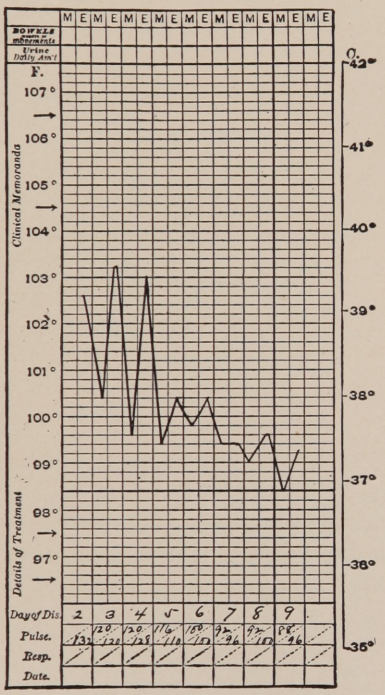

FIG. 18.—Scarlet fever.

head symptoms persist; the throat continues sore. As the eruption fades, the temperature falls by lysis, and there is in uncomplicated cases a general amelioration of the symptoms, so that by the end of the first week or the beginning of the second convalescence is established. When the rash has faded the outer skin (epidermis) peels off, sometimes in bran-like scales, sometimes (especially about the lower part of the abdomen and from the hands and feet), in extensive shreds or strips. The convalescence is in a considerable proportion of the cases interrupted by the occurrence of acute inflammation of the kidneys (post-scarlatinal nephritis).

The fever in some very mild cases is slight; as a general rule, it is high. It rises abruptly, and often attains 104°–105° F. on the first day, and may even rise higher on the second day. It remains high until the eruption fades, when it falls by lysis, very rarely indeed by crisis. If the fever extend into the second week, it is usually kept up by some complication. The pulse is almost always rapid.

Sore throat is always present, though very different in kind and intensity in different cases. Severe sore throat with much swelling, and extension of the inflammation to the deeper tissues, is almost always attended by enlargement of the lymphatic glands of the neck, which often terminates in the formation of abscesses. The infiltration of the neighboring tissues gives rise to much swelling and hardness, an appearance to which was formerly applied the descriptive term "collar of brawn."

Diphtheria is frequently present as a complication.

It may appear at any time in the course of the disease. It adds much to the gravity of the attack, and is attended by high fever and severe general symptoms; by painful swelling of the glands about the angle of the jaw; by sore mouth, and by a foul, purulent discharge from the nostrils. In fact, nasal discharge of a purulent character is apt to be present in cases of marked sore throat of any kind.

Inflammation of the parotid gland may occur in severe cases.

Suppurative inflammation of the middle ear is common. It occurs about the close of the attack, and is very frequently first made known by the appearance of pus on the pillow or at the ear, neither deafness nor earache having been previously noticed. In other cases earache is severe.

The tongue, after the first coating clears off, presents a peculiar appearance, being red and dotted over with enlarged papillæ, and is hence known as the "Strawberry tongue."

Scarlatinal inflammation of the kidneys does not often occur until after defervescence. It may be so mild as to escape observation, unless the urine be systematically examined, when it reveals itself by those chemical (albumen) and microscopical changes (blood-disks, cells from the kidneys, casts) peculiar to it, or so severe as to overwhelm the patient and lead very quickly to a fatal result. Its onset is preceded or accompanied by fever. Soon puffiness of the face and eyelids with intense pallor are observed. The dropsy may become general.

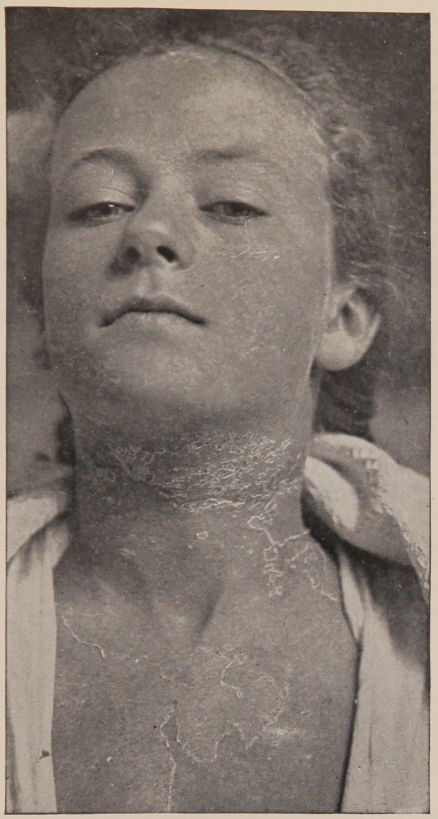

FIG. 19.—Desquamation upon face, neck, and chest after scarlet fever.—After Welch and Schamberg.

The urine becomes scanty and high-colored, even bloody. It may be almost or even completely suppressed. This condition may be accompanied by uræmia, coma, or convulsions.

Inflammation of the joints, resembling in some respects rheumatism, often comes on during the period of desquamation. It is, as a rule, of transient duration.

Pneumonia may occur, and inflammation of the membranes of the heart.

Diarrhœa is not a rare symptom, especially towards the end of the attack.

We may distinguish four forms of scarlet fever:

1. Very mild or rudimentary;

The fever is slight and transient; the rash faint or irregularly distributed; the child appears to be scarcely sick. Desquamation or late inflammation of the kidneys may be the first intimation that scarlet fever has been present.

2. Simple or ordinary;

Varying grades of intensity.

3. The anginose form;

So called on account of the prominence of the throat symptoms.*

4. The malignant;

Under this heading are grouped those cases of scarlet fever in which the eruption is scanty or absent, the general symptoms, and especially those referable to the nervous system, being from the start extremely severe. These cases usually prove speedily fatal.

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* Anginose, angina, from a Latin verb, *angere*, to choke.

Many cases of scarlet fever are greatly protracted by complications.

Relapses are rare.

No case of scarlet fever ought to be regarded as favorable until convalescence is complete. The vicissitudes are not always to be foreseen. It sometimes happens that in a family where there have been several cases a child supposed to have escaped will be found later dropsical and very ill.

The treatment of scarlet fever is in the mild cases expectant, in the severe symptomatic. Many physicians employ so-called specific medication.

The diet should be composed of broths, milks, jellies, custards, and the like. The skin should be sponged twice a day or oftener, and anointed freely with carbolized or washed lard or goose-grease every six hours, or oftener if there is great restlessness or itching. These inunctions are a source of comfort to the patient, and, as they tend to prevent the scales or epidermis from blowing about, they are, when kept up during desquamation, to some extent a safeguard against the spread of the disease. The body-linen and bed-clothes may be, when necessary, changed, with due precautions against exposure or chilling; but too frequent changes are unadvisable, in view of the increased danger of spreading the infection which they occasion.

The sick-room should be large and airy, preferably at the top of the house, and with a southern exposure. All carpets, curtains, hangings, ornaments, and unnecessary furniture must be removed before the patient is

taken into it. The ventilation must be as complete as can be arranged. In cool weather an open fire should be kept burning. A sheet moistened with some disinfectant solution to which glycerin is added should be carefully hung at the inside of the doorway. A small wash-tub should be ready to receive all clothing and towels, which are to be freely sprinkled with disinfectants before going to the laundry and boiled before being handled. Soft rags must be used instead of handkerchiefs for the discharges from the nose and mouth, and absorbent cotton for purulent discharges. These must be burned as soon as soiled. Only the necessary attendants should enter the sick-room, and the physician should on leaving it pass at once from the house.

He should provide himself with a white linen gown reaching to the feet, and a hood, in which his visits to the room are to be made. This overgarment should be kept just outside the door. On leaving the room he should thoroughly wash his hands in sublimate solution, afterward rinsing them in recently boiled water or water flowing from the hot spigot. This rule should be observed also in the case of the other highly contagious or readily transmissible diseases, as typhus fever, small-pox and varioloid, diphtheria, and the plague.

It is within our power to effectually isolate and disinfect a scarlet fever patient in any well-ordered and uncrowded house. I do not, therefore, as a rule, send the other children away. They have generally been equally exposed under the same circumstances with the

first patient, and usually in close association with him until the appearance of the eruption. Should they have been already infected, it is better that all the cases of a family should be treated under one roof; if by chance they have escaped, they are probably still as safe at home as elsewhere.

The patient's mouth, nose, and throat should from the commencement of the illness, even in mild cases, be systematically and frequently cleansed by spraying with Dobell's solution, Listerine, Labarraque, hydrogen dioxide in proper dilution, or with other suitable antiseptic fluids as the doctor may prescribe. For this purpose any one of the numerous hand-ball atomizers sold in the shops may be selected. Special hard-rubber spray apparatus is required for the solution of hydrogen dioxide.

If the throat be very sore, and especially when there are diphtheritic deposits, it is proper to allow the patient to breathe an atmosphere moistened with steam from a croup-kettle so arranged that the spout projects in the neighborhood of the child's face. The steam may sometimes be advantageously confined by erecting a sort of tent or closed canopy around the head of the bed.

The nurse must be on her guard to detect the earliest symptoms of inflammation of the ears. The swelling of the glands of the neck must be treated at first with salves, applied as directed by the physician; then with ice or poultices.

When there is continuous high temperature, with great disturbance of the nervous system, with tremor,

twitchings, stupor, or grave delirium, it may become necessary to employ gradually cooled baths, not below 84°–80° F., which may be repeated several times in the course of twenty-four hours, and even to practise cold affusions while the patient is in the bath. The cold pack with repeated sprinklings is a gentler measure often followed by equally beneficial results. In view of the possibility of depression of the circulation, wine or brandy must always be on hand, and will frequently be given with advantage.

It is well to keep the patient in bed, or, at all events, in his room until the "skinning" is over; partly as a precaution against injudicious exposure and errors of diet, partly in order to detect the earliest symptoms of kidney-trouble, against the occurrence of which it is not always possible to guard; but over and above these reasons for prolonging the stay of the patient in his room is this, that it is necessary as a safeguard against his spreading the disease.

If inflammation of the kidneys occur, it requires prompt and energetic medical treatment. Perspiration may be excited when there is suppression of urine by hot-air or vapor baths, which may be administered in bed, as follows: The covers being raised away from the patient's body by hoops, over which several blankets are stretched, and these well tucked in, hot bricks wrapped in dry or wet flannels, as the case may be, are slipped underneath the covers, with due precautions against burning the patient, until the heat is as high as can be comfortably borne. Or steam may be introduced by the long spout of the croup-kettle, or gener-

ated by slipping pieces of lime one after another into a pan of water under the covers, a towel having been arranged over the pan to prevent pieces of the lime or heated water from flying over the patient as it separates in slaking. Some skill and much care are required in giving a vapor-bath in this manner.

I repeat that a convalescent must be kept away from all who are liable to contract or convey the disease until desquamation has wholly ceased. Before leaving the sick-room the patient must have two or three thorough warm soap-baths and be dressed in uncontaminated clothing.

Books and playthings ought to be destroyed by fire in the room, which must then be washed with corrosive sublimate solution, fumigated with sulphur in the presence of moisture or with formaldehyde, and opened to the sun and air for some days. Even then individuals who have never had scarlet fever ought not to be permitted to occupy it for some time.

Scarlet fever is the type of the eruptive diseases, and what has been said of its management may be said, with certain modifications, hereafter to be pointed out, of the management of the others.

MEASLES.

Definition.—Measles is an acute febrile disease, implicating in successive stages the mucous membranes and the skin; characterized by catarrhal symptoms from the beginning and a peculiar eruption, which appears about the fourth day, fades about the eighth or ninth, and is followed by shedding of the outer skin in

minute branny scales; is highly contagious, usually prevails in more or less extensive epidemics, and occurs, as a rule, but once in the same person.

Synonymes.—Rubeola; Morbilli.

History.—Until about the close of the last century measles was not clearly distinguished from small-pox, of which it was generally regarded as a peculiar and benign manifestation. It is widely prevalent, and chiefly affects children. For this reason it is comparatively rare among adults, but when it attacks them, is usually severe. I had under my care during a recent epidemic, at nearly the same time and in the same house, cases representing three generations: three children, their father, aged forty-two, and his mother, aged seventy-six. Measles is, as compared with scarlet fever, a mild disease, the appearance of which excites, as a rule, little apprehension in a community. It is, however, sometimes very severe, and becomes dangerous to life or subsequent health upon the occurrence of certain complications. When introduced as a new disease, as happened some years ago on several occasions among the islands of the Pacific Ocean, it prevails as a malignant and extremely fatal pest.

Individual immunity probably does not exist.

Causation.—The infecting principle has not yet been recognized, nor is its method of transmission positively known. It is probably inhaled. The prevalence of the disease in epidemics is due to its extreme contagiousness. It is not tenacious, as is the poison of scarlet fever, and for this reason its spread in households and communities, largely by way of the atmosphere, is

much less under our control. It can also be conveyed from the sick to the well for a considerable distance by those not themselves suffering from it, and in fomites of various kinds,—articles of apparel, toys, books, and the like.

Course and Symptoms.—The period of incubation is eight or ten days. The outbreak is sudden, usually without premonitory symptoms, and is marked by sudden rise of temperature,—102°–104° F.,—catarrhal symptoms, sneezing, cold in the head, sometimes nose-bleeding, irritation and watering of the eyes, intolerance of bright light, cough, and hoarseness. There is restlessness, headache, and loss of appetite. During this stage there may be observed a reddish mottling of the palate and roof of the mouth. In a strong light there may be seen upon some of the spots upon the mucous membrane of the cheeks and lips minute bright whitish or bluish-white flecks, which appear early and soon disappear—Koplik's sign. The eruption appears on the fourth day, less frequently on the third or fifth, first on the cheeks, forehead, and chin, and spreads rapidly over the whole surface. It consists of dark-red or even faintly brownish-red spots, varying in size from a mere point to that of a split-pea, slightly elevated and closely arranged, occasionally touching, but generally separated by a narrow extent of nearly normal skin. The larger spots sometimes present an irregularly crescentic or half-moon arrangement. When the eruption is severe there is commonly some swelling of the skin, especially of the face, the expression being thus changed and disfigured, and of the backs of the hands. Distressing itch-

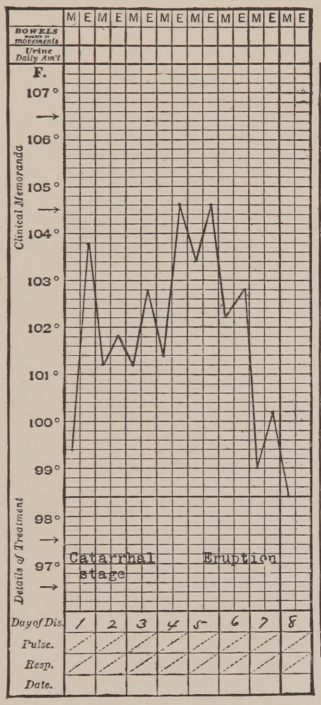

FIG. 20.—Measles.

ing and burning often attends the eruption, and it may be complicated by nettle-rash or hives.

The eruption reaches its full development in thirty-six or forty-eight hours, and then, after two or three days, rapidly fades. With the fading of the eruption the fever—which has increased on its appearance—and the catarrhal symptoms also decline, the defervescence being, in uncomplicated cases, usually critical. The desquamation of measles usually takes the form of the shedding of very fine scales, quite unlike the shreds and flakes thrown off in scarlet fever. If complications do not occur, the convalescence is usually complete by the tenth or twelfth day. Diarrhœa is not uncommon at some periods of the attack.

A very common symptom, especially in young children, is pain across the upper part of the abdomen. This pain has its seat in the muscles, and is of the kind known as myalgia. It is caused by the excessive use of the abdominal muscles in the act of coughing.

The complications of measles, as a rule, consist in unusual intensification or extension of the catarrhal inflammations characteristic of the disease. They may affect the eyes, nasal passages, throat, larynx, and chest. Inflammation of the middle ear also occurs.

Epidemics of measles are very often preceded or followed by whooping-cough. There is, however, no well-established causal relation between these two diseases. The catarrhal inflammations of measles render certain patients especially liable to the development of pulmonary consumption.

There is occasionally a tendency to the extravasation

of blood into the skin, constituting so-called "black-measles." The gravity of this symptom has been exaggerated, probably because in the past other diseases attended with petechial eruptions, and notably typhus fever, have been mistaken for measles. Very rare cases of undoubted measles with tendency to bleeding both into the skin and from the mucous surfaces have been described. Such cases are often severe; sometimes fatal.

Variations from the ordinary form are much less common in measles than in scarlet fever, and consist in modifications in the intensity of the general symptoms and in the absence or presence of complications, which are themselves merely exaggerations of symptoms proper to the disease.

The treatment of measles is expectant and symptomatic. Its general management demands attention to the following points:

The patient must be sedulously protected from draughts of cold air; the temperature of the room kept at 68°–72° F.; even in mild cases he must be confined in bed till the rash has faded and desquamation is over. The room may be slightly darkened, but must not be kept absolutely so. The eyes, nostrils, and mouth must be bathed at regular intervals with lukewarm water, to which a little borax or fluid extract of witch-hazel has been added. The edges of the eyelids ought to be once or twice a day lightly smeared with fresh cold cream or with vaseline. The throat and nasal passages may be advantageously sprayed as in scarlet fever. Inunctions of washed lard rubbed up with a few drops of carbolic acid to the ounce go far to

relieve the itching. For this purpose sponging with cold or lukewarm water containing borax or three or four drops of carbolic acid to the ounce, or Labarraque's solution, or Listerine, is also useful.

A generous dietary is absolutely necessary. Alcohol in the form of milk-punches, eggnogg, wine-whey, or sound port may often be administered with advantage. Children of delicate organization, and especially those of families liable to scrofulous glandular enlargements and pulmonary consumption, must be cared for with solicitude for some weeks after the attack, or indeed until full health is regained.

While it is not in all cases possible to prevent measles from extending when it has shown itself in a household, it is always advisable to avoid unnecessary risk of infection, and our plain duty to see that all due precautions are taken to prevent its spread beyond the limits of the house. To this end the children not yet sick must not be allowed to go to school or to make or receive visits.

RÖTHELN.

Definition.—Rötheln is an acute infectious disease characterized by an eruption having superficial resemblances to that of measles; by swelling of the lymphatic glands of the back of the neck, and by nearly complete absence of fever and catarrhal symptoms. It does not often occur a second time in the same individual. It is an independent affection, and has no relationship with measles or scarlet fever.

Synonymes.—German Measles; French Measles; Rubella; Roseola; Epidemic Roseola.

History.—It is only within recent years that rötheln has been fully recognized as a separate and distinct disease. At one time it was regarded by some physicians as an irregular form of scarlet fever; by others, as an irregular form of measles; by yet others as a hybrid of those two diseases. Finally there were others who looked upon it not as a constitutional affection at all, but as a mere symptomatic rash analogous to the nettle-rash (urticaria) or rose-rash (erythema), which often show themselves in connection with derangements of the digestion, or after certain articles of food, as shell-fish, strawberries, or cheese. Rötheln was unknown to the majority of American physicians until within the last forty years. It is not, in fact, a fever in the ordinary sense, but is, as an infectious malady, highly contagious, self-limited, and self-protective, properly described among the fevers, especially since much confusion still prevails in regard to its relation to measles and scarlet fever.

Causation.—A specific, infecting principle, which must be, judging from its mode of distribution and effects, a germ. The disease is highly contagious, and contagious in the same way as measles. Hence its prevalence in epidemics and the especial liability of children.

Course and Symptoms.—The period of incubation is between two and three weeks. The eruption is usually the first symptom observed. Constitutional disturbances are slight, often absent; occasionally they are manifest a few hours before the rash. Fever is slight and transient, sometimes absent altogether. The erup-

tion is irregular in character and distribution. It appears first about head and face, and resembles sometimes that of measles, sometimes that of scarlet fever, but is paler, and appears and disappears irregularly over the surfaces, so that a fresh patch may make its appearance just as a patch in some other region is fading. Slight catarrhal manifestations occur, and the glands of the back of the neck are more or less swollen. It is not often necessary to keep the patient in bed. At the end of about four days—sometimes five or six—the rash vanishes without desquamation, except when the eruption has been unusually intense. Very little treatment is required.

SMALL-POX.

Definition.—An acute contagious disease, characterized by sudden onset, high temperature, and great constitutional disturbance; the appearance about the third day of a peculiar eruption which by stages develops about the ninth day of the disease into pustules, and upon the thirteenth or fourteenth day begins to form crusts, which dry and fall off in the course of the next week, usually, but not invariably, leaving upon the face numerous shallow but distinct characteristic scars. Second attacks are very uncommon.

Synonyme.—Variola.

History.—Small-pox has been a scourge of the human race since early historical periods. It ravaged Europe in destructive and constantly-recurring epidemics up till the time when the discovery of its preventive treatment by the immortal Jenner was, early in the nineteenth century, firmly established upon a practical basis.

During recent years unmodified small-pox has prevailed in civilized communities only in limited outbreaks.

Causation.—A specific infecting principle, the nature of which has not been demonstrated, but which in its natural history, mode of distribution, and enormous increase in the bodies of the sick shows itself to be a micro-organism.

Liability to small-pox, except as lessened by vaccination, is universal. The disease may occur at any age. One attack confers subsequent immunity, the exceptions to this rule being extremely rare.

Small-pox is invariably the result of transmission by direct or indirect contagion from a person already ill with it. As in the other contagious diseases, however, it is not always possible to trace the mode of transmission, since the poison may be conveyed by patients to a considerable distance and after the lapse of some time. The disease may be contracted from contact with the bodies of those dead of it. It can be produced by inoculation.

Course and Symptoms.—The period of incubation is variable, from ten to fourteen days being the average.

The attack begins suddenly, without premonitory symptoms. There is chill, followed immediately by high fever, headache, pain in the loins. Severe constitutional symptoms, as stupor, delirium, restlessness, complete inability to take food, dry brown tongue, vomiting, attend this initial stage. The pulse is rapid, the temperature high. There is constipation, as a rule. On the second or third day there are to be seen irregu-

larly distributed and usually ill-defined rashes, which are sometimes associated with slight hemorrhages under the skin (petechiæ).

During the third or on the fourth day the fever suddenly abates. At the same time there is usually great improvement in the general symptoms, so much so as to lead the patient to suppose himself convalescent. The variolous eruption now makes its appearance,—stage of eruption.

The eruption begins upon the face and hairy scalp, next appearing upon the trunk and arms, and finally upon the legs. It appears at first as little red dots or spots, which in about two days form small knots, feeling to the touch like minute shot under the skin. On the top of these red knots a little water-blister or vesicle soon forms. This gradually increases in size, its contents becoming more opaque, until at length, by the sixth day of the eruption and the ninth of the disease, the characteristic pustule of small-pox is fully formed. The pustule has, as a rule, at its summit a little navel-like depression or dimple, and is hence spoken of as "umbilicated," and is surrounded by a red inflammatory border. There is, generally, especially when the pocks are thick-set, swelling of the skin, particularly that of the face, attended by considerable burning and itching pain. The countenance is much disfigured, the eyes closed by the swelling, and the hands puffed and painful. The mucous membranes of the mouth and throat, and to a less extent, of the vagina and rectum, are the seat of an analogous eruption, which does not, however, form pocks, but rather painful superficial

ulcers. These ulcers, especially in the mouth, sometimes run together, and are the cause of great annoyance. In the larynx they occasion hoarseness, and may give rise to sudden dangerous symptoms of suffocation.

The temperature falls with the efflorescence of the variolous eruption nearly or quite to the normal. Only, however, to rise again with the process of suppuration, which is attended with return of the more serious symptoms of constitutional disturbance. It is at this period of the disease that serious complications are apt to arise.

Towards the end of the second week the pustules begin to dry up,—stage of desiccation.

The pus of the pocks, some of which have burst, dries into yellow or brownish-yellow crusts; the swelling of the skin subsides; the fever declines; the general symptoms amend, and in the course of a few days the crusts fall off and convalescence is well begun. There is at this time troublesome itching of the skin. The site of the pocks shows a more or less distinct dark stain, —pigmentation,—and wherever the suppurative process has destroyed the skin there is a lasting scar. The hair falls out; but as a rule, to which there are occasional exceptions, it grows in again.

The temperature of the initial stage is high, very often reaching 104°–106° F. It falls nearly or quite to normal at the time of the appearance of the eruption, and rises again with the suppuration. The second access of fever lasts a week or more. Defervescence is gradual. In severe cases abscesses, erysipelas, gangrene, or bed-sores occur as complications.

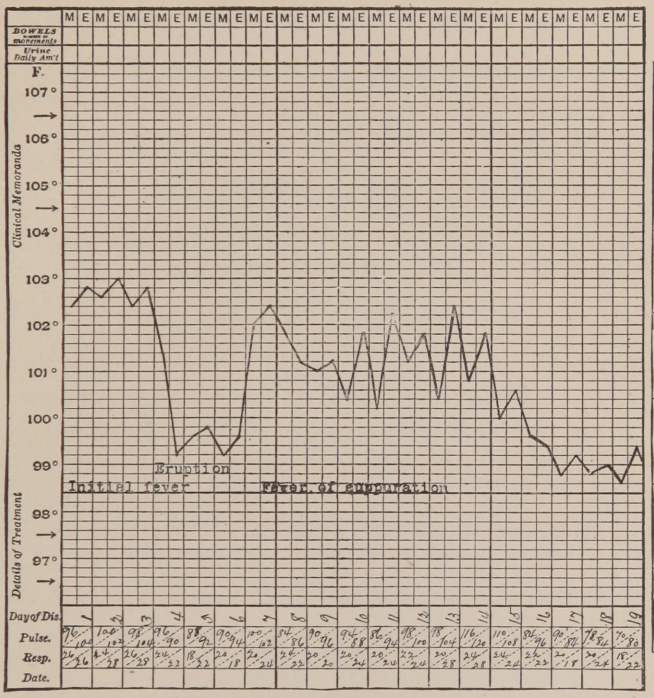

FIG. 21.—Discrete small-pox. Moderate fever of suppuration, recovery.—Royer.

FIG. 22.—Discrete small-pox.—Royer.

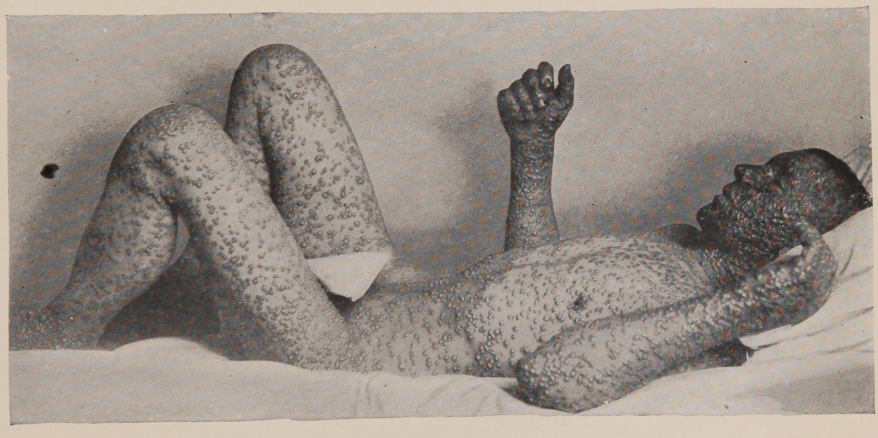

FIG. 23.—Confluent small-pox.—Royer.

Confluent small-pox is that form in which many of the pustules run together, forming more or less extensive areas of suppurative inflammation of the skin.

Hemorrhagic small-pox is characterized by effusion of blood into the vesicles and by bleeding from mucous surfaces. It is also called black small-pox. It is apt to occur in elderly, feeble, or broken-down persons.

There is another hemorrhagic form, only to be recognized as small-pox by its occurrence in connection with other cases, in which extensive irregular effusions of blood into the skin take place, without the development of pocks. It attacks young and robust persons, and proves fatal by the fifth or sixth day. It is known as purpuric small-pox.

The preventive treatment of small-pox, which during the present century has proved such an inestimable boon to the human race, consists in vaccination. This operation should be performed in infancy, and again about the age of puberty. At the time of the prevalence of epidemics of variolous diseases it is advisable for persons who have not already passed through an attack of varioloid or small-pox to be again vaccinated.

The period of incubation of the vaccine disease is shorter by some days than that of small-pox. It is therefore proper for persons unprotected by vaccination or a previous attack of small-pox, who have been exposed to the latter contagion, to at once submit to vaccination. By this means the severity of the subsequently developing disease may be favorably modified.

Small-pox in successfully vaccinated persons loses many of its terrors, and becomes the comparatively

mild affection to which the term varioloid or modified small-pox is applied. The essential identity of the two forms is shown, among other things, by the fact, of highest practical importance, that the mildest case of varioloid is capable of producing by contagion in unprotected persons the gravest forms of small-pox.

VARIOLOID.

(*Modified Small-Pox.*)

The difference between small-pox and varioloid is not one of kind, but of degree of intensity. In truth, there is no distinct boundary-line between the two. At the bedside the striking difference is to be found in the fact that the pocks do not, as a rule, in varioloid undergo suppuration. Varioloid occurs usually in those who have been protected by vaccination. It may, however, exceptionally occur in persons possessing an extreme degree of insusceptibility to the action of the specific infecting principle.

The initial stage of varioloid differs in no respect from the corresponding period of small-pox.

But when the eruption appears the difference is at once manifest. The pocks are few in number and usually scattered chiefly over the trunk, instead of first appearing upon the face. They do not go on to suppuration, but begin to dry up when they have reached the vesicular stage, not later than the sixth or eighth day of the disease. The whole duration of the attack is much shorter than that of small-pox. The secondary fever, or suppurative fever, does not occur, or if present

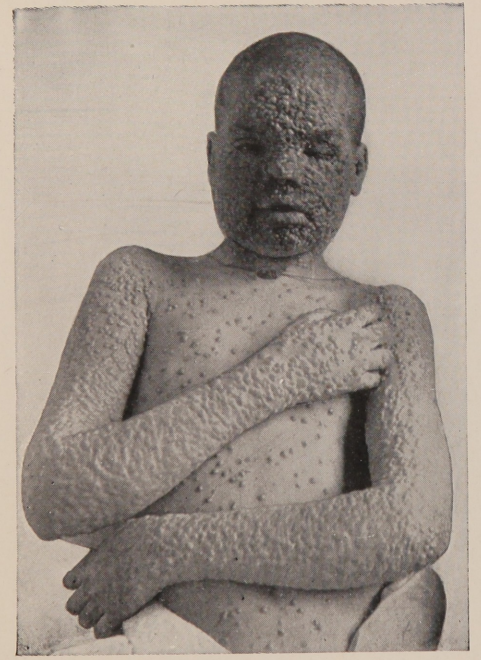

FIG. 24.—One of two sisters suffering from smallpox; being unvaccinated, she developed a severe smallpox, and recovered, though considerably pitted.

FIG. 25.—Sister of the preceding, was successfully vaccinated in infancy; she contracted a mild varioloid and recovered without scarring.

at all, is slight. The temperature falls abruptly upon the appearance of the eruption, and does not rise again to any extent.

The treatment of these diseases is symptomatic.

The general management of the cases demands the careful observance of the rules of sick-room hygiene, complete isolation, effectual disinfection. The room must be large and airy; sunlight should be excluded, since its action during the stages of suppuration increases the liability to pitting or scarring. The temperature should be maintained at 60°–70° F. Timid and unprotected persons should be excluded. The attendants ought to be selected from those who are fully protected and familiar with the disease.

The nature of the disease demands a supporting treatment throughout. In the stage of suppuration alcohol must be freely administered. The mouth and nostrils should be systematically sprayed with diluted Dobell's solution, Listerine, or Labarraque, or a saturated solution of boracic acid in rose-water. The utmost attention must be paid to cleanliness. The skin must be bathed with tepid water at such intervals as are directed by the physician, and the clothing changed as may be required. Especially is care to be taken to prevent the accumulation of salves and lotions mixed with discharges from broken pustules and scabs upon the surface. In fact, there is at present a strong tendency among physicians to avoid the use of salves and ointments, and to pay more heed to cleanliness and the use of antiseptic lotions. The use of tincture of iodine, mercurial ointment, and countless other substances rec-

ommended as applications to prevent pitting, as well as the evacuation of the pustules with or without touching their bases with lunar caustic, fails of its purpose, and may well be omitted. Better results are found to follow the continuous application of iced or tepid compresses wet with weak carbolated solutions. These are to be applied to the face, hands, and arms, their temperature being determined by the sensations of the patient.

The management of the fever and of complications is to be conducted in accordance with general rules.

So long as the scabs are exfoliating the patient must be from time to time bathed with soap and water and lightly anointed with carbolized vaseline. The crusts are to be burned. The complete disinfection or the destruction by fire of articles of clothing used about the patient, the effectual disinfection of the room and furniture, are to be vigorously enforced. The bodies of those dead of this horrible and loathsome disease should be disposed of by cremation.

CHICKEN-POX.

Definition.—Chicken-Pox is an acute infectious disease of infancy and childhood, attended by transient mild constitutional symptoms, characterized by a scattered vesicular eruption, which comes out in successive crops and abruptly, and, soon undergoing desiccation, disappears in from three days to a fortnight, sometimes leaving shallow, sharply-defined permanent scars. It does not occur a second time in the same person.

Synonym.—Varicella.

History.—Formerly regarded as a form of small-pox.

Causation.—It is a disease of early life, contagious, and occasionally prevalent in an epidemic form, particularly in hospitals and asylums for children.

Course and Symptoms.—The period of incubation is on an average about two weeks. There are no premonitory symptoms. The disease appears suddenly, with small bright-red spots, which rapidly develop into water-blisters or vesicles about the size of a split pea, seated superficially upon the skin, and lacking the hard base of the variolous pock. These blisters are surrounded by a narrow, bright-red ring or areola. They are attended with little or no pain. They vary in number from a dozen to one hundred or more, but are never thick-set, as is the eruption of small-pox. The greatest number usually is found upon the trunk; a few on the face and hairy scalp; still fewer on the extremities. Three or four may often be discovered upon the mucous membrane of the palate or elsewhere in the mouth. As the eruption appears in crops, we often see fresh vesicles side by side with those which are drying up. Each vesicle dries quickly about the time the fluid loses its clearness and acquires a milk-like opaqueness. They very rarely go on to pustulation. Children rarely show any great disturbance of the general health beyond slight feverishness, loss of appetite, pains in the limbs, and trifling catarrhal inflammation of the throat and nose. Even these symptoms rapidly pass away. Complications as such do not occur. Exceptionally there

is high fever—103°–105° F.—of brief duration and corresponding general disturbances.

Recovery always takes place. No special treatment is necessary beyond confinement to the room or bed for a few days, and measures to prevent the irritation of the pocks by picking or scratching. Any mechanical injury to the delicate roof of the vesicle increases the danger of the formation of conspicuous lasting scars.

VII.

FEVERS WITH MARKED LOCAL MANIFESTATIONS.

Rheumatic Fever—Pneumonia—Cerebro-Spinal Fever—Diphtheria—Bubonic or Oriental Plague.

THE temperature range, if we except pneumonia, does not conform to a type, nor does defervescence occur on definite days. Fever is, it is true, a controlling symptom, but the evidences of local mischief are conspicuous and characteristic.

This group includes

Rheumatic Fever.
Pneumonia.
Cerebro-Spinal Fever.
Diphtheria.
The Bubonic or Oriental Plague.

RHEUMATIC FEVER.

Definition.—Rheumatic fever is a non-contagious, constitutional, febrile disease, characterized by acute inflammation of the joints, occurring irregularly and terminating without suppuration; inflammation of the membranes of the heart is of very frequent occurrence. The disease does not run a definite course either in its duration or in the sequence of the symptoms; it depends upon constitutional peculiarities, either inherited or acquired, and is not self-protective. On the contrary, the very fact of an individual's once having

suffered from rheumatic fever indicates a liability to develop it under unfavorable circumstances again, or even repeatedly.

Synonymes.—Acute Articular Rheumatism; Inflammatory Rheumatism.

History.—Rheumatic fever is prevalent in temperate countries, and rare alike in cold and in tropical latitudes. It is endemic in Europe and the United States, but is by no means uniform in its distribution and frequency. Some districts are almost free from it, while its prevalence where it is common varies from a few scattered cases at one season to such frequency at another as almost suggests an epidemic. Rheumatic fever is common after the sixth year of life; most frequent between fifteen and forty; rare after that period.

Causation.—Exposure to cold and especially to damp cold. But why such exposure should cause rheumatism in certain persons, while others escape or suffer from other diseases, as pneumonia or bronchitis, is not clearly understood. Notwithstanding the great diversity of the manifestations of acute rheumatism, the older theories of its causation have been abandoned and it has definitely taken its place among the specific infections. The primary exciting cause is a staphylococcus, probably that variety described by Poynton and Paine and now generally known as the *Streptococcus rheumaticus.*

Course and Symptoms.—The chief symptom of rheumatic fever is an acute inflammation of the joints, of which several, and commonly the larger, are simultaneously or successively affected. It is not common for many of the joints to become inflamed at the same time. In fact, it is characteristic of this disease that

the inflammation which is attended by the symptoms of swelling, redness, and pain makes its appearance suddenly, and often subsides rapidly. A joint that is inflamed to-day may be well to-morrow, or it may remain inflamed, while others previously free from disease are suddenly affected. In this way the disease is said to fly from joint to joint. Very often, however, the signs of inflammation very slowly pass away.

This sudden inflammation of the joints is often the first symptom of the disease. Usually there are slight premonitory symptoms, as general sensations of discomfort, chilliness, trifling sore-throat.

Fever is seldom wholly absent, often slight, usually moderate, 102°–103° F. Its course is not typical, being irregularly intermittent, and corresponding in intensity to the activity of the local inflammation and the number of joints implicated. There is rarely a marked initial chill, and many of the familiar symptoms of fever, as complete loss of appetite, great thirst, headache, drowsiness, and delirium, are absent. The skin is often bathed in perspiration, which has an acid odor and reaction, but which bears no necessary or constant relation to a fall of temperature.

The course of the attack shows alternations of improvement and aggravation of the joint-pains and the fever, and may extend over one or two, or, if not well treated, over as many as five or six weeks. The subsidence of the symptoms is gradual and the convalescence slow. It is apt to be interrupted by relapses.

The patients are usually quite helpless, every movement being attended with agonizing pain. In many

cases the mere weight of the bed-clothes is insupportable.

The physician will be on his guard to detect by daily examinations the first signs of implication of the heart. The rheumatic inflammation affects most frequently the lining membrane and the valves,—*endocarditis;* less commonly its enveloping membrane,—*pericarditis.* These heart-troubles are probably more common than generally supposed. Sometimes they are too slight to give rise to easily detected changes in the heart-sounds; very often they occasion no appreciable symptoms. They constitute a most serious element of rheumatic fever, however, for the reason that they often lead to, and in fact are, the commonest cause of permanent heart-disease.

There is a form of rheumatic fever which differs in certain particulars widely from the disease as ordinarily seen. It is attended by alarming nervous symptoms, and has therefore received the name of "cerebral rheumatism"; there is almost always an extremely high temperature, as high as is encountered in any form of sickness, which is spoken of as "rheumatic hyperpyrexia." This condition may develop in the course of an attack which has not differed in any respect from the ordinary disease, or it may be preceded by unusual nervous symptoms, as headache and delirium, from the outset. The development of the symptoms is, as a rule, abrupt. There is great uneasiness, delirium, sometimes spasmodic twitchings of the extremities, or spasms of the muscles of the face, with stiffness of the jaw as in tetanus (lock-jaw). There may be general convulsions.

There is great pallor and lividity of the face and extremities, and small, rapid, running, almost uncountable, pulse. The temperature at first rises suddenly to 105°–106° F., and goes on to 107°–110° F. without remissions. The hyperpyrexia attains its highest point just before or shortly after death. Recovery from this form of rheumatic fever very rarely occurs. Fortunately, it is of most uncommon occurrence, many physicians in large practice never having met with a single case. The special conditions which cause it are not well understood.

The medicinal treatment of rheumatic fever by salicin, salicylic acid, and the salicylates has in recent years been attended by brilliant results, which have largely led to the disuse of the older methods.

General hygienic and dietetic treatment are of great importance. An even temperature must be maintained in the sick-room. Draughts, cold, dampness, and sudden changes of temperature are followed by intense pain and constitutional disturbance. The joints may be wrapped in cotton batting, or preferably in sheets of carded wool. The patients must, even in the mildest cases, be strictly confined to bed. My rule is, if possible, to keep them in bed ten days or two weeks after the acute inflammation of the joints has subsided. This is of more importance than is commonly supposed whenever there has been the slightest implication of the heart.

The diet should consist of soup, eggs, custards, jellies, and milk in moderation. If the fever has subsided, or is moderate, bread, toast, fresh fish, oysters, the

white meat of fowl, and game in small quantities may be permitted.

For lingering joint-pains massage and galvanism are useful.

The occurrence of hyperpyrexia demands the prompt and energetic use of the cold bath. If this measure cannot be employed, cold may be applied by means of ice, cold affusions, ice-bags, wet compresses, and injections of iced-water. Every effort must be made to keep the temperature below 105° F. Chest complications will not preclude active antipyretic measures. Alcohol may be required to counteract the flagging tendencies of the circulation. When the temperature falls under the influence of external cold, the thermometer must be used every hour. When the temperature again rises to 104° F., the bath must be again employed.

In all cases of rheumatic fever in which there are nervous symptoms, the thermometer must be regularly used at intervals not exceeding two or three hours.

Those who have ever suffered from an attack of rheumatic fever are to be warned of the danger of its recurrence, and they should avoid cold and damp dwellings, over-exertion, and subsequent exposure. They ought to habitually use daily cold sponge-baths, rapidly taken, only part of the body being exposed and bathed at once, and followed by brisk friction, the whole process occupying not more than ten minutes.

PNEUMONIA.

Definition.—An acute specific fever, characterized by the invariable presence of more or less extensive

changes of an inflammatory kind in one, less frequently in both lungs. These changes are attended by chest symptoms, among which are pain, cough, and rust-colored expectoration. The fever is of sudden onset, considerable intensity, and of variable duration, critical defervescence taking place, however, in a large proportion of the cases, on or about the seventh day. Pneumonia is not self-protective.

Synonymes.—Lung Fever; Lobar Pneumonia; Fibrinous Pneumonia; Pleuro-Pneumonia; Croupous Pneumonia.

The old term lung fever corresponds very closely with the views at present held concerning the nature of pneumonia. Lobar pneumonia expresses the fact that one or more lobes of the lung are affected. It is used in contradistinction to lobular pneumonia, by which an essentially different lung-disease is known. Fibrinous and croupous pneumonia are terms intended to indicate the nature of the inflammatory substance thrown out into the lung, and are in contrast to the terms catarrhal or broncho-pneumonia, which describe an entirely different affection. Pleuro-Pneumonia indicates that there is inflammation of the membrane covering the lung as well as of the lung itself. The doctrine until recently almost universally entertained, that pneumonia is an inflammation of the lung, and the accompanying fever merely a symptomatic fever, is no longer tenable.

History.—Pneumonia has been more or less clearly recognized as an independent disease from the early days of medicine. It is a common disease, and is en-

demic among the civilized races. It is occasionally so prevalent in localities that it assumes the guise of an epidemic visitation.

Causation.—The primary exciting cause of pneumonia is the diplococcus pneumoniæ. In some cases other organisms are present. It is probable that several different micro-organisms may cause pneumonia. The disease is most frequent in the winter and spring. It may occur at any period of life from infancy to advanced age, but the greater number of cases are observed in youth and middle age. It is somewhat more common in men than in women.

Course and Symptoms.—Pneumonia usually begins suddenly with prolonged chilliness or a decided chill. The patient in the course of a few hours experiences pain in the affected side, which is intensified on deep breathing. The respiration is quickened, shallow, and often irregular. At a later stage there may be urgent shortness of breath. Cough is usually troublesome from the beginning of the attack. As the cough is attended with pain, it is apt to be partly suppressed; hence it is often short, muffled, and frequent. The characteristic tough, rusty expectoration is seen on the second day. It may, however, be absent throughout. Fever-blisters —herpes—often appear on the lips and nose. Appetite is lost, thirst not excessive; vomiting may occur, especially early in the attack; constipation is the rule, diarrhœa the exception. Headache, sleeplessness, and delirium are met with in severe cases.

The fever is almost always high from the beginning, —104° F.,—and conforms to a typical course. It is

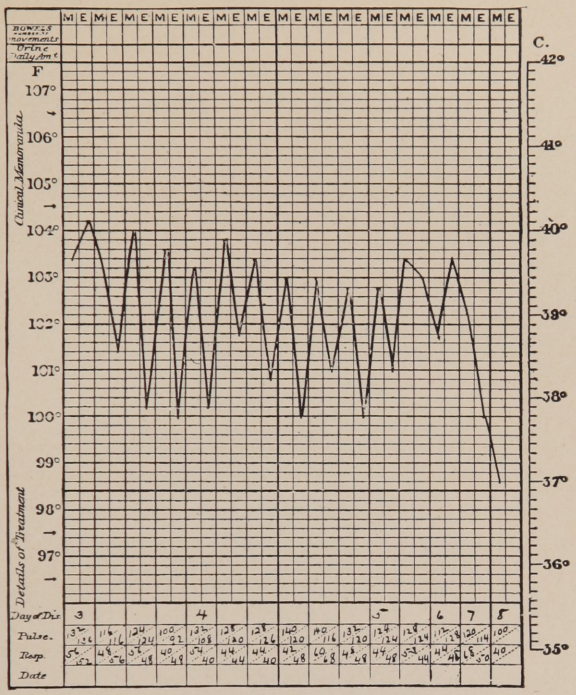

FIG. 26.—Croupous pneumonia. Recovery.

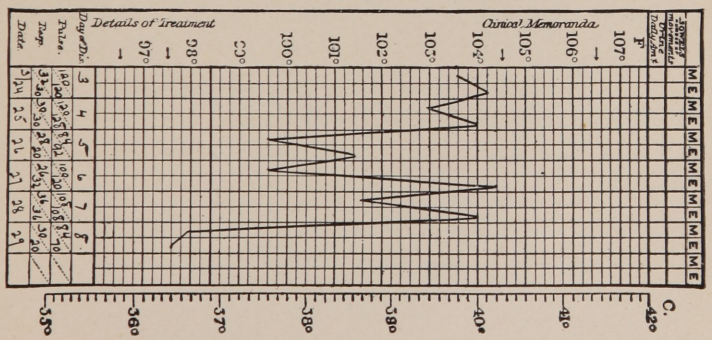

FIG. 27.—Pneumonia; pseudocrisis, 5th day; crisis 8th day.

subcontinuous in type. There are occasionally marked remissions in the early days of the sickness. The temperature occasionally reaches 105°–107° F. As a rule the violence of the constitutional disturbance corresponds to the intensity of the fever; but this is not always the fact, very grave cases, and even those ending in death, occasionally showing very moderate fever, 101°–103° F.

The fall of temperature generally occurs as a distinct crisis. It frequently takes place at night, and often reaches subnormal grades in the course of a few hours. There is usually more or less abundant perspiration. Much less frequently defervescence is gradual. The fifth or seventh, and less commonly the ninth, twelfth, and thirteenth days of the attack are critical days. The lung-symptoms do not at once pass away with the fever, but as a rule the improvement in every respect is very marked.

The frequency of the pulse is from the beginning greatly increased. It reaches 100 or 120. A pulse-rate of 140 or 160 indicates danger to life, although great frequency of the pulse is less ominous in children than in adults. A small, weak, irregular pulse is also of unfavorable omen. It is apt to be present in cases where, on account of feeble heart-action, dangerous attacks of collapse occur.

Jaundice occurs in a certain proportion of the cases. When very deep or associated with serious general symptoms it adds to the causes of alarm. Light jaundice is sometimes present in benign cases.

In children the initial chill is absent; vomiting is,

however, common at the beginning. Drowsiness, delirium, and convulsions are often present at the onset, and may obscure the real nature of the sickness. Rusty expectoration is very seldom seen in children under ten years of age.

Old persons are extremely liable to pneumonia, and are apt to succumb to it. It often begins insidiously, and is marked by great weakness and debility from the onset. Marked nervous symptoms are common.

Pneumonia is very common and very fatal in drunkards. The lung-symptoms are often masked by those caused by disturbance of the nervous system. The case presents all the appearances of a severe attack of Delirium Tremens. Neither cough, shortness of breath, nor pain in the chest are prominent symptoms.

Pre-existing diseases render pneumonia much more dangerous.

Much difference of opinion prevails among physicians in regard to the treatment of pneumonia. Bleeding, formerly much practised, is not at present regarded as admissible, save in exceptional cases.

The usual plan of treatment is symptomatic. The three prominent symptoms which especially demand relief are pain, cough, and difficulty in breathing.

The pain is often relieved by the application of ice-bags, cold compresses, warm compresses, hot poultices, mustard-plasters, or dry cups. Hypodermic injections of morphine are used by many physicians. Leeches and cut cups are employed in cases for which they appear suitable. The high temperature does not usually require active antipyretic treatment. Cold baths are

seldom necessary. The tepid bath, into which the patient is to be lifted without any effort on his part, is said to be followed by very good results, especially when there are marked nervous symptoms or great difficulty in breathing. Its temperature should be about 80° F., and the duration of the bath not more than five to ten minutes.

The most generous diet that can be digested is to be given, and wine or spirits, in cases for which their effects are necessary, may be administered without stint. Particularly is very free stimulation needed in the case of feeble and elderly persons and of drunkards.

CEREBRO-SPINAL FEVER.

Definition.—A malignant continued fever, occurring in general or limited epidemics, and caused by a specific micro-organism. It is of sudden onset, mostly of rapid course, and very fatal. The symptoms point to profound disturbance of the functions of the brain and spinal cord; associated headache, vomiting, and painful contraction of the muscles of the back of the neck are characteristic. Delirium, stupor, coma, and palsies occur. In many instances eruptions, chiefly herpetic and petechial, attend the disease. There is uniformly great nervous depression. The changes found after death are constant, varying only in the degree of their development. They are the results of an acute diffuse inflammation of the investing membrane of the brain and spinal cord.

Synonymes.—Epidemic Cerebro-Spinal Meningitis; Epidemic Meningitis; Spotted Fever.

History.—Cerebro-spinal fever was first recognized as

a distinct affection about the beginning of the nineteenth century. Prior to that date it was regarded as a peculiar form of typhus fever. It has during the present century prevailed in every country of Northern Europe and in most parts of the United States.

It made its appearance in Philadelphia in 1863, and prevailed annually in an epidemic form until towards the close of that decade, while occasional cases were observed up to 1873, in which year a small but fatal epidemic prevailed in every district of the city, even those most widely separated. Since 1873 it has not occurred here as an epidemic. Many cases have occurred in widely separated localities of the city during the years 1905, 1906, and 1907.

Causation.—The primary cause of cerebro-spinal fever is the diplococcus intracellularis meningitidis. Much less is known of the laws which govern its origin, its distribution, its action in communities and upon individuals, than is known of the active causes of the other infectious diseases. The unaccountable appearance of the disease at the same time in widely separated localities, its diffusion by isolated attacks rather than by direct advances, its erratic and often long-continued prevalence in epidemics, the extraordinary diversity of the symptoms at different times and in different cases, baffle the comprehension and render futile every effort to account for the origin of this remarkable disease.

Cerebro-spinal fever may occur at any period of life. It is by far more common during the first twenty years of life than later. It is equally common in the two sexes in infancy and childhood; in adult life the preponderance of cases is among males.

Cerebro-spinal fever is not contagious in the ordinary sense,—that is, like scarlet fever, small-pox, or typhus, —but that it is communicable from the sick to the well under favorable circumstances is very probable.

Course and Symptoms.—Cerebro-spinal fever presents a great diversity of symptoms in different cases. Like other epidemic diseases, its course is attended by the greatest variations in intensity, duration, and the prominence of particular phenomena, not only in different epidemics, but in the same epidemic. In this respect, however, it not only resembles other epidemic diseases, but it also far surpasses them. No acute disease whatever appears in such various arrays of symptoms. Stillé has well called it a "chameleon-like disorder." It is this that has rendered it more difficult to describe satisfactorily than to recognize at the bedside. It is this also that has led to the great diversity of opinions concerning it that have been entertained by different observers.

In by far the greatest number of cases the attack is ushered in by symptoms of the most formidable character. The patient is seized with a violent chill; agonizing headache, nausea and vomiting supervene. He is restless, tossing about the bed and oppressed with an overwhelming sense of illness. His countenance betokens his profound distress. His face is seldom flushed, usually pale, sometimes wearing the expression of those under the influence of narcotic poisons. In a short time dragging pains in the neck come on, which spread to a greater or less extent along the spine and into the extremities, and are soon followed by that

tetanic stiffness of the muscles of the spinal region that is one of the characteristic features of the disease. Pain is now experienced in attempting to bend the head forward, or to turn it from side to side. The muscular stiffness extends to the extremities, and movements are made with awkwardness and difficulty. The head is drawn back, the spine curved, the forearms flexed upon the arms, the legs upon the thighs. Cramps in the muscles of the legs and elsewhere, and spasmodic twitchings of the lips, eyelids, etc., come and go. General convulsions may occur, especially in children. A slight pinch, or an attempt to separate the eyelids for the purpose of examining the eye, will often call forth an expression of pain, even when insensibility is profound. The greatest suffering is, however, from the headache, which often causes restlessness and expressions of suffering during insensibility. It is described as sharp, lancinating, or boring, and may be either in the forehead or occiput, or may shoot about in all directions. Sometimes it is felt as a constricting band; sometimes it cannot be located, but is spoken of as an unutterable anguish. Pain of a like nature is felt in the lumbar, epigastric, and umbilical regions. The abdominal pain is usually an early symptom, and sometimes precedes the vomiting. Vertigo persists. It recurs upon every attempt to rise, and is often distressing when the patient lies quiet, compelling him to seize hold of the bed. The vomiting continues. At first the contents of the stomach, afterwards bilious matters, and gastric mucus are thrown up.

The high mental excitement which marks the onset

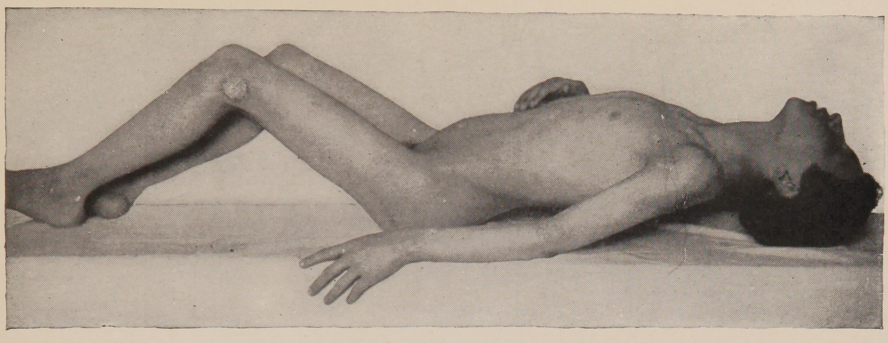

FIG. 28.—Epidemic cerebro-spinal fever.

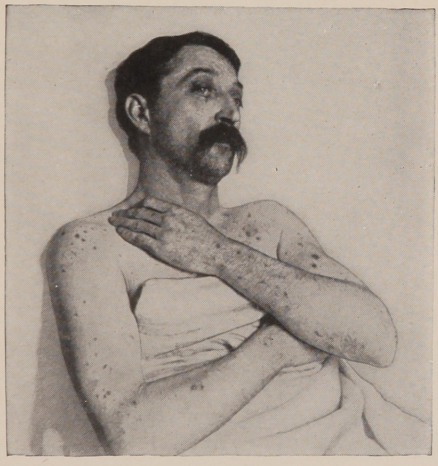

FIG. 29.—Petechial eruption; cerebro-spinal fever.

of the attack passes into delirium,—which may be active, even maniacal, or of a busy, wandering character. In a short time it passes into somnolence or stupor, which is, however, still attended with more or less restlessness and continual movement upon the bed. Various disturbances of the special senses occur. Intolerance of light is constant, double vision and temporary or even permanent blindness, sometimes supervene. Intolerance of sounds, ringing in the ears, and dizziness usher in deafness, which is more or less pronounced and not infrequently persistent. Taste is lost,—the patient refuses food; nevertheless, the vomitimg persists. Constipation is present at first, often throughout the sickness. Towards the end of the attack, diarrhœa and involuntary discharges may take place. In this respect epidemics differ greatly, and in truth it cannot be said that the symptoms referable to the alimentary canal are at all characteristic. The tongue is, as a rule, lightly covered with a whitish fur; where there is great depression it becomes dry and brown, and sordes collect; but this again gives place to a moist and whitish fur.

The fever is generally moderate, very irregular, and does not observe a typical course. The pulse is about normal in frequency or moderately quickened. It presents, however, the most remarkable variations in respect of its frequency, being at one time unaccountably quickened, at another unaccountably slowed, and these conditions succeed each other with great rapidity and no less irregularity; the changes in tension are not less notable. The respirations are likewise irregular. They

are at first quickened, later they become shallow and irregular in rhythm.

Cutaneous eruptions appear after the first few days. Herpes is common; erythema and nettle-rash occur. Petechiæ also, the sign of blood-disintegration, are common. In many epidemics no eruption has been observed. The herpetic eruption is most frequent on the face; it occurs elsewhere on the body, and is sometimes symmetrically distributed. The others are of irregular distribution.

The disease develops rapidly to its height; from the third to the sixth day the symptoms have reached their full intensity. If the attack goes on to an unfavorable ending, the symptoms of excitation give way to those of depression; the rigidity is replaced by relaxation; stupor deepens into coma; the fixed look of pain fades into blankness. The temperature rises to 105°–108° F.; the pulse becomes rapid, small, and so feeble that it can scarcely be felt, and with convulsive muscular movements, ending in profound coma, death puts an end to the scene of horror.

If the case runs a favorable course, the symptoms of depression are less marked, and they continue for a much shorter term. Intense headache, backache, and pains in the limbs occur; the patient generally lies quiet in one position; there is intolerance of light and sound. In the course of a few days the vomiting ceases, the headache and other pains diminish, and along with them the muscular rigidity; the strength is slowly regained, and, after a period varying from two or three to several weeks, the patient recovers his health. The convalescence is often protracted for a

long time by pains in the head and neck, and by disturbance of the sight and hearing.

The *fulminant form* of cerebro-spinal fever is that in which the effects of an overwhelming infection fall upon the patient like a thunder-bolt. He is struck down without warning in the midst of health, and speedily falls into a state of collapse. Death usually ensues in the course of a few hours.

The *abortive variety* occurs at the height of, and during the decline of, epidemics. The association of symptoms is characteristic, but the manifestations of the disease are very faint. Many of these cases do not seem ill enough to go to bed. There is headache, stiffness of the back and neck, and a general feeling of discomfort (*malaise*). Vomiting occurs, but fever is, as a rule, absent.

The diagnosis may be made with certainty by the laboratory investigation of the cerebro-spinal fluid obtained by lumbar puncture. The presence of the diplococcus intracellularis or meningococcus is of positive significance.

The course of the temperature is extremely irregular.

The high death-rate of cerebro-spinal fever places it among the most dreaded of epidemic diseases. The mortality varies greatly in different epidemics; in the mildest it is about thirty per cent., in the most severe seventy-five per cent. The average is about forty per cent.

A considerable proportion of persons who recover suffer from permanent impairment of sight and hearing, and from various palsies, which result from destructive local inflammation involving particular nerves and their investing membranes.

The drug treatment of cerebro-spinal fever is purely symptomatic. The early use of the specific serum prepared by Flexner has greatly reduced the mortality. It is injected through the needle after withdrawal of castro-spinal fluid by lumbar puncture.

The direct application of cold to the head and spine by means of ice, snow, or a freezing mixture in rubber bags is attended with satisfactory results as regards the symptoms of inflammation. If the bags cannot be procured, a bladder filled with cracked ice mixed with bran may be substituted. In children gentle cold affusions may be practised. The application of cold by these means is in most cases followed by very marked mitigation of the pains, and often by quietude or sleep. It should be continued as long as the patient is comfortable, and repeated upon the return of the symptoms. Patients frequently require the continuous applications for hours at a time. A hot mustard foot-bath, or a general hot bath (100.4°–102.2° F.), should be employed as early as possible, care being taken that the strength of the patient be in no wise taxed. This may be followed by gentle frictions with some stimulating liniment, or with oil of turpentine, if the surface be cold and the circulation depressed. A stimulating enema may at the same time be administered. The patient should also be covered with warmed blankets, and artificial heat applied to his sides, thighs, and extremities. In all cases it is well, while using the cold to the head and spine, to counteract its depressing effect by the application of moderate heat elsewhere. This may be accomplished by means of hot flannels, bags of hot sand or salt, bottles filled with hot water, or heated

billets of wood well wrapped up. At the same time, if necessary, sinapisms are to be applied to the extremities and over the heart.

The application of ice to the head and spine may, however, do mischief by the depression of the circulation which it causes. The use of hot water applied by a sponge passed over the spine every two or three hours is preferred by many physicians. The best modern American authorities agree in advising the continuous use of external heat, to anticipate and counteract the early depression which is so grave an element of the disease, a practice very general in the early epidemics in this country, but for a long time strangely overlooked here and altogether neglected abroad.

A generous alimentation is to be given from the beginning of the sickness. During the continuance of the fever, milk, broths, and meat-juices must be administered at regular intervals and kept up during the night. When food cannot be taken by the mouth or is not retained, an attempt should be made to administer nutritious enemata.

So soon as he is able to take it, the patient must be allowed an abundance of easily digestible solid food. The appetite is often excellent from the beginning of convalescence.

The desire for water must be freely gratified. The use of alcoholic stimulants calls for great judgment on the part of the physician.

When there is great prostration, and indeed in most cases, the patient should not be allowed to assume the erect posture, or even to sit up in bed, for fear of his fainting.

The room should be darkened, and all noises and other disturbing influences avoided.

Delirium, spasms of various muscles, and irritability of the stomach too often in the severe cases render for a time the administration of food and medicines impracticable.

DIPHTHERIA.

Definition.—A specific, acute, infectious disease, endemic in certain localities, and frequently prevailing in epidemics; characterized by the exudation upon mucous surfaces, and especially upon that of the tonsils, palate, uvula, pharynx, larynx, and trachea,—*i.e.*, of the upper air-passages,—of a peculiar, thick, tough, stratified false membrane, which is developed not only upon the surface but in the superficial structure of the mucous membrane on which it rests: this exudation shows a disposition to extend and to promptly form again when detached. Diphtheria is attended by the signs of grave constitutional infection, rapid prostration, and great danger to life. It is very often followed upon recovery by palsies. It is not self-protective.

Synonyme.—The term Membranous Croup was formerly sometimes applied to cases of diphtheria in which the exudation began in or was restricted to the larynx and trachea.

It is proper to state that many physicians formerly believed diphtheria and membranous croup to be different diseases. The evidences of the identity of the false membrane are such that there is no longer ground for doubting the essential identity of the two affections, which present somewhat different features merely because of the different train of

symptoms produced by false membrane occupying different positions. The narrowness of the passage for air in the larynx is such, especially in children, that the presence of the diphtheritic exudation at that point immediately gives rise to symptoms of obstruction.

History.—Diphtheria was formerly known under various names, among which the most significant was "Putrid Sore Throat." The present name of the disease, by which it is now known in all civilized countries, is of comparatively recent origin,—1855. It is derived from a Greek word signifying "a skin."

Causation.—The infecting principle is an organized germ, the Klebs-Loeffler bacillus. Diphtheria is chiefly, but by no means exclusively, a disease of childhood. Sporadic cases are at all times encountered in the larger towns and cities: while at irregular intervals of time the disease assumes the epidemic form. The poison finds its way to the upper air-passages, lodges there, and produces an infection at first local, but which very quickly becomes constitutional. The infection is in all cases originally derived from a previous case of the disease.

The disease is, under special circumstances, directly contagious. Thus physicians and nurses occasionally contract it by means of particles from the throats of patients, which are coughed into their mouths, or sucked from a tracheotomy tube, or in some similar way brought into contact with the mucous surfaces of their throats. Though the poison is given off from the infected mucous surfaces, and not, as in typhus and scarlet fever, from the general surface of the body, it is well to observe the strictest precautions against the

communication of the disease from the patient to those who come into contact with him, or to others, by means of fomites, as toys, books, clothing, or other objects to which the poison may be adherent. The potency of the infectious matter is not easily destroyed. The possibility of transmission from animals or from person to person by means of pet animals must be remembered. The diptheritic poison haunts localities and houses. The occurrence of a single case, much more the occurrence of several successive cases, renders imperative a thorough sanitary inspection of all local and neighboring plumbing and draining and the immediate correction of every defect.

Course and Symptoms.—The period of incubation is brief, rarely exceeding five days. The attack begins with soreness, pain or swelling of the throat, malaise, headache, and fever. In young children who do not ordinarily make complaint of sore throat the local trouble may be easily overlooked. It is a good plan to carefully examine the throats of children who are taken acutely sick.

In the early stages of diphtheria we find more or less redness and swelling of the tonsils and neighboring parts. One or more patches of grayish-white false membrane are discovered. These are found to be firmly adherent to the mucous membrane. In the milder cases they are usually confined to one of the tonsils ; in severe cases they extend rapidly, and creep over to the soft palate, the uvula, and even to the posterior wall of the pharynx. Thence they may extend into the posterior nares—nasal diphtheria—or into the larynx—laryngeal dipththeria. There is swelling of the lymphatic glands

at the angle of the jaw. There is restlessness alternating with drowsiness, complete loss of appetite, frequent vomiting, great depression. Fever is present, but is not typical in its course. It is usually moderate, 102°–104° F., but subject to irregular fluctuations. Occasionally fever is absent even in cases in which the other symptoms are severe. The pulse is feeble and rapid. There is usually, but not invariably, albuminous urine. Mild cases running a favorable course usually terminate in convalescence in a week or ten days. Severe cases commonly show themselves to be such from the early stages of the attack.

Nasal diphtheria is betrayed by swelling of the mucous membrane of the nasal passages, an abundant muco-purulent discharge, the presence of excoriations and superficial ulcers at the edges of the nostrils, and even the visible diphtheritic exudation.

Laryngeal diphtheria, or so-called membranous croup, is a very dangerous form. It is a distressing and very often, despite the resources of medicine and surgery, a fatal malady. Very little or no visible exudation may exist in the pharynx. In other cases the tonsillar or pharyngeal exudation is extensive. As a rule hoarseness is the earliest symptom of the extension of the disease to the larynx. Cough, harsh, ringing, and "croupy," then follows, and quickly the signs of obstruction to breathing come on. Respiration is not always much hurried, but it is difficult, and the muscles of the neck are brought into play. The restlessness of the little patient increases. His face is pallid, the lips bluish, his expression anxious; the nostrils dilate

in the gasping efforts to breathe; unable and indisposed to speak, he implores with eager eyes the relief which he so urgently needs. The obstruction to breathing is mechanical, the membrane almost closes the larynx. Portions of it becoming detached may act like a valve, being sucked in with each act of inspiration. In such cases death from suffocation may occur at any instant. Sometimes the occluding membrane is expelled by a violent cough or in the act of vomiting, and great relief for a time ensues. But re-forming exudation or a displaced fold may cause renewed distress and danger. If after the expectoration of the membrane no fresh exudation takes place, the case may go to recovery. In many cases the symptoms of suffocation steadily increase: the breathing grows shallow and rapid as it becomes more and more ineffectual: the child is now deeply stupid and livid, and with shuddering convulsions dies. The obstruction is by no means always confined to the larynx. In a considerabble proportion of cases proving fatal by suffocation the false membranes are found, upon post-mortem examination, to extend deeply into the bronchial tubes.

Cases are by no means uncommon in which death results from the intensity of the constitutional infection, without very extensive local exudation, and especially without suffocative phenomena. Here a tendency to sleep deepens into stupor, the pulse becomes feeble, and so weak and rapid as to be counted with difficulty, and death takes place from failure of the heart.

The diphtheritic process sometimes extends deeply into the tissues, causing extensive destruction not only

of the mucous membrane but also of the deeper tissues underlying it. The term "gangrenous diphtheria" has been employed to designate such cases.

The exudation may invade the Eustachian tube, the channel of air communication between the throat and the middle ear, and thus cause serious inflammation of the latter. It also occasionally extends to the gums and lips, and the infectious material being conveyed by the hands of the patient or otherwise, the diphtheritic process may be set up in the eyes, about the genitalia, or upon the surface of wounds, ulcers, or excoriations.

Patients convalescent from diphtheria are liable to palsies, which have been described under the name of "diphtheritic paralysis." This nervous affection may appear within a day or two after the throat-trouble passes away, or not for a fortnight or more. It may follow mild as well as severe cases. It most commonly affects the palate, and leads to impairment in the act of swallowing, fluids being regurgitated through the nose. At the same time the voice assumes a peculiar thick, nasal tone, or may be reduced to a mere whisper by reason of partial paralysis of the vocal cords. There may also be palsy of the muscles of the eye, leading to imperfect vision, especially for near objects, and occasionally to squint.

Paralysis of the muscles of the trunk or extremities very often occurs. There may be great difficulty of walking without the actual signs of loss of power,—ataxia. Permanent loss of power and stiffness from the contraction of certain groups of muscles sometimes

result from diphtheritic palsies. As a rule, however, these nervous troubles improve by degrees, and terminate in eventual recovery.

Many cases of diphtheria are mild, and end in recovery in the course of ten days or two weeks. Many more severe cases also terminate favorably after a sickness of three or four weeks. But the terribly fatal nature of the bad cases is well known. One attack does not confer subsequent immunity from the disease. On the contrary, there is reason to believe that some persons and families are peculiarly liable to contract it upon slight exposure to the infection, and therefore suffer from repeated attacks at longer or shorter intervals.

The expectant plan of treatment is inadmissible in diphtheria. Every case must be treated on its own merits, with energy and promptness. Each symptom as it occurs must be combated. Especially must the tendency to prostration, which is so characteristic of the disease, be met, or rather anticipated, from the time of the appearance of the earliest symptoms, by the systematic administration of nutritious and readily assimilable liquid fluid in generous quantities, and by the free use of alcoholic stimulation. Children sick of this disease not only seem to be benefited by alcoholic stimulants, but they are frequently able to take them with advantage in large amounts. There is more danger of giving too little than too much. All complications must be promptly treated.

With the whole question of medicinal treatment, which is a very much disputed one, both as regards

local and general treatment, the nurse can have little or nothing to do, save to carry out with fidelity and promptness the orders of the physician.

The mode of infection in diphtheria, different in several important respects from that of the other contagious diseases, has led to a false sense of security as regards its contagiousness. The same, even more stringent, precautions are necessary against the spread of diphtheria than are employed to prevent that of small-pox or scarlet fever.

The patient, even in mild cases, must be isolated, and the other children sent out of the house. If this be impracticable, let them occupy as distant a part of the house as possible, and spend as much time as possible in the open air. Their throats and that of their nurse should be examined every day by the physician before his visit to the sick of the family. It is well to have the temperature of the well children taken each night at bedtime.

The bedding and night-clothing must be frequently changed and disinfected. The room must be systematically and thoroughly ventilated. As soon as convalescence sets in the patient ought to be placed in another room, in order to avoid the dangers of reinfection and relapse. The room first occupied, with all its contents, must be at once disinfected.

The well or apparently well members of the household must not attend church, places of amusement, or other public places of assemblage, nor pay or receive visits. The children must not be allowed to go to school. It is advisable when an epidemic has broken

out to temporarily close the schools of the infected locality.

Adults and children who are old enough should rinse the mouth frequently with antiseptic solutions, such as diluted Listerine, Labarraque's solution, or one or two per cent. solutions of carbolic acid. The same substances may also be efficiently used in the atomizing apparatus, and this is necessary in the case of younger children.

Steam inhalations may be given by means of a croup-kettle, water alone being used, or water containing lime, or turpentine, a teaspoonful to the pint, or terebene, half a teaspoonful to a pint, or alcohol, two or three ounces to the pint. The steam may be simply discharged in the direction of the patient's nose and mouth at a distance of several inches, or it may be confined about him in an extemporized tent or hood about and over the head of the bed. If a gas-stove is used, and, indeed, in all cases, it is important to see to it that there is a sufficient supply of fresh air, and that the temperature of the room does not exceed 72°–74° F. Although gargles are commonly prescribed, they are much less useful than sprays, and are often very painful from the forced use of the muscles of the throat, which are always to some extent involved in the inflammatory process.

Local applications to the throat may be made under the direction of the physician. Loeffler's solution, corrosive sublimate, 1 : 1000 ; carbolic acid, three parts to 100 of a thirty per cent. solution of alcohol ; tincture of the chloride of iron, ten parts to 100, chlorine water,

boric acid, hydrogen dioxide solution, and trypsin may be used for this purpose. Loeffler's solution is the most useful of this list.

In cleansing the mouth and nostrils, and in making such applications to them as may be directed, it is well for the nurse to tie a handkerchief, napkin, or strip of sterilized gauze about her face in such a way that it may cover her nose and mouth, and thus protect her from the direct infection to which she would otherwise be exposed if the patient coughs or sneezes. Neglect of this precaution has led to the loss of many a valuable life.

It is in diphtheria that serum-therapy has achieved its most brilliant results. This method of treatment depends upon the fact that the blood-serum of animals rendered immune by repeated inoculations with the diphtheria virus when injected into other animals renders them also immune, and the further fact that such blood-serum of artificially immunized animals exerts a curative influence upon diphtheria when established. These facts are the result of systematic laboratory investigations upon the subject, and the names of Roux and Behring are prominently connected with the earliest observations concerning it. The serums are prepared for commercial purposes in laboratories which in France and Germany are under government supervision. They are standardized, the antitoxine unit being the amount of antitoxine which, when injected into a guinea-pig weighing 250 grammes, counteracts 100 times the minimum lethal dose of toxine of standard strength. By laboratory processes the potency of the serum is increased so that similar volumes are made to represent increased numbers of antitoxine units. The more con-

centrated antitoxine serums are preferable, but they are much more expensive. The antitoxine serum should be administered as early as possible and in suspected cases without waiting for bacteriological investigation into the character of the false membrane. In children over two years the initial dose should be from fifteen hundred to two thousand units in severe cases. This dose should be repeated within the course of twenty-four hours if no improvement is seen and again in twenty-four hours if the case continues to progress unfavorably. Mild cases should receive one thousand units for the first injection, and in children under two years of age the initial dose should be about one thousand units, to be repeated again if required.

A most remarkable improvement both in the local and general symptoms follows in favorable cases in the course of twenty-four hours. The membrane separates and disappears, swelling and injection of the throat diminishes, the temperature falls, the pulse improves, and the patient enters rapidly upon convalescence. The earlier the treatment is instituted the better are the results. This favorable response to the treatment does not, however, occur in all cases even when instituted early in the course of the attack.

The serum is injected by means of a special syringe which should be thoroughly sterilized. Sterilized glass tubes containing the serum, each conveniently fitted with a sterilized needle and plunger and suitably encased, are now supplied by the manufacturers. Preferably the injection should be made into the back between the shoulder blades, and the region should be prepared by a careful scrubbing and sterilization, and the nurse

and the physician should take the same precautions against accidental secondary infection, as in the case of surgical procedures.

Smaller doses—five hundred to fifteen hundred antitoxine units—should be for immunization administered to the nurses, attendants, and members of the household or institution. The immunity is transient, not extending over six or eight weeks, at the end of which time, if the danger of infection persists, a second immunizing dose should be administered.

The Schick Test.—It is essential that the trained nurse should have some knowledge of this test, although she will not be expected to employ it, except in the diphtheria wards of special hospitals, under the supervision of the physician. One-fiftieth of the minimum lethal dose of diphtheria toxine for a guinea-pig weighing 250 grammes is diluted to make 0.1 c.c. of fluid, which is injected into the skin. If no local reaction follows, the person thus tested seldom acquires the disease. If, however, within forty-eight hours an inflammatory reaction occurs, there is a susceptibility to diphtheria. The value of this test has led to its general employment in persons who have been or are exposed to diphtheria, especially doctors, nurses and attendants in special wards. If a positive reaction occurs, it is the practice in the Philadelphia Hospital for Contagious Diseases to give a series of three injections of standardized toxine—antitoxine serum at intervals of a week, the toxine content remaining the same and the antitoxine being progressively increased at each dose. As a result active immunity is developed, which greatly outlasts the im-

munity produced by the immunizing dose of antitoxine formerly employed.

In laryngeal diphtheria two operations are now performed with a view to obviate the obstruction to the entrance of air into the lungs. These are tracheotomy, which consists in opening the windpipe below the point of obstruction, and intubation, or the insertion of a metal tube in the larynx in such a manner as to overcome the obstruction. The details of the nurse's duties in case of the necessity to perform these operations will in all cases be minutely pointed out by the surgeon in charge of the case.

Diphtheritic paralysis is, in addition to medicinal measures, advantageously treated, especially in its later stages, by massage, Swedish movements, and electricity.

THE PLAGUE.

Definition.—A specific infectious disease of rapid course and great severity, characterized by inflammatory changes in the lymphatic glands, the occurrence of carbuncles and hemorrhages.

Synonymes.—Bubo or Bubonic Plague; Oriental Plague.

History.—The plague was the great historical pestilence of the Middle Ages. It prevailed extensively over Europe until the middle of the seventeenth century. The last great epidemic of the British Isles was the great plague of London in 1665. The plague, which has continued to smoulder in the Orient, prevailed with great severity in Hong Kong in the spring and summer of 1894. The disease reached Canton and Northern India

by way of Thibet, and raged fiercely in the city of Bombay in 1896–97, and has since spread widely throughout the Presidency of Bombay. This disease, which was long regarded as having a merely historical interest, has, in point of fact, assumed great present importance.

Causation.—The specific organism is a bacillus first described by Kitasato. This organism is found in the blood and organs of the body of those ill of the disease, and in the dust of houses and in the surrounding soil in infected districts. The domestic animals and vermin, especially rats, suffer from the disease.

The plague is not contagious or transmissible in the ordinary sense. It is dependent on the disease in the rat, and is transmitted from the rat to man and other animals by the rat flea. This parasitic insect also infests other rodents, as squirrels, which may thus become active in spreading the disease. Fleas are carried by personal and other fomites. Cases in a house commonly occur at first singly. Insanitary conditions, except as to rats, play no part in the origin and distribution of the plague.

The chief predisposing influences are to be found in that combination of physical and social wretchedness which attends poverty and overcrowding. Ignorance and neglect of sanitary laws, personal filthiness, improper and insufficient diet, accumulations of human excreta and other filth in and around dwellings, imperfectly buried corpses in the neighborhood of human habitations, have been enumerated as conditions favorable to the prevalence of the plague. But all these conditions are very common without giving rise to

the plague. It is only because they are favorable to the existence of the rat, and under conditions in which these vermin have become plague-infected, that epidemics arise and spread.

Individual predisposition to the disease is increased by depressing influences, such as bodily or mental overexertion, intense and prolonged anxiety and fear. Physicians, nurses, and others occupied in the care of the sick, and those who buried the dead especially suffered in the older outbreaks. A better knowledge of the mode of transmission of the plague and improved methods of sanitation have greatly lessened the risk of infection on the part of those who perform these offices. In the recent epidemics Europeans and even the physicians, nurses, and inspectors have only in rare instances contracted the disease. It has been stated that oil-carriers and dealers in oils and fats, water-carriers, and the attendants at baths enjoy comparative immunity from attack.

Course.—The stage of incubation is three or four days. The onset is manifested by great headache, pain in the back and limbs, a feeling of apprehension, restlessness and mental depression. There is rapid breathing, and bleeding from the nose or lungs may occur. In the course of a few hours the temperature rises, and may reach 104° or even 106° F. The pulse becomes correspondingly rapid. Gastro-intestinal disturbances consist of complete loss of appetite, dry, brown tongue, thirst, and constipation. Symptoms of collapse may now occur, and in the graver cases death takes place at this period. In more than two-thirds

of all cases glandular swellings or buboes appear,—the inguinal, axillary, cervical, and popliteal glands being involved, in the order mentioned. The swelling begins somewhere between the third and fifth days. In cases that recover, these glands may undergo resolution, or suppuration may take place. Carbuncles may develop in different parts of the skin, particularly upon the buttocks and back. Suppuration has been regarded as a favorable symptom.

Hemorrhages from the mucous membrane and into the skin very commonly show themselves and are sometimes most extensive. Blood-spitting is a prominent symptom in some epidemics. The mortality is enormous. Taking all cases, it is more than seventy per cent. In some epidemics entire villages have been depopulated.

Prophylaxis.—An efficient prophylaxis consists, first, in the removal of the conditions favorable to the development of the disease; and, second, in the restriction of the disease by quarantine to the locality in which it has shown itself. In the words of Hirsch, "The extinction of the plague in Europe was a gradual process, and kept pace in great measure with the development and perfection of the quarantine system with reference to the Orient and the different countries of Europe." This author goes on to say, "I cannot, in fact, understand how any one, criticising the facts and without prejudice, and having regard to the state of the plague in the East, can for a moment hesitate to attribute the general cause of the disappearance of the plague from European soil to a well-regulated quarantine system." As a cause of scarcely secondary importance, however,

we must invoke the improved methods of living of a progressive civilization. The European has not lost his susceptibility to the plague. He is liable to attack in the East. His immunity at home is to be found in the restriction of the exciting cause of the disease to its present haunts. There can be little doubt that the rigorous quarantine established at the town of Noja in lower Italy in 1815, and similar measures of isolation practised on the Volga in the Province of Astrakhan in 1878–79, prevented this disease from entering Europe. The complete disinfection of all clothing and other articles used in the service of the sick is a necessary measure of prophylaxis. It has not been uncommon to destroy by fire the houses in which cases have occurred, together with their contents.

Treatment.—The management of individual cases must be expectant and symptomatic. Ventilation, cleanliness, a liquid diet systematically administered, and abundant cool drinks, form the basis of the treatment. The early collapse and evidences of failure of the forces of the circulation call for the free use of stimulants, and especially of alcohol. Cold or tepid sponging, in accordance with the sensations of the patient, may also be employed. Cold affusions are said to have been of use in many cases, and the rhythmic effects of systematic cold bathing, according to the method of Brand, should be obtained.

The disease is of short duration and very fatal. In the fulminant form the duration of the whole attack is often not more than a few hours. In the grave or ordinary form the resources of medicine are inadequate to

modify the attack or avert the fatal issue in the large proportion of cases. The milder symptoms and the longer duration of the larval or abortive cases afford an opportunity for symptomatic treatment and careful nursing.

Preventive inoculations have been practised during the epidemic in the Presidency of Bombay. For this purpose sterilized cultures of the plague bacillus in increasing quantities have been injected. By others an antitoxine serum obtained from the horse, much in the same manner as the diphtheria antitoxine serum is prepared, has been used. Very favorable reports of the effects of these methods of preventive treatment have been published in the medical journals.

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