

system by the typhoid poison, and a secondary, caused by the gangrene and ulceration of the intestine, and consequent septicemia. Delirium, again, instead of being of a mild, stupid type, may be very active and acute, the patient requiring watching to prevent his getting out of bed or jumping from a window.

DIAGNOSIS.—The diagnosis in a typical case of typhoid fever is comparatively easy. The gradual onset, with backache, headache, loss of appetite, and general malaise, occasionally with chills and vomiting, with gradually increasing rise of temperature, and frequently a progressive apathy, in conjunction with flushed face, dry tongue, and often an early enlarged spleen, and early rose spots, make a picture which is very characteristic of the disease. There is, however, as has been already stated, every variation in these symptoms, and sometimes the evidence is so slight that diagnosis is very difficult. In these cases certain laboratory tests may make the diagnosis possible.

Leucocytosis.—The leucocyte count is of somewhat negative value, as in typhoid fever, uncomplicated by any inflammatory process, the leucocyte count is usually normal or may be less than normal. It is apt to become less during the acute stage of the disease, and may become high on the advent of any suppurative process. For this reason a leucocyte count early in the disease may be of great relative value and should always be done as a routine measure.

Widal Reaction.—The Widal reaction was discovered in 1896 from the converse of the theory that certain organisms could be identified by their agglutinating under the action of serum from animals immunized to their influence. If, then, the serum had this effect on identified organisms, it would probably be from an immunized animal. This was found to be true in a large percentage of typhoid-fever patients, and the test is now applied as a routine in all hospital and many private cases, and should be in all cases.

The most practical way of applying the test is as follows: From a bouillon pure culture of typhoid bacilli with a sterilized platinum loop take ten drops, place this fluid on a clean slide and cover with a cover glass. On another slide place ten more loopfuls of the culture and one loopful of the suspected serum and stir well. On still another slide place five or ten more loopfuls of this culture and one loopful from the second slide, and mix thoroughly. This gives for examination one specimen of the typhoid culture for a control, one of suspected serum diluting the culture 1 to 10, and the third diluting the serum 1 to 50 or 1 to 100, according as five or ten drops are used on the third slide. These three preparations may be made with care on different parts of the same slide. The first two of these preparations are watched occasionally under the microscope, and if in fifteen minutes, or at most within half an hour, the bacilli in the second specimen lose their motility and become clumped together in numerous colonies, the reaction is presumably positive. This process should occur also in greater dilution, and for this purpose the third preparation should also be examined if clumping has occurred in the second.

The clinical importance of the Widal reaction as a pathognomonic sign of typhoid fever is very great in spite of some of its disadvantages. In the best statistics from very large numbers of cases a positive Widal reaction has been obtained in over ninety-five per cent. In some of these series of cases the reaction is present in ninety-nine per cent. In diseases other than typhoid the reaction is obtained in less than two per cent., and probably with the more proper high dilution (1 to 50) this proportion would be still less. From the blood of some cases resembling typhoid fever with persistent negative Widal reaction organisms, called paracolons bacilli, closely allied to Eberth's bacillus, have been isolated, and with cultures of these organisms an agglutination reaction has been obtained from the serum from the patient. It is possible that other similar organisms exist, and probably when they are identified a positive serum reaction will be obtained in a still larger proportion of cases.

The principal disadvantage of the Widal reaction is that it does not usually occur early in the disease. Though it has been found as early as the third day, it occurs in the first week in only about twenty-five per cent. of the cases. In the majority of cases it is present in the second week, but it may be much delayed, perhaps occurring during a relapse or convalescence as late even as the sixtieth day.

Diazo Reaction.—The diazo reaction, suggested by Ehrlich in 1882, may be of some help in the diagnosis of typhoid fever. A small quantity of the patient's urine is mixed thoroughly with an equal quantity of a freshly prepared solution containing one part of a one-half-per cent. solution of sodium nitrite and fifty parts of a saturated solution of sulphanic acid (2 gm.) in hydrochloric acid (50-1,000 c.c. water). This mixture is then made alkaline with ammonia, and if the diazo reaction is present, the solution and foam become carmine red, otherwise they are brownish-yellow. This reaction occurs usually early in typhoid fever, often before rose spots or the Widal reaction. It also usually disappears early in the defervescence and may reappear in relapse, but not in recurrence of fever due to other causes. The objections to this test as a diagnostic aid are that it does not occur in ten per cent. or more of the cases, and it may occur also in tuberculosis, typhus, pneumonia, and acute exanthemata, especially measles.

Other laboratory aids in diagnosis, which are, however, at present of somewhat less practical value, are the obtaining of typhoid bacilli in cultures from the stools, urine, sputum, blood, and rose spots. They may be obtained very early from the stools, and in pure culture from the urine, blood, and rose spots before a positive Widal reaction is present, but the technique of these procedures makes them as yet somewhat difficult of general application.

Differential Diagnosis.—In differentiating typhoid fever of a more or less atypical form, or with misleading complications, the laboratory aids to diagnosis may be very helpful. The leucocyte count may serve to distinguish cerebro-spinal meningitis and pneumonia, and an examination of the blood may show a malarial parasite. The disease from which it is most difficult to distinguish typhoid fever is acute miliary tuberculosis. The absence of remittency in the fever and the presence of rose spots are the most characteristic evidence of typhoid fever, but in the absence of a positive Widal reaction, if the bacilli were cultivated from the stools, urine, or blood, the diagnosis would be certain. Tubercle bacilli may be demonstrated in the blood or may be obtained from the sputum. The two affections have been found together.

Paratyphoid is referred to already in connection with the paracolons group of bacilli, and is described elsewhere.

ANATOMICAL LESIONS, MORBID ANATOMY, PATHOLOGY.—For a complete description of the various pathological lesions, and they are numerous—such as parenchymatous degeneration, cloudy swelling of the vital organs, fatty degeneration of the substance of the heart, hypostatic congestion of the lungs, ulcerations of the larynx and oesophagus, enlargement of the spleen, thrombosis, abscesses, diphtheritic affections, etc.—common to typhoid fever and other wasting febrile diseases, the larger treatises should be consulted. The changes in the intestinal glands, and especially in the solitary and agminated glands (Peyer's patches) of the ileum, constitute the characteristic lesions of typhoid fever; these are invariably present, and in the later stages are peculiar to this disease; they are generally most pronounced in the neighborhood of the ileo-cæcal valve, the patches being most numerous in this part of the ileum. The process may extend to the solitary glands in the large intestine. The individual glands forming a Peyer's patch number from one to four hundred, and give the mucous membrane in health an unequal and roughened appearance. The patches are elliptical, situated on the free borders of the intestine opposite the insertion of the mesentery, their long diameter being parallel with the longitudinal axis of the intestine. They number from thirty upward, are

confined to the small intestine, and, as before said, are most numerous and least scattered in its lower third.

These glandular lesions are usually described as passing through four stages: (1) The stage of swelling and



Fig. 4808.—Peyer's Patch and Solitary Lymph Nodules. Peyer's patch shows marked swelling with some loss of surface due to necrosis and beginning ulceration. (From Mallory.)

hyperplasia of the intestinal and mesenteric glands; (2) necrosis and sloughing; (3) ulcerations; (4) healing. In general terms, it may be said that during the first week the glands become gradually enlarged and the mucous membrane undergoes the usual changes of catarrhal inflammation; during the second week necrosis of the superficial of the glands sets in; during the third week there is sloughing of the necrosed glandular tissue, forming ulcers which from the end of the third week begin to clean, and then pass on to the stage of healing. At whatever period of the disease a patient dies, some of the intestinal glands will generally be found in the first stage, and at most autopsies some will be found in the first three stages. The process less often passes on to the second and third stages in the solitary glands.

Since the discovery in 1880 of the specific micro-organism causing typhoid fever, this bacillus has been demonstrated as occurring in every part of the body of patients dying with this disease, viz., the heart's blood, the lymphatic system, the bile, rose spots, etc. In fact, it has been demonstrated in life occurring in the blood, in the urine, in sputum, and in rose spots. Thus from one point of view typhoid fever may be regarded as a systemic affection; but the mode of entry is by ingestion, and the most important and the characteristic lesions are those of the intestine and mesenteric lymph nodes. Though there have been a number of cases of typhoid fever reported in which the diagnosis was made bacteriologically and clinically, but in which no intestinal lesions were found, yet it cannot be proved that no such lesions had existed.

By a series of very early autopsies at different stages of the disease, Mallory showed in 1898 (and his work has since been confirmed by others) that the lesions are due to the action of the diffusible toxin of the typhoid bacillus, which causes a proliferation of the endothelial cells of the lymphoid tissue, lymphatics and blood-vessels of the intestine, of the mesenteric lymph nodes, and of the

liver and spleen, and to some extent of other organs. The cells become phagocytic and include lymphoid cells and red blood corpuscles. They lead to necroses in the intestine, mesenteric lymph nodes, liver and spleen, and occasionally other organs, by blocking up the blood-vessels and capillaries.

Necrosis and Sloughing.—The hyperplasia of the lymph cells having reached a certain degree, resolution is impeded, the vessels become choked, an anæmic necrosis or venous thrombosis is induced, a slough forms, which must be separated and thrown off. This process may be superficial, affecting only the mucous tissue or even only a part of this; or it may be, and usually is, deeper, extending to and involving the submucosa. It is always more intense toward the ileo-cæcal valve. The solitary glands may be capped with small sloughs. They have a yellowish-brown color from the bile pigments. The depth to which the necrosis extends depends on the intensity of the lymphoid infiltration; it may be deep in the muscular coat, and even reach the serosa, when perforation becomes imminent. The retrograde process advances more rapidly in the follicles than in the interfollicular tissue, and pigment is deposited in the depressions thus formed.

Ulceration.—The separation of the sloughs is gradually effected from the edges inward, and entails among other



Fig. 4809.—Peyer's Patch and Solitary Lymph Nodules just below Ileo-cæcal Valve. Appendix is curled around the lower end. Shows same condition as Fig. 4808. (From Mallory.)

dangers of opening blood-vessels and perforation of the coats of the bowel. The size of the ulcer is directly proportionate to the depth and extent of the necrosis. The entire thickness of the mucosa may not be affected, and small, shallow losses of substance may frequently be seen in swollen patches. Generally the slough, in sepa-

rating, exposes the submucosa and muscular coat, particularly the latter, which forms the floor of a large majority of typhoid ulcers. It is unusual for an entire

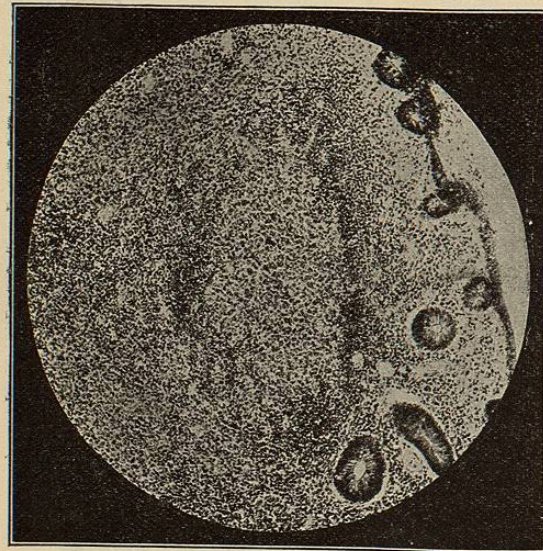


FIG. 4810.—Lymph Nodule in a Peyer's Patch showing the Presence of great Numbers of Phagocytic Cells which have replaced nearly all of the Lymphoid Cells. (From Mallory.)

patch to slough out, and the perfectly ovoid ulcer opposite the mesenteric attachment is rare. More commonly the sloughing commences in different portions of a patch, and small irregular losses of substance result, which may gradually extend and thus form one large ulcer. A large patch may present three or four ulcers divided by septa of mucous membrane. Very often the terminal six or eight inches of the ileum is one large

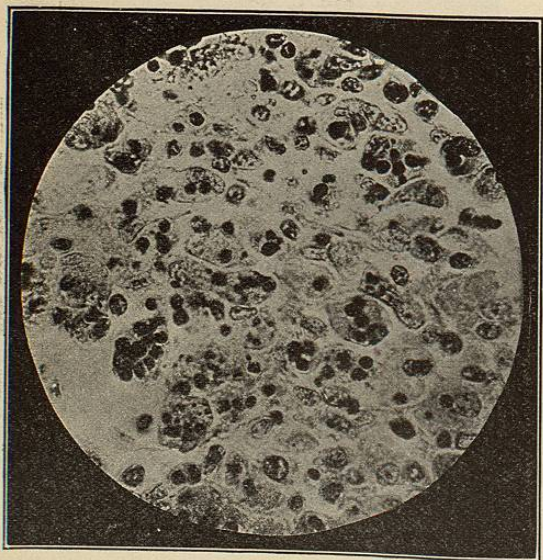


FIG. 4811.—High Power from Fig. 4810 showing Formation of Phagocytic Cells in the Lymph Nodules in a Peyer's Patch. (From Mallory.)

ulcer, with islets of mucosa left here and there. Those originating from the patches naturally affect an oval form, with the long diameter in the direction of the gut, and those originating in the solitary glands affect a

spherical form. In rare cases the ulceration may extend slightly beyond the confines of the glands. The sloughing or disintegration of the new tissue being completed, there is no induration or thickening of the base or edges of the ulcer. The base of a typhoid ulcer is smooth and clean, and is usually formed of the submucous or muscular coat of the intestine—occasionally of the peritoneum alone. The edges are thin and undermined, and consist of a well-defined fringe of congested mucous membrane, as may be seen by floating the gut in water.

Healing, or cicatrization, is the fourth stage. The majority of deaths occur before this stage is reached. The process begins with the development of thin granulation tissue, which covers the base of the ulcer and gives it a soft, shining appearance. The undermined edges approximate to, and unite with, the floor of the ulcer,

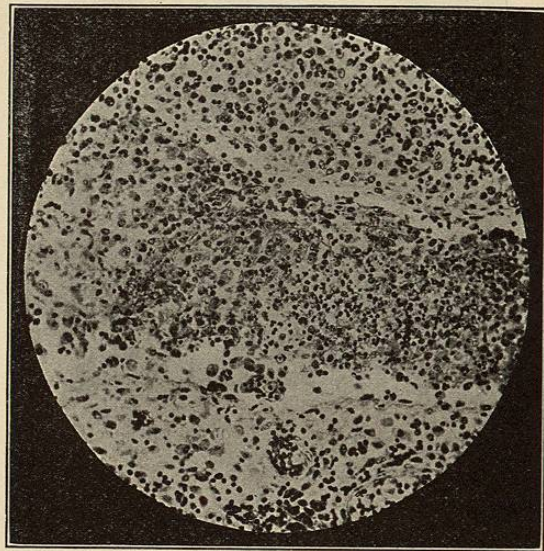


FIG. 4812.—High Power from Fig. 4810 showing Formation of Phagocytic Cells in the Lymph Nodules in a Peyer's Patch. (From Mallory.)

and from its margin new epithelial covering is gradually formed. The gland structure is not regenerated. The site of a healed ulcer is slightly depressed, is less vascular than the surrounding mucous membrane, and is pigmented.

In some cases, especially of relapse, the floor of the ulcer becomes the seat of a secondary ulceration; or occasionally an ulcer heals in one part and extends in another; and again, there may be ulcers healing in one part of the intestine, with fresh ulcers and patches in a state of hyperplasia elsewhere.

The secondary ulceration is said to be more apt to cause profuse hemorrhage and perforation than the primary sloughing of the glands.

The Mesenteric Glands.—The changes in these glands are comparable with those in Peyer's patches. The distribution of those affected usually bears a relation to the involved part of the intestine, but is more extensive. The process is also

similar and practically synchronous with that in the intestine. These glands likewise are the seat of an acute hyperplasia, which usually undergoes a gradual process of resolution. Softening and suppuration may exceptionally occur, or, the capsule of the gland being de-

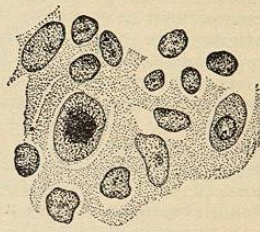


FIG. 4813.—From Periphery of Lymph Nodule, showing a Large Cell of the Reticulum in Mitosis. (After Mallory.)

stroyed, the softened matters may escape into the peritoneal cavity, causing peritonitis.

Liver and Gall Bladder.—The constant changes (focal necroses) always occurring in the liver in typhoid are of no practical value. Rarely, however, abscess of the liver may occur, and more often a cholecystitis or cholelithiasis may be due to this infection, for which surgical interference may be required. Typhoid bacilli have very often been found in the gall-bladder (Chiari found them in twenty-two out of twenty-four cases), and they are known to persist there for a very long time, seven years in one

case. They are supposed frequently to form the nucleus of calculi.

Spleen.—Changes in the spleen are comparable to those of a Peyer's patch. Except in cases with previous disease of the organ, or in elderly persons, or in cases with much distention, the spleen is generally sufficiently enlarged to be felt. The enlargement is due to hyperemia and hyperplasia. In the second week it is smooth and tense, dark-red on section. In the third week it is larger, softer, and darker. With defervescence these changes subside and the organ becomes of tough consistence. Infarcts and abscesses very rarely occur. Perisplenitis is rather more common.

Urinary Organs.—The kidneys are almost always enlarged in the second week and hyperemic on section. Febrile albuminuria is the rule. Following this is parenchymatous degeneration. Infarcts and abscess of the kidney with typhoid bacilli in pure culture have occurred. Cystitis may occur, but there may be large numbers of bacilli in the urine without causing symptoms; 170,000,000 per cubic centimetre have been estimated by Petruschky, which indicates the importance of disinfection of urine as well as other discharges.

TREATMENT.—Treatment properly includes the whole management of the patient. In those not uncommon cases in which the evening temperature does not rise above 102° F., nor the pulse advance beyond 110, and there are no complications, the actual "treatment" may not go beyond rest in bed and a modified diet.

A patient being fairly suspected of typhoid fever should be ordered to bed. The physician should immediately inform himself, when practicable, of the condition of the house drainage and water supply. The origin of the disease should, if possible, be discovered and corrected. The ventilation and regulation of the temperature of the sick-room should be secured. Car-

pets, curtains, window hangings, and unnecessary furniture, it is well to remove. The bed is best in the middle of the room, certainly not in the corner; a second bed or movable couch is very desirable. The mattress should be neither very soft nor very hard—hair is the best material, and upon it a rubber cloth should be placed. The bed covering should be light; fever patients are apt to be too warmly and weightily covered. The patient's pulse and temperature should be taken at least twice a day, say between 6 and 8 A.M. and between 6 and 8 P.M. and recorded on a chart; if they can be taken oftener, so much the more accurate picture is given of the course of the disease. A three-hour chart is always instructive, and sometimes most desirable. The temperature in the axilla is sufficiently accurate for practical purposes in this disease, if proper precautions—such as wiping out the axilla and keeping the arm close to the side—are observed.

During the first week of typhoid fever many patients undoubtedly get out of bed to evacuate the bowels, and it is very seldom that any ill result can be traced to this; it is, however, safer and in the end more convenient to insist upon the use of the bedpan from the first, although to some its use is very uncomfortable, and regard should be had to the form most convenient to the individual. The dejecta should be persistently and unfailingly disinfected; too much stress cannot be laid upon this point. They should be passed into a disinfectant solution, another portion of which should be added after their passage, and the whole thoroughly mixed. The same injunction applies to the urine, and in less measure to the sputum. These points will be referred to again under the head of Disinfectants.

Soiled bedding, clothing, linen, etc., should be placed in a disinfecting solution before being taken from the sick-room, and when taken thence placed, as soon as possible, in boiling water. It is desirable, even when there is no hyperpyrexia, that the patient be sponged morning and evening. Water at any desired temperature, with or without the addition of vinegar, alcohol, bay rum, toilet vinegar, etc., may be used. When the fever is pronounced, the water should be cool, about 75° F., and the sponging repeated more frequently. The process is best carried out

by placing an old blanket under the patient and going over different portions of the body successively.

DIET.—These details attended to, the regulation of the diet is of prime moment. The general principles to follow are that it be easy of administration; that it be suitable in amount; given at proper intervals; easily digested; uniritating in its passage through the alimentary



FIG. 4814.—From near the Periphery of Lymph Nodule, showing Newly Formed Cells Beginning to Incorporate the Lymphoid Cells. (From Mallory.)

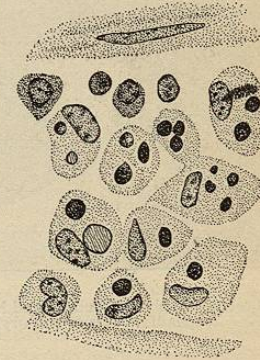


FIG. 4816.—Lymphatic Vessels of Mucous Membrane containing Phagocytic, Lymphoid, and Plasma Cells. (From Mallory.)

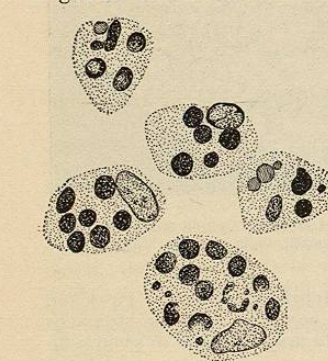


FIG. 4815.—From Centre of Lymph Nodule, showing the Newly Formed Cells Filled with More or Less Digested Lymphoid Cells. Several red blood globules have also been incorporated. (From Mallory.)

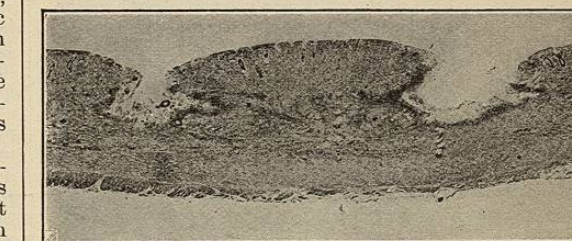


FIG. 4817.—Two Ulcers in Large Intestine Following Typhoid Lesions of Solitary Lymph Nodules. (From Mallory.)

canal. Good pure milk may be made to meet these requirements better than any other one thing. The individual as well as the disease is to be considered; but, in general, from two to four ounces of milk every two to



FIG. 4818.—Typhoid Swelling and Necrosis of Appendix. (From Mallory.)

nourishment is to be insisted on through the early weeks. When milk in small quantities disagrees, lime water, aerated waters, or boiling may be resorted to as diluents. A few patients cannot, or will not take milk in any form. And even for those who can, for whom it is the staple, a variety is needed. Albumen water, prepared by straining the whites of eggs and adding an equal quantity of water, with proper flavoring, is a good

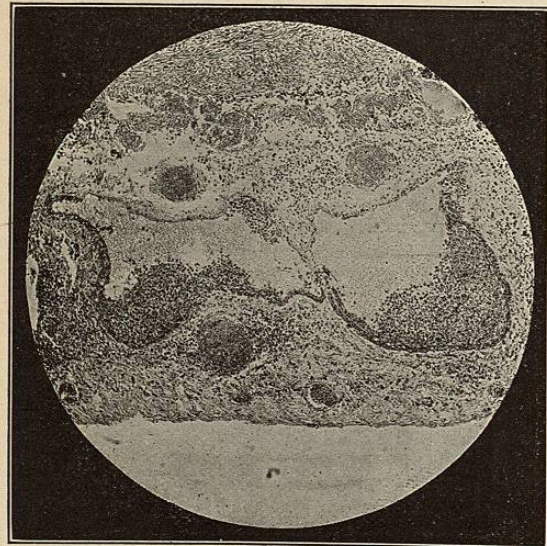


FIG. 4819.—Two Lymphatics Beneath Peritoneum, Over Appendix; Filled Partly with Phagocytic Cells, Partly with Serum. (From Mallory.)

substitute at times. Broths of beef, of veal, of chicken, or of mutton, given twice a day, in addition to milk, four to six ounces each time, or oftener and in somewhat smaller quantities without milk, are useful, and often agreeable. Barley or rice may be boiled in the water, and

the whole should be well strained. An egg, if really fresh, may be dropped in and stirred up. Beef juice, if not increasing the activity of the bowels, may be given with advantage; the stimulation thus provided is very useful, and nourishment may be secured in other ways. For increasing the digestibility of milk, broths, beef teas, etc., the peptonizing process may be resorted to. Chocolate boiled in milk or water, if finely ground and not highly flavored, and cacao deprived of fat and treated in the same way will sometimes prove useful and acceptable adjuncts to other diet. The Germans give fruit soups, made by boiling fresh or dried fruits in water, flavoring with sugar, lemon peel, etc., and straining; these are refreshing, but have little nourishment. Wine whey made with sherry or Madeira, milk punch made with brandy or rum, eggnog, Bordeaux if really good, may be given in addition to the above articles if required. There are now to be had a great variety of non-irritating starchy foods or cereals which, properly prepared, may be useful. Koumyss and matzoon should be mentioned. A few of the forms of nourishment most suited to the early weeks of typhoid fever have been suggested, the practical experience of each practitioner will doubtless suggest others. A state of solution, requiring only absorption and not digestion, would be the ideal one for the admin-

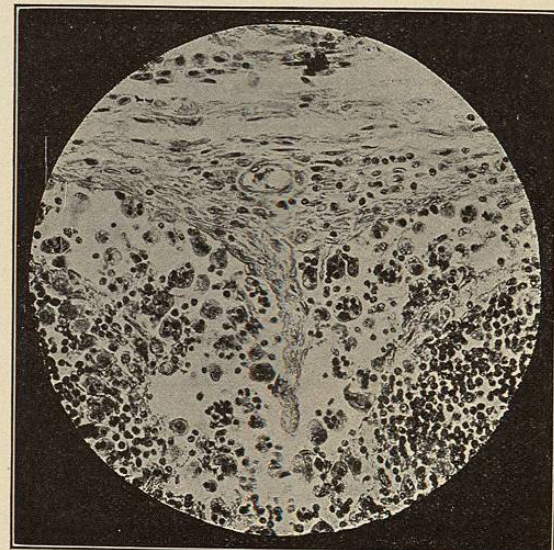


FIG. 4820.—Peripheral Sinus of Mesenteric Lymph Node Distended and Containing many Phagocytic Cells. (From Mallory.)

istration of nourishment in febrile dyspepsia. Pavy and Hoppe-Seyler have shown, however, that the stomachs of animals in a pyretic state may be made to yield a digestive fluid.

Diet in Convalescence.—When the temperature falls to normal, and convalescence begins, the vexed question of increasing the diet arises. Patients do, unknown to their doctors, eat solid food all through an attack of typhoid fever with impunity. Still more often, and this sometimes with the doctor's consent, they begin to eat freely with the return of appetite and the fall of evening temperature to the normal, and this without evil consequences. I think, however, that the old rule—if one must have a rule—to wait a week after the evening temperature remains at normal before increasing a diet as liberal as that outlined above either in amount or consistence, otherwise than very gradually and tentatively, is a good one, and that he who follows it in his practice will, in the long run, have fewer relapses and shorter and better recoveries. Eggs—raw, soft-boiled, or dropped—oyster soup with a finely crumbed cracker, porridges of various consistencies, meat juice, scraped beef, soft

dipped toast, etc., may gradually be added or increased in amount, while the digestive and absorptive organs are recovering their normal activity and chemistry. Care should be taken well on into convalescence that the food, of whatever description, be taken in moderate but frequent portions.

A somewhat more generous dietetic treatment than that suggested above is allowed by some practitioners. Dr. F. C. Shattuck finds that his experience at the Massachusetts Hospital, compared with that of his colleagues, favors such a practice. Peabody, of New York, is also an advocate of more solid nourishment.

Drinks.—A fever patient should have a liberal supply of pure cold water. He is not likely to take more than he requires. All the conditions present indicate its necessity. Pieces of cracked ice, kept in a flannel crater over the top of a bowl, and covered with flannel, at the bedside, will be very grateful to the dry mouth if given occasionally. The unmedicinal, not too strongly aerated, waters are at times refreshing. Some practitioners rely a good deal upon the administration of some one of the mineral acids—dilute hydrochloric, sulphuric, or phosphoric. Water acidulated with one of these in the proportion of a drachm to the pint makes an acceptable drink. It is important to keep the mouth as clean and moist as possible, for which purpose the alkaline waters, glycerin and water, or lemon, the same with a little borax added, may be employed.

Bowels.—It is not often that interference with the bowels is required. If the diarrhoea is exaggerated, the stools being both copious and frequent—more than four or five in the twenty-four hours—after the diet has been regulated, it may be thought best to give a suppository of a grain of opium, a rectal injection of laudanum in starch or water, or some bismuth by the mouth. On the other hand, constipation may be present in such degree as to increase the dullness and pain in the head. At such times a rectal enema, or even some castor oil or a Rochelle powder, will do great service. But, as said, if the diet is properly regulated one need seldom interfere with the bowels. Some practitioners, especially among the Germans (Wunderlich, Liebermeister, Friedreich), favor the early administration of calomel—before the ninth day—in doses of eight grains, three or four times daily, for one or two days. They maintain that the subsequent diarrhoea is thereby diminished, the course of the disease is rendered lighter, and not rarely aborted, and the mortality rate diminished. Calomel is given to remove the poison from the bowel, as well as to antagonize it. The early use of calomel, which sometimes is undoubtedly attended with apparently favorable results, is a revival of an earlier practice.

Various antiseptics and eliminatives, separately or combined, have been employed in recent years to antagonize the toxic bacteria and their products in the bowel, or to remove them therefrom. To many of the most careful and experienced clinicians these measures do not commend themselves either theoretically or practically.

When tympanites is troublesome, turpentine stupes or ten drops of the oil in emulsion at intervals internally, guaiacol carbonate, five grains, a simple enema, or the careful introduction of the long rectal tube are all, at times, useful.

Fever.—In the treatment of any febrile disease, and especially of typhoid, it is not to be forgotten that a continuous high temperature is more exhausting than an intermittent or remittent temperature which reaches a higher maximum. Moreover, in estimating the bearing of any temperature the frequency and character of the pulse and the condition of the nervous centres should be carefully considered. An evening temperature of 102° F., or even of 103° F., with a morning remission, may be regarded as the normal result of the typhoid process. An evening temperature rising above 103° F., especially if the morning remission be slight, suggests the propriety of interference. The various modes of controlling temperature may be classed under the two heads of (1) the

external application of cold, and (2) the internal exhibition of antipyretics.

1. **Cold** may be applied externally by means of sponge baths, the wet pack, sprinkling the exposed surface of the body, fan baths, tubbing, rubbing with ice, the ice cap to the head.

Baths.—Since the introduction of baths by Brand of Stettin in 1861, their therapeutic value has become thoroughly appreciated. The effect on the mortality has been very noticeable. Before this treatment was in use, the mortality in typhoid fever in hospitals was given variously as from eleven to sixteen—nineteen per cent. (twelve to fifteen per cent., Osler). The mortality now varies with the locality and in different years, but in general is a little over seven per cent. The manner of giving baths varies with the locality and with the practitioner. In the New York, Philadelphia, and Baltimore hospitals tub baths are largely given, whereas in Boston hospitals sponge or fan baths are given and sometimes wet packs are used. Baths are given every three or four hours if the temperature is 102.5° F. or more, and they usually last about twenty minutes. The tub bath is given by immersing the patient carefully, all but his head, into water at about 70° F. Continual rubbing of limbs and trunk is advisable. Patients may collapse during a bath, and a little stimulation just before or after may prevent chilliness and cyanosis. The sponge bath may be given with water at various temperatures to suit the requirements, and may expose the whole of the body or only part at a time. The fan bath is given by covering the patient with one thickness of gauze wrung out of warm water, and which is then fanned to assist evaporation. The gauze is repeatedly sprinkled with warm water, and the amount of water evaporated shows approximately the heat subtracted from the patient. These baths have been proved by experiment to be practically as effectual as tub baths, and they entail much less disturbance of the patient and are generally more agreeable. The kind of bath used may be governed by the effect on an individual case and modified accordingly.

Whatever bath is used—at whatever temperature, whether higher or lower; however prolonged, whether for a longer or shorter time; however general, whether total or partial—the effect to be sought, and which should be obtained, is a lowering of temperature, an improvement of circulation, a toning up of the nervous system, with accompanying restfulness, and often a diminution of delirium, stupor, and tremor, and consequent better sleep and digestion.

The ice cap to the head is generally grateful to the majority of typhoid-fever patients.

2. **THE INTERNAL EXHIBITION OF ANTIPYRETICS.**—Among these remedies may be mentioned quinine, salicylic acid, salicylate of soda, digitalis, alcohol, and the coal-tar derivatives. Of these alcohol, digitalis, quinine, and the coal-tar derivatives alone demand consideration.

Alcohol.—The administration of alcohol is to be governed by the pulse rather than by the temperature; but although its stimulant and sustaining properties are most marked, it may still be conveniently spoken of in this connection. The alcoholic treatment of fevers was introduced more than forty years ago by Dr. Todd, since when it has at times been used in an excessive and indiscriminate way, from which there has been a proper reaction, and the present tendency is to regulate the use while avoiding the abuse of alcohol in typhoid and other fevers. Sir William Jenner gives in a few words good guidance on this point. When in doubt as to the wisdom of giving alcohol, do not give it, and when there is a question of a larger or smaller dose, prescribe, as a rule, the smaller. If given, it should be for the purpose of attaining a certain definite object and for the relief of certain symptoms. Its effects should be carefully watched, and the desired results obtained with the smallest possible dose. Its administration, except as a gentle stimulant in the form of wine, of wine whey, or of milk punch, is rarely indicated before the end of the second