day, which are often profuse and weakening. A little blood and mucus may be passed at first, but they are not specially characteristic elements in the stools.

In all forms of dysentery death usually results from asthenia. The pulse becomes weaker and more rapid, the tongue dry, the face pinched, the skin cool and covered with sweat, and the patient falls into a drowsy, torpid condition. Consciousness may be retained until the last, but in the protracted cases there is a low delirium deepening into collapse.

(*d*) **Chronic Dysentery.**—This usually succeeds an acute attack, though the amœbic form may be subacute from the outset and not present an acute period. Anatomical changes in the large intestine in chronic dysentery are variable. There may be no ulceration, and the entire mucosa presents a rough, irregular puckered appearance, in places slate-gray or blackish in color. The submucosa is thickened and the muscular coats are hypertrophied. There may be cystic degeneration of the glandular elements, as is beautifully figured in Woodward's volume.

Ulcers are usually present, often extensive and deeply pigmented, in places perhaps healing. The submucous and muscular coats are thickened and the calibre of the bowel may be reduced. Stricture, however, is very rare.

The *symptoms* of chronic dysentery are by no means definite, and it is not always possible to separate the cases from those of chronic diarrhœa. Many of the characteristic symptoms of the acute disease are absent. Tenesmus and severe griping pains rarely occur except in acute exacerbations. The character of the stools varies very much. Blood and necrotic shreddy tissue are not often found. Mucus is passed in variable amounts. On a mixed diet the fæces are thin, often frothy, and contain particles of food. The motions vary from four or five to twelve or more in the twenty-four hours. There are cases in which marked constipation alternates with attacks of diarrhœa, and scybala may be passed with much mucus. In many cases the fæces have a semi-fluid consistency, and a yellowish or brown color depending on the amount of bile. Fragments of undigested food may be found, and the discharges have the character of what is termed a lienteric diarrhœa. Indeed, variations in the bile and in the food give at once corresponding variations in the character of the stools. In chronic dysentery recurrences are common in which blood and mucus again appear in the stools, accompanied perhaps by pus. Flatulence is in some cases distressing, and there is always more or less tenderness along the course of the colon. The appetite is capricious, the digestion disordered, and unless the patient is on a strictly regulated diet the number of stools is greatly increased. The tongue is not often furred; it is more commonly red, glazed, and beefy, and becomes dry and cracked toward the end in protracted cases. There is always anæmia and the emaciation may be extreme; with the exception of gastric cancer, we rarely see such ghastly faces as in patients with prolonged dysentery.

The complications are those already referred to in the acute form. The greater debility renders the patient more liable to the intercurrent affections, such as pneumonia and tuberculosis. Ulceration of the cornea was frequently noted during the civil war.

Complications and Sequelæ.—A local peritonitis may arise by extension, or a diffuse inflammation may follow perforation, which is usually fatal. When this occurs about the cæcal region, perityphlitis results; when low down in the rectum, periproctitis. In one hundred and eight autopsies collected by Woodward perforation occurred in eleven. By far the most serious complication is abscess of the liver, which occurs frequently in the tropics and is not very uncommon in this country. It was not, however, a frequent complication in dysentery during the civil war. In this latitude it is certainly not uncommon, as we have had five cases, within two years, in the Johns Hopkins Hospital. It usually comes on insidiously. The symptoms will be discussed in connection with hepatic abscess.

It is stated that malaria is a complication, but with one exception the cases which I have seen with intermittent pyrexia were invariably associated with suppuration. In extensive epidemics, however, Woodward states that cases of ordinary dysentery occur associated with all the phenomena of malaria. With reference to typhoid fever, as a complication, this author mentions that the combination was exceedingly frequent during the civil war, and characteristic lesions of both diseases coexisted. In civil practice it must be extremely rare

Sydenham noted that dysentery was sometimes associated with rheumatic pains, and in certain epidemics joint swellings have been especially prevalent. They are probably not of the nature of true rheumatism, but are rather analogous to gonorrhœal arthritis. In severe, protracted cases there may be pleurisy, pericarditis, endocarditis, and occasionally pyæmic manifestations, among which may be mentioned pylephlebitis. Chronic Bright's disease is also an occasional sequel. In protracted cases there may be an anæmic œdema. An interesting sequel of dysentery is paralysis. Woodward reports eight cases. Weir Mitchell mentions it as not uncommon, occurring chiefly in the form of paraplegia. As in other acute fevers, this is due to a neuritis.* Intestinal stricture is a rare sequence—so rare that no case was reported at the Surgeon-General's office during the war. Among the sequelæ of chronic dysentery, in persons who have recovered a certain measure of health, may be mentioned persistent dyspepsia and irritability of the bowels.

Diagnosis.—The recognition of the acute follicular form is easy; the frequency of the passages, the presence of blood and mucus, and the tenesmus forming a very characteristic picture. Local affections of the rectum, particularly syphilis and epithelioma, may produce tenesmus with

* Pugibet, Revue de Médecine, February, 1888.

the passage of mucoid and bloody stools. The acute diphtheritic form, coming on with great intensity and with severe constitutional disturbances, is not infrequently mistaken for typhoid fever, to which indeed in many cases the resemblance is extremely close. The higher grade of fever, the more pronounced intestinal symptoms, the presence, particularly in the early stage, of a small amount of blood in the stools, the absence of enlargement of the spleen and the rose rash should lead to a correct diagnosis. In the amœbic form the diagnosis can readily be made by examination of the stools. A characteristic feature of these cases is their irregular, chronic course. A patient may be about and in fairly good condition, with well-formed stools and very slight intestinal disturbance, in whose fæces the amœbæ may still be discovered, and in whom the disease is at any time likely to recur with intensity. In some cases, complicated by abscess of the liver and lung discharging through a bronchus, the diagnosis may rest on the detection of amœbæ in the sputa, when they cannot be found in the stools owing to the latency of the intestinal disturbance. Three such cases occurred in my wards in 1890.*

Treatment.—Flint has shown that sporadic dysentery is, in its slighter grades at least, a self-limited disease, which runs its course in eight or nine days. Reading a report of his cases, one is struck, however, with their comparative mildness.

The enormous surface involved, amounting to many square feet, the constant presence of irritating particles of food, and the impossibility of getting absolute rest, are conditions which render the treatment of dysentery peculiarly difficult. Moreover, in the severer cases, when necrosis of the mucosa has occurred, ulceration necessarily follows, and cannot in any way be obviated. When a case is seen early, particularly if there has been constipation, a saline purge should be given. The free watery evacuations produced by a dose of salts cleanse the large bowel with the least possible irritation, and if necessary, in the course of the disease, particularly if scybala are present, the dose may be repeated. Purgatives are, as a rule, objectionable, and the profession has largely given up their use. Of medicines given by the mouth which are supposed to have a direct effect upon the disease, ipecacuanha still maintains its reputation in the tropics. It did not, however, prove satisfactory during the civil war; nor can I say that in cases of sporadic dysentery I have ever seen the marked effect described by the Anglo-Indian surgeons. The usual method of administration is to give a preliminary dose of opium, in the form of laudanum or morphia, and half an hour after from twenty to sixty grains of ipecacuanha. If rejected by vomiting, the dose is repeated in a few hours.

Minute doses of corrosive sublimate, one hundredth of a grain every two hours, are warmly recommended by Ringer. Large doses of bismuth, half a drachm to a drachm every two hours, so that the patient may take

* For details see monograph of Councilman and Lafleur.

from twelve to fifteen drachms in a day, have in many cases had a beneficial effect. To do good it must be given in large doses, as recommended by Monneret, who gave as high as seventy grammes a day. It certainly is more useful in the chronic than the acute cases. It is best given alone. Opium is an invaluable remedy for the relief of the pain and to quiet the peristalsis. It should be given as morphia, hypodermically, according to the needs of the case.

The treatment of dysentery by topical applications is by far the most rational plan. A serious obstacle, however, in the acute cases, is the extreme irritability of the rectum and the tenesmus which follows any attempt to irrigate the colon. A preliminary cocaine suppository or the injection of a small quantity of the four-per-cent solution will sometimes relieve this, and then with a long tube the solution can be allowed to flow in slowly. The patient should be in the dorsal position with a pillow under the hips, so as to get the effect of gravitation. Water at the temperature of 100° is very soothing, but the irritability of the bowel is such that large quantities can rarely be retained for any time. When the acute symptoms subside, the injections are better borne. Various astringents may be used—alum, acetate of lead, sulphate of zinc and copper, and nitrate of silver. Of these remedies the nitrate of silver is the best, though I think not in very acute cases. In the chronic form it is perhaps the most satisfactory method of treatment which we have. It is useless to give it in the small injections of two or three ounces with one to two grains of the salt to the ounce. It must be a large irrigating injection, which will reach all parts of the colon. This plan was introduced by Hare, of Edinburgh, and is highly recommended by Stephen Mackenzie and H. C. Wood. The solution must be fairly strong, twenty to thirty grains to the pint, and if possible from three to six pints of fluid must be injected. To begin with it is well to use not more than a drachm to the two pints or two and a half pints, and to let the warm fluid run in slowly through a tube passed far into the bowel. It is at times intensely painful and is rejected at once. In the cases of amœbic dysentery we have been using at the Johns Hopkins Hospital with great benefit warm injections of quinine in strength of 1 to 5,000, 1 to 2,500, and 1 to 1,000. The amœbæ are rapidly destroyed by it. These large injections are not without a certain degree of danger. Brayton Ball reports the case of a child in whom general peritonitis followed the injections. I have never seen any ill effects, even with the very large amounts. When there is not much tenesmus, a small injection of thin starch with half a drachm to a drachm of laudanum gives great relief, but for the tormina and tenesmus, the two most distressing symptoms, a hypodermic of morphia is the only satisfactory remedy. Local applications to the abdomen, in the form of light poultices or turpentine stupes, are very grateful.

The diet in acute cases must be restricted to milk, whey, and broths,

and during convalescence the greatest care must be taken to provide only the most digestible articles of food. In chronic dysentery, diet is perhaps the most important element in the treatment. The number of stools can frequently be reduced from ten or twelve in the day to two or three, by placing the patient in bed and restricting the diet. Many cases do well on milk alone, but the stools should be carefully watched and the amount limited to that which can be digested. If curds appear, or if much oily matter is seen on microscopical examination, it is best to reduce the amount of milk and to supplement it with beef-juice or, better still, egg-albumen. The large doses of bismuth seem specially suitable in the chronic cases, and the injections of nitrate of silver, in the way already mentioned, should always be given a trial.

XXI. MALARIAL FEVER.

Definition.—An infectious disease characterized by: (*a*) paroxysms of intermittent fever of quotidian, tertian, or quartan type; (*b*) a continued fever with marked remissions; (*c*) certain pernicious, rapidly fatal forms; and (*d*) a chronic cachexia, with anæmia and an enlarged spleen.

With the disease are invariably associated the hæmatozoa described by Laveran.

Etiology.—(1) **Geographical Distribution.**—In Europe, southern Russia and certain parts of Italy are now the chief seats of the disease. It is not widely prevalent in Germany, France, or England, and the foci of epidemics are becoming yearly more restricted. In America it is now rare on the Atlantic coast above the latitude of Philadelphia. From New England, where it once prevailed extensively, it has gradually disappeared, but there has of late years been a slight return in some places. In the city of New York genuine malaria is rare except as an imported disease. In Philadelphia and along the valleys of the Delaware and Schuylkill Rivers, formerly hot-beds of malaria, the disease has become much restricted. Except in the low-lying southern portions of the city it rarely develops, and the majority of cases admitted into hospital are of the poorer class, who have returned from picking cranberries and peaches in Delaware and New Jersey. In Baltimore a few cases develop in the autumn, but a majority of the patients seeking relief are from the outlying districts and one or two of the inlets of Chesapeake Bay. Though prevalent in certain regions on this bay, the disease is yearly becoming less widespread and less severe. In the Southern States there are on the seaboard many isolated regions in which malaria prevails; but here, too, there has everywhere been a marked diminution in the prevalence and intensity of the disease. W. W. Johnston states that in the Gulf district there are places in which the disease is increasing. The percentage of cases admitted to the Marine Hospital Service in 1876 was 18·4, and 23·4 in 1887.

But this may be due to the development of the shipping trade and to the greater number of sailors who carry the infection from the West Indian ports, and those of Mexico and Central America.

In the interior of Louisiana, Mississippi, Arkansas, and Texas malaria is endemic, and the severe types are not infrequent. At irregular periods epidemics of the most severe forms occur.

In the Western and Northwestern States malaria is almost unknown. It is rare on the Pacific coast. In the region of the Great Lakes malaria prevails only in the Lake Erie and Lake St. Clair regions. It has practically disappeared from Lake Ontario, whereas in the upper Huron and Lake Superior basins it is unknown. The St. Lawrence River region remains free from the disease. In Montreal a patient with malaria is invariably questioned as to his latest residence.

(2) **Telluric Conditions.**—The importance of the state of the soil in the etiology of malaria is universally recognized. It is seen particularly in low, marshy regions which have an abundant vegetable growth. Estuaries, badly drained, low-lying districts, the course of old river-beds, tracts of land which are rich in vegetable matter, and particularly districts such as the Roman Campagna, which have been allowed to fall out of cultivation, are favorite localities for the development of the malarial poison. These conditions are most frequently found, of course, in tropical and subtropical regions, but nothing can be truer than the fact that reeking marshes of the most pestilent appearance may be entirely devoid of the poison, and the disappearance of the disease from a locality is not necessarily associated with any material improvement in the condition of the marshes or of the soil. Thus, in New England and in parts of western Canada, in which malaria formerly was very prevalent, the increased salubrity is usually attributed to the clearing of the forests and the better drainage of the ground; but these improvements alone can scarcely explain the disappearance, since in many districts there are marshy tracts and low-lying lands in every respect like those in which, even at the same latitude, the disease still prevails. Compare, for example, a swampy tract on the northern shore of Lake Erie and a similar tract on the southern shore of Lake Ontario; the flora and fauna of the two districts are practically identical, but in the former the conditions under which the malarial virus develops still exist, whereas in the latter they have gradually disappeared. In short, it is impossible to ascertain from the nature of the soil and climate in any given place whether it is malarial or not. In the absence of accurate knowledge as to the habitat of the hæmatozoa, the only means of deciding this point is by noticing the effect of residence in such a place on the human subject, preferably one of the Caucasian race.

(3) **Season.**—Even in the tropics, where malaria constantly prevails, there are minimal and maximal periods; the former corresponding to the summer and winter, the latter to the spring and autumn months. In temperate regions, like the central Atlantic States, there are only a few