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# CEREBRO-SPINAL MENINGITIS.

## THE BOYLSTON PRIZE ESSAY FOR 1866.

By SAMUEL G. WEBBER, M.D.

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By an order adopted in 1826, the Secretary of the Boylston Medical Committee was directed to publish annually the following votes:—

1st. That this Board do not consider themselves as approving the doctrines contained in any of the dissertations to which premiums may be adjudged.

2d. That in case of publication of a successful dissertation, the author is to be considered as bound to print the above vote in connection therewith.

# CEREBRO-SPINAL MENINGITIS.

## CHAPTER I.

On several occasions an epidemic has prevailed, which, by its fearfully rapid and excessive mortality, has given rise to great terror in the community. Popularly known as spotted fever, its more classic name is cerebro-spinal meningitis. It has also been known by the names "typhus syncopalis," "winter epidemic," "catarrhal fever," "peripneumonia notha," &c.

The symptoms of the disease will be considered first, as exhibited in 164 cases during the last few years, together with its pathology and the most successful mode of treatment. Afterwards, it will be well to review the histories of similar epidemics in the past; the methods of treatment which have been advocated; and from these records discover, if possible, the causes of the disease and its nature.

### SECTION I.

#### Symptoms.

At the very commencement, a difficulty is encountered—the disorders of sensation or function caused by the disease are so various that it is impossible to include them all in a single description.

"To describe a disease, so as to be readily recognized by one who has had some acquaintance with it, may easily be done; but so to exhibit or paint a disease, attended with multifarious symptoms, that it may be immediately apprehended by one, upon his first observance of it, is more difficult, especially when it appears, in different cases, in a variety of forms."*

* Dr. E. North on Spotted Fever.

Three varieties of the disease may be recognized—1, where the nervous centres are the principal seat of its action; 2, where its force falls upon the lungs; 3, other cases, involving especially the blood and the integuments, with no marked change in the internal organs.

The first variety has been most prevalent during the late epidemic in this country, cases of the other varieties having been comparatively rare. Its symptoms will therefore be considered first, and subsequently the differences between it and the other varieties will be noticed.

I.—In the first variety, that, namely, in which the nervous centres are most seriously implicated, the attack sometimes commences with the usual precursory symptoms of fever; more frequently, however, the attack is sudden and unexpected; the patient continues his ordinary occupation until interrupted by severe headache, pain in the limbs, the back of the neck or along the spine; or the first symptom of disease may be nausea and vomiting, or a sense of chilliness. Following these abnormal sensations come delirium, great restlessness, nausea and vomiting. The pain in the head, back and limbs continues; fever sets in; the appetite is lost; the thirst is increased; the surface of the body becomes hot, or it may be warm and moist; in some cases it is cold to the touch, and a sense of chilliness is experienced by the sufferer, or the face only is hot and flushed; the conjunctivæ are injected; the pupils are more frequently dilated than contracted, and insensible to light. Sometimes, especially in severe cases, spasms occur on the first day, and stiffness of the muscles of the neck, with retraction of the head. Coma and general collapse are very rare so early in the disease, except in grave cases. Occasionally, petechiæ appear the first day on the body and limbs, not commonly on the face. At the commencement the pulse is often normal, or only slightly increased in frequency; in many instances, however, it is more rapid than in health, and full, though wanting in strength; occasionally thin and hard, or weak and feeble. The respiration is not materially altered. The tongue is but little changed from its natural condition; sometimes it has a white fur and is rather dry. In very severe cases, it may be covered with a brownish fur even on the first day. Not unfrequently the throat is sore, and on inspection is found more or less inflamed; the tonsils may be swollen.

As the disease continues, the symptoms referable to the nervous

system become more severe. Headache and pains in the back of the neck, along the spine and in the limbs, if not previously experienced are now felt; and where slight at first may become excessively severe, eliciting cries of agony even from the strong and robust. The surface of the body, especially at the neck and back, becomes tender, so as not to endure pressure. Delirium is a more constant symptom, usually of a talkative or muttering variety rather than wild, though sometimes the patient will struggle to rise from his bed. In place of the delirium, or succeeding it, occur stupor and coma, the patient falling into a heavy lethargy, from which he can be aroused only with difficulty, and which becomes deeper and deeper till it ends in death. Among other less frequent nervous symptoms are paralysis of some of the limbs, jactitation, subsultus tendinum, floccitation, sleeplessness, moaning and a general trembling, similar to that of mania à potu.

The surface of the body remains hot, or is sometimes cool; it is not very often dry. The pupils continue dilated, are sometimes contracted, or unequal, and insensible to light; rarely there is strabismus. Spasms and opisthotonos continue, or occur where they did not previously exist. Generally, there is nothing noticeable in regard to the decubitus. Petechiæ appear in the course of from two to six or seven days. The pulse is variable, usually more rapid than in health; as death approaches it becomes slower, though at times its rapidity and force are retained until very near the last minutes of life. With the progress of the disease the tongue becomes darker colored and drier, and, with the teeth and lips, is covered with sordes, or it remains white and dry; sometimes it continues moist throughout the attack. Vomiting and nausea occur, but not so frequently as at the commencement. There is usually constipation, passages being obtained only by means of medicines; occasionally diarrhœa exists, which can be easily controlled. The urine is frequently loaded with lithates, and is sometimes secreted in only a small quantity. Cases have been recorded where albumen occurred. Both fæces and urine are often passed involuntarily, when the condition is very low.

These symptoms are probably never all found together in any one case. In very severe cases time is allowed for only a few of them to become developed. The first shock of the attack may be sufficient to destroy life, and only intense headache will be noticed, followed quickly by delirium and coma. The following cases illustrate the rapidity with which the disease may terminate.

Case I.*—"A. B., æt. 19, of good habits and vigorous health, complained in the night of severe pain in the head, and was at daylight found groaning, with his hands pressed upon his abdomen, as if suffering from colic. I saw him immediately; found him groaning, though insensible; paralyzed in one arm and leg; occasionally convulsed in every part except the face; pupils equally and moderately dilated and insensible to light; conjunctivæ of a dull red hue; face darkly flushed; tongue and teeth coated with sordes; pulse frequent and full; breathing stertorous. He continued in the same state, and died in the afternoon."

Case II.†—"When I first saw the patient, he had been sick but two or three hours, and was, at the time referred to, partially unconscious. Would respond, but not readily, to a question asked him; special and general sensation seemed not much impaired; in a few minutes he could not hear. The pupils were now much dilated, and did not respond to a strong light; nasal passages insensible to carbonate of ammonia, and lips and tongue to tincture of capsicum. General sensation seemed, if not gone, much impaired; and spasmodic muscular movements ceased first in the upper, last in the lower extremities, and in both sides simultaneously. Diaphragm apparently ceased to act. A few attempts at purely thoracic respiration were made, and the patient ceased to breathe. The heart, however, continued to act well to this period, and did not cease to act until nearly two minutes after respiration ceased."

Case III.—A case of a lady is reported by Dr. Lamb in the *American Journal of Medical Sciences* for July, 1863. "She took her tea as usual, about 7, P.M. At 8, she complained of acute pain in the head, and giddiness. She was carried up to the bedroom in the arms of her husband. Body warm and extremities cold; pulse irregular and intermittent, threadlike; pupils greatly dilated and vision very indistinct; delirious. She became comatose at 4, A.M., and died at noon, about fourteen hours from the first feeling of indisposition."

Another case is related in the same Journal by Dr. Lidell, which was fatal in about five and one half hours. Here excessive pain between the shoulders, like that caused by "pressing a bar of hot iron into his backbone," was the principal symptom. He had three attacks of this, and died during the last one.

* Recorded by Dr. William Frothingham, in the American Medical Times, April 30, 1864.
† From Transactions of Illinois State Medical Society, 1864.

Some of the symptoms which have been briefly enumerated in the general description, require a more extended and careful notice.

Among the earliest symptoms have been mentioned those which are most frequent; but so varied is this disease in its manifestations that almost any part may become the seat of attack in the first instance. In one case hæmaturia, with pain in the penis, introduced the disease; in another, the symptoms of a severe cold first attracted attention; in another, tetanus; in a number of instances soreness of the throat was early witnessed.

*Pain* is almost a constant attendant upon this disease, though varying in position and severity. Usually it is very severe; sometimes it is slight. So severe is it at times as to occasion syncope; and may not death in the fourth case, just related, have been caused by pain alone? Almost every case is accompanied with headache, which is more frequent in the forehead; but the occiput and vertex are not spared. The back of the neck is a very common locality for pain, and so is the spine. The limbs not unfrequently are attacked with it, and in many cases it is confined to the joints, or most severe in them; in one case, as already stated, pain in the penis was among the first symptoms of the attack. Severe colic may be experienced. The character of the pain is often rheumatic, especially when seated in the joints; at other times it is of a burning, stinging character; it is rarely dull and heavy. Closely connected with this symptom, and, indeed, constituting one variety of it, is the abnormal tenderness of the surface. This is not unusually general, and so exceedingly sensitive does the surface become that the least touch occasions cries of agony, even the bedclothes being insupportable. When local, it is most frequently situated at the back of the neck and along the spine. Sometimes tenderness is observable in the right iliac region, accompanied with tympanites, as in typhoid fever. Tenderness is found also in the epigastrium; it is most frequently experienced late in the disease. There is rarely intermission in the pain—this is particularly the case with the headache; when this symptom has once shown itself, it continues throughout the attack, and even during unconsciousness its existence may be proved by pressure upon the occiput or nucha causing uneasy movements, as if to escape the touch.

*Delirium* is an almost constant symptom, and sets in early, if the attack is at all severe, even on the first day. It is not usually very wild; but is more frequently of a mild character and often so slight

that the patient may be readily aroused sufficiently to answer questions rationally, though as soon as he is left to himself he will relapse into a low moaning or muttering, and perhaps will become quite wild. As the disease continues, the delirium becomes more and more constant, and the difficulty of attracting his attention increases. At length stupor is observed, which may at first be noticed with a feeling of relief by his friends, as they suppose that sleep has brought a remission to his suffering; but after a while it is found that his breathing has changed, or the sleep continues so long that attempts are made to arouse him, and then it is discovered that the sleep is not sleep but coma, which gradually deepens until it is impossible any longer to arouse him, and death occurs.

The senses, especially sight and hearing, are sometimes impaired and not regained until convalescence has been established for many days. The same is true in regard to the use of the limbs.

*Spasms* are usually of the tonic kind. The muscles of the back or neck are most frequently attacked, and thereby the head is bent backwards; the neck and spine may likewise be curved in the same direction, and complete opisthotonos occur. So great is the force by which this position is maintained, that even under the influence of ether or chloroform it is often impossible to straighten the body. Sometimes the position can be rectified, but then respiration may cease until the opisthotonos is allowed to return. Trismus may occur without any other tetanic symptom. Deglutition is not unfrequently difficult, seemingly from insufficiency of the nervous influence; sometimes it is impossible to introduce anything into the stomach, even the thought of swallowing causing spasms, as in hydrophobia. The toes and thumbs, or either of these members alone, may be curved inwards. Opisthotonos is a symptom of the later stages of the disease.

In connection with spasm, may be mentioned the state of restlessness into which the patient usually falls, even upon the first day of the attack. He tosses from side to side of the bed, unable to find rest; he rises and turns over, then returns to his former position, fatiguing himself and his attendants; and even where the weakness is so extreme as to preclude voluntary motion, he will call upon his attendants to turn him, which requires great care, on account of the excessive tenderness. This restlessness is a very constant symptom and a very marked one.

*Petechiæ* are not always present; when present, they vary from

minute spots to blotches an inch or more in diameter, the most usual size being from one to three or four lines. They are of every shade, from light red to livid purple. They are few, or so many as to give rise to a uniform reddish tint, similar to that of scarlet fever. They are usually even with the surface, and when the finger is passed over them cause no sensation of roughness. Occasionally, however, they have been found slightly elevated. They do not disappear under pressure, except sometimes the very lightest colored. They were first observed, in fifteen cases on the first day; in thirteen, on the second day; in four, on the third; in one, on the fourth; in one, on the fifth; in one, on the sixth; in one, on the eighth; in one, on the tenth; and in one, on the eleventh. They occurred most frequently on the limbs and body; on the legs more than on the arms; about as often on the chest as the abdomen; frequently on the face; more rarely on the shoulders, neck and back; in one or two cases there were ecchymoses under the conjunctivæ, similar to petechiæ. Usually, they were round and regular in form, though occasionally irregular, pointed or star-shaped. After their first appearance, they sometimes increase in size with the progress of the disease, and sometimes remain without change until they gradually fade away and disappear. They are mentioned in fifty-two out of one hundred and fifty cases where particulars more or less full are given with regard to the symptoms.

Another eruption, herpes labialis, is not unfrequent about the mouth.

Purpuric eruptions and vibices are also met with, though more rarely.

The face or the surface of the body, instead of being covered with petechiæ, may be of a uniform dusky, livid hue.

*The pulse* cannot be employed in the usual way as a guide in deciding in regard to the severity of the attack. In the same case it may vary exceedingly, and in a few hours rise or fall a number of pulsations, as many as forty or fifty. In three or four cases an irregularity is mentioned, which "consisted in a frequency of about two and a half, then falling off to one pulsation in the second, and this alternating from four to six times during" the minute. In the majority of cases the pulse is rapid, over 90. It is usually full, but weak and compressible, almost never is it strong and hard. Occasionally it cannot be distinguished from a healthy pulse; sometimes,

as in the second case related above, the heart continues to act even after respiration has ceased.

*The respiration* is usually hurried, often it is difficult, and towards the fatal termination it becomes stertorous.

The *nausea* and *vomiting* seem to depend on the disease of the encephalon. The vomitus consists of the ingesta, or of bile and mucus.

The *tongue* is very variable in its appearance; it may be moist and natural, but is more frequently dry and more or less coated with a whitish or dark colored fur. In some cases it closely resembles the tongue of typhoid fever.

The *bowels* are usually sluggish, and it is necessary to exhibit cathartics. When obtained the stool is not unfrequently dark colored and very offensive. Sometimes it is almost impossible to obtain a movement, and the patient does not seem to suffer from want of it. When there is diarrhœa at the commencement of the attack it can usually be easily controlled; but when it sets in during the later stages it is more difficult to arrest, and often points to a fatal termination.

Occasionally *swellings* and *abscesses* occur during the course of the disease in various parts of the body, or the swelling continues a few days and then subsides without suppuration. Abscesses also occur during convalescence.

Epistaxis, hæmorrhage from the bowels, and other signs of a hæmorrhagic tendency occurred in four or five cases. In three or four women the catamenia appeared too early by a week or ten days.

In three instances pregnant women were the subjects of the attack; one aborted at about the sixth month, the other two carried their children to full term, though threatened with abortion. Both the children were sickly and died; one in the fourth month of diarrhœa, and the other in the tenth month of "pulmonary catarrh."

Not unfrequently after the disease has continued several days hypostatic congestion of the lungs is developed; sometimes it is attended with cough and the expectoration of bloody sputa.

In one or two cases great weight and oppression in the epigastrium were experienced, seemingly like that described by Dr. Miner in his account of the epidemic of 1825.

One sympton which occurs in almost every case, and which is quite characteristic of the disease, has not yet been mentioned. It is de-

bility, which is excessive, and is found to exist in every variety of the disease.

There is some danger of relapse: imprudence in diet or exposure; any cause which produces much mental agitation, may give rise to this accident; care on all these points is therefore necessary during convalescence.

II.—In the second or pneumonic form there is less disturbance of the cerebral functions; delirium is wanting, though headache may exist. With great debility are found the symptoms, rational and physical, of pneumonia. Petechiæ occur. Opisthotonos is not unusually met with. Only two cases of this form occurred among those recorded; both recovered, both exhibited petechiæ. In one case with the cerebral symptoms pneumonia occurred on the fourteenth or fifteenth day, caused by accidental exposure. In the *Boston Medical and Surgical Journal*, vol. 72, p. 372, is the following in a letter by Dr. J. W. Goodell, upon this disease. "We have had some twenty cases of pneumonia since Jan. 1st, and most of them strongly typhoid; in fact, such a lot of black tongues I have never seen in real typhoid fever." May not these cases have belonged to this second variety?

III.—The third variety is marked by an absence of all the peculiar local symptoms; having the debility, the petechiæ and complications. Two cases occurred, one with suppuration of both parotids, the other with great swelling and excessive tenderness of the right knee; both were without cerebral symptoms; both recovered.

Though these last two varieties have been so seldom observed during late years, they were more frequent during former epidemics, especially the pneumonic form; formerly also sore throat was frequently a symptom of the third variety.

## SECTION II.

### Post-mortem Appearances.

The emaciation is not great; rigor mortis is usually very strong, though sometimes wanting. The petechiæ and other eruptive discolorations seen during life are usually present after death; sometimes they become developed then, though not previously visible; in a few cases the spots disappear during the last hours of life or im-

mediately after. On incising them, they are seen to consist of an infiltration of blood into the cutaneous and cellular tissues, and they vary in color according to the amount of blood effused.

The principal lesions are found in the brain and spinal cord. The morbid changes vary from slight increase of the number of hæmorrhagic points to extensive softening of the brain, with effusion of lymph and pus between the membranes. On removing the calvarium, a congested appearance of the dura mater is seen, and there may be a flow of fluid of a serous or sero-purulent character, probably from beneath the dura mater, though not stated in the account. Sometimes ecchymosis is found under the pericranium. The arachnoid, in some instances, has lost its transparency and become opaque, especially at the vertex. Beneath it may be seen the vessels of the pia mater engorged with blood, that membrane being congested. Between the membranes there is often an effusion of lymph, pus or serous fluid, which may also extend into the ventricles, distending them; lymph occurs more frequently than serum, and is deposited upon the under surface of the cerebrum, cerebellum, pons Varolii and medulla oblongata rather than upon their upper surface, and follows the sulci, nerves and vessels, imbedding them in its substance. Pus is often found in the same situations. The lymph is of a greenish or greenish yellow color, varying in amount from a thin layer to nearly half an inch in thickness, and in consistency from a dense, almost fibrous membrane to a soft, semi-liquid substance. The veins and sinuses of the brain are distended with dark fluid blood. The substance of the brain may be natural in appearance, but it is often congested, the hæmorrhagic points being increased in numbers; it may be softened almost to a pus-like liquid, though such an extensive softening may be partially cadaveric. On cutting into the brain, a serous liquid sometimes exudes in great abundance. The same congested appearance and softening are found in the cerebellum, pons Varolii and medulla oblongata. The choroid plexus has been found thickened, injected and covered with lymph. The most frequent lesions are, effusion of serum, lymph or pus, and a congested condition of the membranes or substance of the brain.

In the spine, a similar condition may exist, the membranes being congested; there being an effusion of serum, lymph or pus, and the substance of the cord being congested or softened. It is to be regretted that the spine has not been more frequently examined in

*post mortems* performed on persons who have died of this disease. So few are the cases recorded, that it would not be safe to enter upon any numerical statement of the comparative frequency with which lesions occur in this part of the nervous system. In twenty-nine instances the brain was examined; in only thirteen was the cord exposed, and in one of these to the extent of only three inches.

In the lungs, the only lesion which is at all general, is a congested state. This congestion is usually in the dependent portion, and is undoubtedly hypostatic, sometimes probably cadaveric. Occasionally, there are hæmorrhagic spots in the substance of the lung, such as have been called apoplectic.

In the pneumonic form, or when pneumonia co-exists with the affection of the brain, there are found the lesions of the lungs usual in that complaint.

When there is sore throat during the course of the disease, marks of inflammation may be found after death.

The heart is occasionally found surrounded by serum or other liquid, contained in the pericardium. Sometimes there is a thick deposit of lymph upon the surface of the pericardium, and sometimes the same substance is found in one of the cavities. The coagula in the heart are often soft.

Upon opening the abdomen a petechial condition of the mesentery or the intestines may be observed occasionally, spots appearing upon the peritoneum similar to those seen in many cases upon the skin.

Among the viscera the liver and spleen are most frequently affected. They are enlarged, congested, or have undergone both these changes. At times they are as large as twice their natural size.

The stomach when not healthy is found to be congested or even softened; this latter change may, however, be cadaveric.

Peyer's patches are sometimes slightly ulcerated, more frequently unduly prominent. The solitary glands are occasionally enlarged.

The kidneys are not unfrequently congested, though no mention has been found of any abnormal appearances under the microscope.

The blood is frequently unnaturally fluid and dark colored; so general was this that it was occasionally considered characteristic of the disease.

Worms are sometimes found in the intestines and stomach, usually the lumbrici, though they probably had no influence on the disease; the fact being interesting because a complication with worms has

existed in some parts of France and was there considered one of the most prominent symptoms.

In some instances, especially where death has followed close upon the attack, no lesion has been found in any part of the body sufficient to produce the fatal result. It must be supposed that then the shock has been sufficient to overpower the vital forces, or the change in the blood has been so great as to extinguish life immediately.

## SECTION III.

### Duration and Mortality.

What data have we for answering the question so often asked, "Doctor, how long shall I be sick?" Tables I. and II., drawn up from the records of 164 cases found in various medical journals, may help to an answer.

If a patient lives beyond the sixth day there is some chance of recovery, less than one-sixth having died after that time; the most fatal period is from the second to the fifth day, more than half dying then. In regard to recovery it is not possible to give so precise information. As will be seen by table II., health may be regained at any period from the third day to the tenth week. Many of the cases mentioned were not reported up to the restoration of full health. Convalescence is usually slow and tedious, and as soon as that was fairly established the record ends. This may perhaps account for the great difference in the length of the cases, some being recorded till health was entirely reëstablished and others only until convalescence.

The state of chronic ill health, or tedious convalescence, to which allusion has been made, and which is frequently found after an attack of cerebro-spinal meningitis, is the only sequela at all common, and postpones the return to health. Continued weakness of some of the limbs and general debility are the most usual symptoms of this condition. Occasionally abscesses occur, but not very often, and the impairment of the senses, which was noticed during the acute stage, may remain for many weeks.

This disease attacks by preference youths and those in good health. The very young, the aged and the feeble are less liable to it. Table III. gives a comparative view of the ages of those who

were attacked. It will be seen that from 15 to 21 is the most exposed age, one-third of the cases having occurred during that period, and only five were attacked who were over forty.

Males were more frequently attacked than females, the former furnishing 114 cases, the latter only 36; sex not mentioned, 14. 67 cases, however, were soldiers or midshipmen in the academy at Newport; deducting these, we have only 47 males, and the disproportion is not so marked, though still noticeable.

The mortality was very great. Out of a total of 249 cases, death occurred in 147, and only 102 recovered. Of the 47 males not in the military service, 27 died; of the females, 18; showing a slightly larger proportion in the number of deaths among males.

## SECTION IV.

### Treatment.

A very important consideration, and one which will especially interest the patient and his friends, relates to the means of cure. Can anything be done to arrest the progress of the disease and restore health to the sufferer, or is it true that "physicians seem not to understand it"? The preponderance of deaths over recoveries would seem to show either that the disease has not been understood, or rather that the remedies have not been; or that it is an unusually obstinate complaint.

The natural tendency seems to be towards death. Treatment to be effectual must be early; in nearly every case where delayed long, death was the result.

It is generally agreed that all debilitating measures should be avoided; general bleeding is rather injurious than otherwise, though in the first and fifth cases recorded by Dr. Robert Burns, of Philadelphia, in the *American Journal of Medical Sciences* for April, 1865, bleeding seemed to be beneficial. In two other cases where this remedy was employed, death occurred. Local bleeding, especially by means of leeches to the back of the neck, or to the temples, and wherever inflammatory action has appeared, is beneficial. Emetics are useful only at the commencement when the stomach is oppressed with ingesta. Violent cathartics are contra-indicated. A supporting and stimulating treatment is demanded. Counterirritation by

means of friction with stimulating liniments, sinapisms, dry cupping and blisters; heat applied externally to the body and lower extremities; cold to the head by means of ice-bags or cloths wrung out in cold water; stimulating enemata; gentle cathartics; quinine; opium to quiet restlessness and procure sleep; stimulants, and nourishment in the shape of milk punch, beef tea, strong broths, &c., have been generally adopted as the best means at our command to control this disease. Quinine and stimulants must be given freely and largely; opium is considered one of the most valuable remedies by many, and apparently with good reason, but it must be given in large doses frequently repeated. It was used thus in France by M. Chauffard with success, as mentioned below. It must, however, be acknowledged that a large proportion die under this treatment.

In addition to these remedies Dr. Upham employed small and frequently repeated doses of calomel, or calomel and ipecac; they were also employed by others. Many cases did well, and about the same number died.

The cases recorded by Dr. Robert Burns, of Philadelphia, include the largest proportion of recoveries, 9 in 12, and it may be interesting to attend to what he says in regard to treatment.

"The treatment pursued was the early abstraction of blood generally or locally, according to circumstances, to relieve the brain and spine. Stimulating frictions to the whole spinal column and extremities. Warmth to the feet, with sinapisms to different parts to cause counterirritation. Blisters sometimes, but seldom necessary. Stimulants. Diaphoretics when feverish. The liver and bowels steadily acted on by mercurial purgatives at night and castor oil next morning, and as soon as the violence of the symptoms abated, quinia freely administered to the amount of eight or ten grains per day for the first three or four days; this, however, to be varied according to circumstances. The nourishment chiefly beef tea or essence, barley gruel, sago and such other articles of a similar kind as best suited the desire or inclination of the patient." It will be seen that his treatment differed from others in a more general use of leeches.

Dr. McVey, of Morgan County, Ill., gave opium in large doses, Fowler's solution, and at length strychnia to counteract paralysis and nervous weakness. He had six recoveries and three deaths. His partner, Dr. Brown, had sixteen recoveries and five deaths.* Fow-

* Transactions of Illinois State Medical Society, 1864.

ler's solution was used with some success by Dr. Miner, in 1825, and by other practitioners during previous epidemics. Strychnia was used, though earlier in the attack, in many cases which occurred at Newport, recorded by Surgeon Wales, U. S. N., in the *American Journal of Medical Sciences*, April, 1863; but it does not appear to have contributed much to a favorable result. The 3d, 4th and 5th cases died under strychnia, while case 6 recovered without it.

Aconite was used in three cases which resulted in recovery.

There are three remedies which have been proposed, and which deserve notice: bisulphite of soda, permanganate of potassa, and ergot.

Bisulphite of soda was employed by Dr. Le Baron Munroe at the hospital on Galloupe's Island, Boston Harbor, in two cases, both of which recovered.* The same remedy was employed by Dr. Pearce, of Mechanicsburg, Ohio, with favorable results.† It has been used with success in pyæmia and other diseases in which the character of the blood seems to be changed, and if the disease we are considering is, as many think, caused by a vitiated state of that fluid, why may not the bisulphite be used with advantage? It is a remedy worthy of further trial.

Permanganate of potassa was used by Dr. Isaac Kay, of Ohio.‡ He says that of the first twenty cases of the disease in Springfield, O., only one recovered. Then the permanganate was employed, "one grain dissolved in one ounce of water and a tablespoonful given every hour." The patient to whom it was first given had been attacked thirty-six hours previously, and was delirious, breathing with difficulty and vomiting. "The vomiting ceased almost immediately, and the brain, in less than one hour, was considerably relieved of congestion, and the patient, after lying for three days in a partially delirious state, began very rapidly to recover, and in five days could walk about the city. Permanganate of potash, in the dose above mentioned, every hour, with occasional doses of opium to quiet the delirium, and an application of cold, wet clothes to the occiput and over the cervical vertebræ, constituted the only treatment." He says, "Since the adoption of this treatment three-fourths of the cases have recovered."

Ergot has been employed in five instances. In one case it was

* Boston Medical and Surgical Journal, vol. 73.

† Cincinnati Lancet and Observer, May, 1865.

‡ Boston Medical and Surgical Journal, vol. 70.

not given until the twenty-sixth day of the attack, and did not benefit the patient. In the other cases it was given early and they all recovered; but it is perhaps worthy of remark that three of these are among the most protracted cases recorded, two having had a relapse. To decide the relative value of ergot and permanganate of potassa farther experience is necessary.

TABLE I.—*Duration of Fatal Cases.*

| Duration. | No. of Cases. | Duration. | No. of Cases. | Duration. | No. of Cases. |
|---|---|---|---|---|---|
| Less than 1 day. | 9 | 8 days. | 4 | 30 days. | 1 |
| 1 day. | 6 | 10 " | 2 | 34 " | 1 |
| 2 " | 18 | 11 " | 1 | 36 " | 1 |
| 3 " | 17 | 14 " | 1 | 5–6 weeks. | 1 |
| 4 " | 16 | 18 " | 1 | Several days. | 1 |
| 5 " | 10 | 20 " | 1 | Not mentioned. | 12 |
| 6 " | 4 | 22 " | 2 | | |
| 7 " | 1 | 24 " | 1 | | |

TABLE II.—*Duration of Recoveries.*

| Duration. | No. of Cases. | Duration. | No. of Cases. | Duration. | No. of Cases. |
|---|---|---|---|---|---|
| 3 days. | 1 | 21 days. | 3 | 58 days. | 1 |
| 4 " | 2 | 23 " | 2 | Few days. | 1 |
| 5 " | 2 | 26 " | 1 | 6 weeks. | 2 |
| 7 " | 3 | 28 " | 2 | 18 " | 1 |
| 10 " | 1 | 30 " | 1 | 10 " | 2 |
| 13 " | 1 | 36 " | 1 | 4 months. | 2 |
| 14 " | 3 | 37 " | 1 | 5 " | 1 |
| 16 " | 1 | 40 " | 1 | | |
| 17 " | 1 | 48 " | 1 | Not mentioned. | 13 |
| 20 " | 1 | 50 " | 1 | | |

TABLE III.—*Age and Position.*

| Age. | Military. | Civilian. | Total. | Age. | Military. | Civilian. | Total. |
|---|---|---|---|---|---|---|---|
| 1 | | 2 | 2 | 21 | 5 | | 5 |
| 1½ | | 1 | 1 | 22 | 3 | | 3 |
| 2 | | 2 | 2 | 23 | 2 | | 2 |
| 3 | | 2 | 2 | 25 | 2 | | 2 |
| 4½ | | 1 | 1 | 26 | | 2 | 2 |
| 5½ | | 1 | 1 | 27 | 1 | | 1 |
| 6 | | 4 | 4 | 28 | 2 | | 2 |
| 7 | | 3 | 3 | 29 | 1 | | 1 |
| 8 | | 2 | 2 | 30 | 1 | 2 | 3 |
| 9 | | 2 | 2 | 31 | 1 | 1 | 2 |
| 10 | | 4 | 4 | 32 | 1 | | 1 |
| 11 | | 4 | 4 | 34 | | 1 | 1 |
| 12 | | 1 | 1 | 37 | | 1 | 1 |
| 14 | 1 | 2 | 3 | 38 | 1 | | 1 |
| 15 | 4 | 3 | 7 | 40 | 2 | | 2 |
| 16 | 3 | 3 | 5 | 42 | | 1 | 1 |
| 17 | 4 | 1 | 6 | 46 | 1 | 2 | 3 |
| 18 | 8 | 2 | 5 | 68 | | 1 | 1 |
| 19 | 11 | 6 | 10 | Not stated | 11 | 37 | 48 |
| 20 | 3 | 2 | 17 | | 68 | 96 | 164 |

In the chronic state of ill-health into which many fall who have recovered from the acute form of the disease, the most beneficial course of treatment is the administration of tonics, iron and quinine, and good diet, with attention to hygienic conditions. A change of situation and removal to another part of the country or travelling might afford benefit; in short, the methods usually employed for the restoration of a shattered and debilitated constitution.

The varied success of treatment in different places is, without doubt, due to variety in the severity of the epidemic, which in some places is very mild and in others rages with a mortality as great as that of the most fatal diseases.

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## CHAPTER II.

### SECTION I.

#### History.

*Foreign History.*—It is difficult to judge with regard to the nature of many diseases described by old authors, and still more difficult to satisfactorily prove that they are speaking of complaints essentially the same as those which we at the present day observe. If petechiæ were the prominent symptom of cerebro-spinal meningitis and confined to that disease alone, the task would be comparatively easy. But there is such a variety of symptoms, some of which closely resemble those of typhus—not only the eruption, but also the nervous and other symptoms—that it is very difficult to draw the line of separation.

The first distinct notice of petechiæ as a symptom is by Jacobus de Partibus, a French physician, who was driven from Paris on account of his opposition to the abuse of the baths, and resided afterwards at Tournay, where he died in 1465.* Though all the epidemics in which petechiæ are described among the symptoms may not have been instances of cerebro-spinal meningitis, yet from this date we have such descriptions more or less complete, and in some we can recognize

* Sprengel's History of Medicine.

a strong resemblance to the epidemics which have occurred in more modern times and borne that name.

In 1480 and 1481, a putrid fever, accompanied with phrenitis, prevailed in Westphalia, Hesse and Friesland.*

In 1503, an epidemic prevailed in Europe called *fièvre cérébrale, de cephalie, céphalalgie épidémique.* The symptoms most generally observed were, a violent delirium, convulsions, contractions of the limbs, immediately followed by prostration and coma. The pulse was frequent, irregular, feeble. Death happened speedily, sometimes in a few hours, more often during the third or fourth day.†

In 1505, an epidemic petechial fever raged in Upper Italy, of which we have a description. "This fever commenced with symptoms of little gravity; subsequently, there were developed all the signs of malignancy, with an extreme prostration of the powers. Heaviness of the head, dulness of the senses, delirium, and redness of the eyes, announced the affection of the nervous system. The urine was white and turbid, and the alvine dejections exhaled a fœtid odor. Towards the fourth or seventh day spots appeared, which did not lessen the intensity of the symptoms. The patient fell into a comatose state, or into complete insomnia; retention of urine occurred, without remarkable thirst; and, finally, hæmorrhages, which diminished his powers, and announced the approach of death." Such is the description, by Sprengel, of this fever, which carried off "an infinite number of sick," and which prevailed also all over Europe.‡

In 1508, Germany suffered from epidemic encephalitis and malignant pneumonia.§

In 1510, we again find mention made of *fièvre cérébrale.*‖

Buserius, in his Institutes, gives a good description of cerebro-spinal meningitis, under the name of petechial fever. He also mentions the *post-mortem* appearances.

"Frequently the membranes of the brain are found to be of a dark color, their vessels distended with black blood, and the cortical part of the brain somewhat livid; the stomach and intestines swelled, hard and black; the pancreas, liver and mesentery enlarged. In patients who had been cut off by hiccup, the stomach has frequently

* Bascome on Epidemics. London. 1851.
† Macartin, Poirsin et Bricheteau, in Bul. de l'Acad. de Med., t. 9.
‡ Sprengel and Bascome, op. cit.
§ Bascome, op. cit.
‖ Macartin, Poirsin et Bricheteau, loc. cit.

abounded with black spots. In others the veins and the membranes of the brain were varicose; the lungs gangrenous and sphacelated, and the blood in the cavities of the heart black and dissolved. Sometimes also abscesses of the brain were present, as well as of the breast, or abdomen. Very frequently, however, no visible taint is discovered anywhere which can be considered as the cause of the patient's death." The account of the symptoms given by Buserius is also very good. Under this description he mentions an epidemic which occurred in 1528. Sprengel also mentions the same epidemic which, during the winter of 1527–28, prevailed in Upper Italy.

In 1556 a disease similar to this occurred in England and France; in 1557 in Spain, where it was as mortal as the plague; in 1564 it occurred in many places; and from 1569 to 1574 continued to prevail with much mortality. It was at Trent in 1591, and Florence in 1592.*

The epidemic of 1557, mentioned by Sprengel as described by Coyttarus, prevailed in the environs of Poitiers, La Rochelle, Angoulême and Bordeaux. It commenced in the month of May, and was so deleterious that, according to the expression of Coyttarus, the sick seemed to die rather from fear than from the disease itself. Sprengel also mentions an epidemic which showed itself in 1587 in Lombardy, described by André Tréviso, of Fontaneto. It prevailed during the winter; in the spring it was complicated with pleurisy, buboes and parotitis, and sometimes by worms. The same author speaks of the epidemic of 1591, described by Octavien Roboreto, which occurred at Trent after a warm summer.

The epidemic of 1557, in Spain, is mentioned by Bascome. He also speaks of a spotted fever which prevailed the previous year in Spain, but seemingly different from that in 1557. He mentions the epidemic of 1564, which was accompanied by fatal quinsies.

In the seventeenth century mention is not made so frequently of petechial fever. In 1604, Bascome says the "punticular fever" extended and raged with great violence all over Spain, attacked old and young, none escaping.

In 1677 Buserius mentions the occurrence of the petechial fever in Italy.

In 1685, in the month of February, commenced the fever of which Sydenham gave a description under the name "febris nova." Inter-

* Dr. Gallup. Epidemic Diseases of Vermont. Boston. 1815.

mittents had been the prevalent class of fevers from 1677 to 1683. The winter of the latter year was very severe, "ut nemo quisquam viventium illi parem, vel intentissimo eo frigoris gradu, vel prælongo temporis tractu, videris unquam;" that is, the "oldest inhabitant" could not remember so severe a winter. The winter of 1684 was not quite so severe, though more so than usual. He first considered the new disease which appeared in February, 1685, to be the same as peripneumonia, but subsequently changed his opinion. "The symptoms observed with what care I could give them are and were nearly these. The patient is attacked by heat and cold alternately; oftentimes there is complaint of pain in both head and limbs; the pulse is not unlike the pulse of health; blood drawn from a vein is frequently similar to pleuritic blood. The patient often suffers from cough, which, with the other symptoms of peripneumonia, yielded the quicker, the longer after winter the attack occurred. Pain is sometimes situated in the neck and fauces at the commencement of the attack, but lighter than in angina. Although the fever may be strictly continued, yet often most troublesome exacerbations occur at night, just as in double tertian or quotidian. However so lightly he may be covered with bedclothes, the patient does not lie in bed continuously without great danger; for the fever being then turned towards the brain he falls easily into coma or delirium. And, as I truly acknowledge, there is such an inclination in this disease to fall into delirium that often it suddenly and spontaneously steals over the patient unawares, without any cause. But the delirium does not rise in this fever to that pitch of irascibility and fury observed in those who are attacked with variola and other fevers; indeed the sick have rather a tranquil delirium, from time to time chattering nonsense. From the untimely use of cordials and a regimen a little stimulating, petechiæ often appear, and, in youths possessed of a sanguine temperament, maculæ, even purpuræ, a most certain sign of high inflammation, appear in this as in any other kind of acute disease. Now and then miliary eruptions, as they are called, are scattered over the surface of the body, not very different from measles, unless they are more red, and when they recede do not leave those furfuraceous scales which are seen in measles. These, indeed, sometimes break out of their own accord, but are oftener forced out by heat of the bed or the diet. The tongue, in proportion to the diet furnished, is moist or dry. When it becomes dry it is of a brown color in the

middle and white on the edges. But where the tongue is moist it is white in every part, having a rough surface and a white coating; for if the patient becomes heated by a diet justly forbidden, the tongue is generally brownish and arid; but if otherwise, it is moist and white. The same may be said of the perspiration, which exudes in proportion to the varying regimen above mentioned; for if the patient is kept too warm, a viscous sweat constantly pours out, especially from the head. Although the perspiration flows copiously and uniformly from every part, he feels but little relief, whence it follows that such sweats are symptomatic and not critical. If a sweat was excited on the first day of the attack by artificial means, usually it caused the transfer of the morbid action, if not to the head, at least to the joints. But when the fever is situated in the head and at the same time the delirium has increased, no sign of fever remains, except that the pulse is now fast, now slow; at length, however, when from bad management, the spirit is led into every kind of confusion, the pulse becomes irregular, with subsultus tendinum; and not long after, death occurs."

From 1691 to 1694 the disease prevailed in Italy; in 1698, in England and at Halle.*

During the eighteenth century it occurred first in Prussia in 1704. England in 1710 and 1741, and Piedmont in 1720, were visited by a disease called spotted fever.†

In 1733 Edinburgh was under its influence. In this case the disease was accompanied by sore throat.‡

In 1746, 1756, '57, and '58, France experienced the ravages of an epidemic. During the latter year it prevailed in the French fleet at Brest, under Admiral Dubois de la Mothe, and extended into the city. Fonsagrives gives the following description of the symptoms: "The patients felt at the commencement a heaviness of the head with acute pain at the superciliary ridges; their powers were weakened; the pulse was full and frequent; the skin was dry and burning; the tongue red; vomiting or at least nausea was commonly experienced; the epigastric region was the seat of discomfort and of an indefinable anxiety; they complained of a very grievous aching of the spine; constipation existed. Such were the symptoms of the commencement. In six or seven days the symptoms became singularly grave;

* Gallup and Buserius, op. cit. † Cop. Med. Dict., Webster on Pestilence.
‡ Buserius, op. cit.

the pulse lost its fulness, it became small and deep; there was tympanites; subsultus tendinum, buboes, petechiæ and parotitis appeared; the patient fell into coma, in which he usually died." In this epidemic about one in fifty passed worms.* The same year the epidemic was seen at Vienna; in 1764, at Naples and Montecchi; in 1765, at Tyrone, Ireland; in 1767, in Tuscany and the district of Aemilia; in 1771 and 1772, at Vienna.†

Sir John Pringle, in his work on the diseases of the army, first published in 1752, gives an account of jail or hospital fever, which, in many respects, reminds one of cerebro-spinal meningitis. It was introduced by changes of heat and cold, trembling, numbness and loss of appetite; skin hot; pulse at first a little quicker than natural; some pain and confusion of head, and dejection of spirits; pulse quick and varying in the same day, both as to strength and fulness. Bleedings were injurious, especially if repeated. Blood commonly little altered, sometimes fluid and the crassamentum resolved. Sometimes diarrhœa, when patient is kept too cool; if kept warm, constipation rather. Calor mordax. After a while delirium sets in. A petechial efflorescence is a frequent but not inseparable attendant on the fever, which is sometimes of a brighter or paler red, at other times of a livid color, but never rises above the skin. The spots were small but generally confluent. In a few cases there were purple streaks and blotches. The duration was from seven to fourteen or twenty days." He does not mention that any cases were so short as is sometimes seen in cerebro-spinal meningitis. In post-mortem examinations there were found cases of suppuration of the brain, which he calls abscesses. Purulent matter was found in the ventricles in one case, and the whole cortical and medullary substance was uncommonly flaccid and tender. In one case the brain, in another the cerebellum, was suppurating. In two the cortical substance of the brain had an inflammatory appearance, but no suppuration. In some the intestines were diseased. The cause he considers to be a vitiated state of the air.

In 1788 an epidemic occurred in Cornwall, Eng., which was compared by Dr. Simmons with typhus. The account of the symptoms is not very full, but the disease strongly resembles cerebro-spinal meningitis.‡

In the early part of the nineteenth century there were not many

* Annales d'Hyg. Pub. et de Med. Leg., t. 12. † Buserius.
‡ London Medical Journal, vol. x.

epidemics of this disease, but about 1837 it became more prevalent, especially in France.

In Geneva in 1805 a disease was seen which resembled cerebro-spinal meningitis in its sudden invasion, vomiting, pain in the head, rigidity of the spine, occasional petechiæ; the principal lesion was engorgement of the brain. One quarter died. Its attack was not general. It prevailed for only three months.*

In the same year a case occurred at Strasbourg, terminating fatally after two relapses, the last one being accompanied by cerebral symptoms. At the post-mortem the vessels of the head and membranes were engorged with blood; serous fluid was found between the meninges above the hemispheres. The brain was soft, the ventricles were dilated and contained about four ounces of turbid serum, with a deposit of pultaceous, puriform matter lining their cavity. There were also lesions of the lungs and heart.†

On the 23d March, 1807, a family of fourteen persons who resided on one of the high declivities of Dartmoor in Blackaton, near Ashburton, were attacked with a disease which had many of the characteristics of cerebro-spinal meningitis. Five persons were attacked, of whom four died. One of them, however, was not in the family, and had not been near any of the sick. The symptoms were briefly these: pain in the head with slight rigors, slight convulsions of the limbs, nausea, thirst, pupils dilated, pulse weak and rather rapid, occasionally soreness of the throat at the commencement, in two cases petechiæ, and in two pain in the foot and lower limbs. There was no post-mortem. This disease did not spread, and these were the only cases. Nothing is said with regard to the situation of the house or the circumstances of the family, and the disease may have been typhus from some local cause, though it had a strong resemblance to cerebro-spinal disease.‡

In the same year the Spanish prisoners who were confined at Briançon were attacked by a disease which was said by M. Billerey, physician in chief of the civil and military hospital at Grenoble, to be the same as afterwards appeared at Grenoble and Mayence, which was considered by M. Boudin as cerebro-spinal meningitis.§

* Vieusseux in Jour. de Med. Chir. et Phar., t. xi.

† Journ. de Med., Chir. et Phar., &c., vol. x.

‡ Med. and Phys. Jour., vol. xxviii.

§ Boudin on Cerebro-spinal Meningitis, in Arch. Gen. de Med., Avr., 1849.

In 1814, a disease appeared at Grenoble, which is described by Comte as follows:—"It showed itself at Grenoble during the months of February, March and April, 1814, in the garrison. The larger part came from the army of Mont Blanc, where, during very severe cold, they had performed very hard service, always in the snow, and exposed day and night to great fatigue; those who were attacked were almost all among the new recruits. The disease began as a true catarrhal, nervous or ataxic fever; at the end of two or three days the eyes became bright and flashing; the conjunctiva was injected, the muscles of the face exhibited convulsive movements, then appeared tetanic stiffness of the upper part of the body, the head being constantly bent back and immovable. The headache was sharp and constant, and was observed principally at the posterior part of the neck; a delirium, more or less violent, supervened. The disease frequently attacked persons in the hospital on account of other complaints. MM. Billerey and Bélon, physicians attached to the hospital, and who saw the first patients, thought that this was the same disease as the nervous fever of Dresden, Leipsic and Mayence."

"In every patient who died, there was constantly found dilatation of the cerebral bloodvessels, traces of inflammation, portions of that viscus apparently macerated and its various cavities filled with varying quantities of serum. The examination, extended even into the spinal canal, disclosed traces of inflammation of the internal surface of the membranes; similar appearances of a livid or dull red color in the cord itself, with some portions of the surface macerated and showing undoubted evidences of suppuration."*

The same disease also occurred at Metz, in 1815.†

Biett, on the 14th of July, 1814, sustained a thesis before the Faculty of Medicine of Paris, wherein he asserted that the disease which had appeared in the army, and which he had observed at the Hospital Saint Louis, was not typhus, but a cerebro-spinal meningitis.

During the spring of 1815, there occurred at the University of Cambridge, Eng., an epidemic which in some of its symptoms and the *post-mortem* appearances very much resembled cerebro-spinal meningitis. The account of the symptoms is not very full, but the following case will serve to show the resemblance:—

* Receuil Gen. de Med., t. lviii. † Boudin, Arch. Gen. de Med., Avr., 1849.

"Mr. Joseph Wilson, æt. 19, had been in general good health, with the exception of occasional pain in the head. When I first saw him (March 25th, 2 o'clock in the morning), he complained of severe pain across the forehead, and heaviness over the eyes; his nurse observed that she had several times found him wandering; it is probable that some slight delirium had existed from the commencement of the disease. My suspicions on this head arise from the mistakes he made in respect to dates. His skin was hot and dry, his countenance flushed, his tongue white, his appetite good, and his pulse 120 and full. From what I could collect, the disease had commenced March 15th, with the symptoms I have mentioned, but in less degree. 26th.—Symptoms somewhat aggravated. 27th, 2 o'clock in the morning, furious delirium came on, which left him at 8 o'clock, and his mind returned to the state in which it was when I first saw him. At 2 o'clock in the afternoon his body became sensibly cold, and was followed by moisture of the skin." He lived till April 1st, sometimes seeming better, and sometimes all the symptoms becoming more severe, and died at 1 o'clock on that day.

"*Post Mortem.*—On removing the calvaria, the vessels of the dura mater appeared distended with blood; the other vessels of the brain were fuller than natural; between the dura mater and pia mater there was a large quantity of fluid. The medullary substance of the brain contained many blotches of blood. The lateral ventricles were much distended with fluid. The gall-bladder was found empty. The stomach and intestines were much distended with flatus. The thorax was not examined.

"P. S.—He had also convulsive movements, especially of upper extremities, and subsultus tendinum and floccitation."*

During the years 1813, 1814 and 1815, an epidemic occurred in Dublin, Ireland, and vicinity. It prevailed during most of the year, but worst in winter, and with a character somewhat different from that which it had during the rest of the year. Dr. Edward Percival gives an account of it. He says:—"The worst forms of typhus fever prevailed at an advanced period of the *winter*. Livid blotches, a dry tongue, dark and tenacious mucus on the gums and lips, muttering delirium, singultus and lethargy, were frequent symptoms. Peripneumonic distress attended at least the commencement of most of these cases. The hepatic viscus was also frequently engaged. But the

* Med. Trans. of Col. of Physicians of London, vol. v., 1815.

peculiar seat of sanguineous congestion appeared to be the brain and its investing membranes.

"All ages, except infancy, were liable to the fever, the duration of which, under the circumstances above described, seldom fell short of fourteen days and often exceeded seventeen. It proved more fatal than any other form of epidemic or contagious fever."

"In typhus, with subdelirium and comatose affection, the brain exhibited, on inspection, all the usual marks of vascular congestion. These were not less observable in cases more protracted. On removing the upper part of the cranium, blood was frequently effused. The vessels of the pia mater and plexus choroides were often turgid, and the capillaries occupied with blood; a glairy fluid, sometimes tinged with blood, was interposed between this membrane and the arachnoid tunic. More or less serous effusion was found in the ventricles. The substance of the brain was in some cases firmer, in others softer than natural. On dividing its substance, numerous bloody points usually presented themselves on the surface of the separated parts. No case of abscess of the brain occurred to my observation."

Either the lungs, pleura, liver, peritoneum or intestines were almost always diseased.

He considered it contagious, though only slightly so.*

An account of a fever which prevailed in Italy and many parts of Germany during 1817, is given by Dr. John Bell. He says that it seems to have been imported into Italy several centuries previous, and sporadic cases appeared every year. "The premonitory symptoms of the disease are pain in the head, muscles and bones, especially in the loins and inferior extremities, want of appetite, little sleep, universal prostration of both physical and intellectual power.

"After the disease is completely formed, the patient suffers from an increased pain in the head, greatest over the eyebrows, watchfulness, involuntary shedding of tears, stillicidium from the nose, heat and pain of the fauces, violent thirst—the tongue moist, covered with a whitish-yellow crust, red at its edges, depraved taste, a sense of bitterness in the mouth, and weakness of stomach, with a desire to vomit—eyes inflamed and sparkling, cough and a troublesome sensation of tightness at the scrobiculus cordis, dry skin, a sense of burning heat attended with cold fits all over the surface of the body—

* Transactions of Fellows of King's and Queen's College of Physicians, vol. i., 1817.

pulse weak and quick, although sometimes full and vibrating, bowels constipated. The fever often presents itself with the character of an intermittent, but soon takes that of a remittent or continued fever. Most commonly, the patients are affected from beginning to end with a violent acute fever, though cases are related where the fever was scarcely perceptible. The physiognomy is of a wretched and desponding cast.

"Such was generally the first stage of the disease. In the second, that is from the fourth to the eleventh day, it became more aggravated—the pain in the head is augmented—some tension of the abdomen is felt, and, according to the particular viscus attacked, succeed either delirium or the symptoms of peripneumony and a sthenic affection of the liver and intestines, or of all the viscera at the same time. Delirium, the effect of cerebral inflammation, is often united to the inflammatory symptoms of the breast, and those of the liver and intestinal tube; the tongue is observed to be red at its apex, dry, and loaded at its base; the looks of the patient are languid and vibrating; the tongue and hands tremble; there is pain, or tinnitus aurium; the pulse is weaker and more frequent; the excretions are small at this time; petechial eruptions, muttering and delirium at night next succeed.

"As respects petechiæ, Palloni remarks that from the third to the seventh day red spots, pointed, irregular and slightly scabrous and elevated, and also petechial spots on the neck and shoulders, extend to the body."

They do not desquamate, are uniform in shape, and have no effect on the progress of the disease.

Appearances on dissection were, effusion into the thorax or abdomen of lymph; brain engorged, effusion between the dura and pia mater, sinuses full of blood, membranes adherent, substance of the brain softened.*

There is no account of any similar epidemic until 1823, when a disease appeared in the Milbank Penitentiary, near London, of which a good description is given by Dr. P. M. Latham, attending physician. The disease exhibited such various symptoms, and was in some respects so dissimilar to the varieties now observed, that a pretty full extract will be interesting.

In the autumn of 1822 the health of the prisoners began to de-

* Philadelphia Journal of Medical and Physical Science, vol. i.

cline. They became pale and languid, thin and feeble. Still, there was no manifest sign of any particular disease. In the beginning of February, 1823, Mr. Hutchinson reported some marks of scurvy in a few individuals. In the last fortnight of February, nearly fifty cases of diarrhœa and dysentery were admitted to the hospital, suspected to be scorbutic dysentery.

Dr. Latham entered on his duties March 1st, and found scurvy prevailing, complicated with diarrhœa and dysentery, and, on *post-mortem* examination, a state of the intestines was found resembling the state of the skin, viz., having ecchymotic spots of various sizes. It was found that the diet of the prisoners was very deficient in animal food, as only one and a quarter ounces of meat for each man and less for each woman, was allowed to make soup. More meat was allowed, and the health of the prisoners improved, and in a report made to Parliament April 5th it was so stated; but after that date the diarrhœa and dysentery returned. During the first part of the attack of scurvy, various degrees of nervous affection, as tremors, cramps, spasms and mental despondency, were noticed, and attributed to constitutional debility. It was not long, however, before the nervous symptoms became more marked; and a man, 31 years old, suffering from cramp and diarrhœa, died suddenly apoplectic. On examination, the vessels of the brain were found slightly turgid, and a few spots of ecchymosis on the intestines were observed.

The bowel complaints were peculiar in their nature. "There was every degree and species of flux that was ever seen or described, resembling cholera, dysentery and common light diarrhœa, and there were cases entirely different from either. In the evacuations there appeared nothing that had any visible quality of fæces, bile, blood, or mucus; they consisted, sometimes, of a mass, like green or black grapes in a state of fermentation; sometimes a matter like yeast; sometimes they were in color and consistence like half-slaked lime, when it is beginning to crumble, and sometimes like a thin mixture of chalk and water, and always intolerably sour and offensive, and in enormous quantity." With this diarrhœa there were still more marked cerebral symptoms. "There were several cases of phrenitis. To sudden and acute pain in the head, were added vertigo, confusion of intellect, twitching of the tendons, strabismus, dilated pupils—and, lastly, distortion of the mouth and hemiplegia." That the bowel complaint and the nervous disorder were due to the same morbid

agency, is proved by the fact that they were coincident and occurred together in the Penitentiary, and the same person was affected by both, and the same remedies were beneficial in relieving both.

The accession was sudden in both the bowel complaint and the nervous disorder, when one was not accompanied with the other; and the premonitory symptoms, when occurring, were very similar. The fever attending both was very moderate. One symptom, which gives it a strong resemblance to spotted fever, or cerebro-spinal meningitis, as described by Dr. Miner, is a terrible "sinking at the pit of the stomach. What this sinking is, those only know who have suffered it. All patients speak of it by the same name, but do not describe it further. I suspected it to consist of a certain degree of actual pain, combined with a feeling which is akin to approaching syncope, and spreads from the stomach, as from a centre, over the whole frame. It is a painful and overpowering sensation, as if animal life itself was hurt and lessened."

When any morbid appearances were found after death in the brain, there was some degree of vascular fulness of the brain and also of the membranes, and some serous effusion between the latter and into the ventricles.

Dr. Latham did not consider that the disease was contagious.*

During the winter of 1829–30, this disease prevailed among the galley slaves confined at Toulon, of which a very interesting account is given by M. Fleury. The symptoms were essentially the same as those which we see at the present day, and the changes of structure revealed by the *post-mortem* appearances were likewise similar, consisting in congestion of the meninges, serous infiltration and exudation into the ventricles, the sub-arachnoid space and the spinal canal; congestion of the lungs approaching gray hepatization. The abdomen exhibited also the familiar appearances of cerebro-spinal meningitis.

In 1832, during the winter months, an epidemic pneumonia appeared at Aubin (Aveyron) similar to the same disease which appeared in New York in 1813–15, and which is only another form of cerebro-spinal meningitis, as will be seen when the nature of that epidemic is considered.†

In the same year, Grenoble was again visited by an epidemic similar to that of 1814.‡

* Reviewed in Johnson's Med.-Chir. Review, July, 1825.

† Monthly Journal of Med.-Chir. Knowledge.

‡ Boudin in Arch. Gen. de Med., Avr., 1849.

In the London *Lancet* for June 10th, 1837, is an account of the spotted fever, which was attended with pneumonic and throat symptoms; there were slight rigors, or they might be absent; malaise, pain in the bones. Next day there was acute pain, commonly in the side, sometimes in the præcordial region, rarely in the epigastrium, darting thence to the shoulder-blades and the intervening space. There were sounds of pleurisy, with pneumonic symptoms. Headache existed, frontal, occipital, or general; but it was often absent. There was not, usually, lumbar pain. Sore throat, with redness of the fauces, was often found, though sometimes it was very slight. The face and upper part of the thorax were frequently flushed. There was restlessness; and the bowels were not freely opened, though without pain or tenderness. The patients numbered thirty-eight. The rate of mortality and *post-mortem* appearances are not given.

In another journal, however, this deficiency is partially supplied. In the London *Medical Gazette*, vol. xx., is an account of the disease by Dr. John Wilson, in which the lesions in three cases are given. In two, the body was covered with port-wine-like stains or spots; the blood was fluid and dark in all. In two, the lungs were gorged; in one, there was extensive extravasation of blood into the pelvis behind the peritoneum. In one, he found a large quantity of clear fluid in both lateral ventricles of the brain. These cases occurred in April, May and June, 1837.

The following year, 1838, during the month of February, the same disease was observed, and an account of it is given by Dr. John Burns.

In the *British and Foreign Medico-Chirurgical Review*, vol. xxiii., is a review of a paper by Casimir Broussais on an epidemic of cerebro-spinal meningitis which prevailed among the different garrisons in France from 1837 to 1842.

"It commenced at Bayonne in 1837 among the military, and soon spread into Les Landes, many cases occurring among the inhabitants of the communes surrounding Dax. Thence it extended to Bordeaux, and in the same year to La Rochelle, in both of which places it was confined to the garrison. It then suddenly appeared at Versailles and St. Cloud, where it raged from 1839 to 1842. From Versailles it spread eastward to Caen and Cherbourg in 1840 and '41; westward to Metz, Strasbourg, Nancy, Château Gonthier, Tours, Blois

and Joigny, and finally appeared in the neighborhood of Rambouillet. From La Rochelle it reached Poitiers in 1840, L'Orient in 1841, and Ancenis and Nantes in 1841 and '42. In all these places the disease was chiefly confined to the military.

"But while it thus extended in a northerly direction, it also spread among the garrisons to the west of Bayonne, appearing in 1837 at Narbonne and Foix, in 1838 at Toulon, and in 1839 at Nîmes. It prevailed at Avignon in the winter of 1839–40, and again in the following year; at Montbrison in 1840; and at Lyons in the winter of 1841–42. It appeared also at Perpignam in the winter of 1840–41, and the following year at Aigues Mortes.

"The progress of the epidemic was not marked by regularity, nor did it pursue a steady course from one garrison to another. Occasionally it appeared at a distant point, from which it sometimes returned to places it had passed over, while at other times it remained stationary for a considerable period. In some garrisons the disease did not prevail as an epidemic, but merely a few sporadic cases occurred; in others it appeared to become naturalized and to take an endemic character.

"The disease, as has already been stated, was confined chiefly to the military, but in a few instances extended its ravages also to the civil population; for instance, at Strasbourg in 1841."

Selestat (Bas Rhine) in 1839 was visited by this disease, which seemed to have been introduced by a body of soldiers who had been formerly stationed at Strasbourg, where the disease prevailed. Soon after their arrival, some of the corps were attacked, and then it appeared in the neighborhood of their barracks and afterwards extended to the interior of the city.*

Such is a brief account of the progress of the disease in France during those years. Other countries were also visited by the scourge, as Caivano (Naples) in 1837. Here the principal symptoms were frontal headache, with injection of the conjunctivæ, which was a constant and pathognomonic symptom; general articular pains; loss of appetite, but great thirst; tongue dry, covered with a yellowish coating, and sometimes dark; delirium; subsultus tendinum; constipation; slight increase in the heat of the skin; the pulse small, rapid and hard; petechial eruption over the skin on the seventh or eighth

* Encyclographie des Sciences Med., 1841, t. vi.

day of the disease; alvine dejections accompanied with lumbricoides; typhoidal symptoms when the eruption appeared early.

Dr. Orofino noticed that the disease ran through regular periods and sometimes terminated by sweats. He considered the critical days to be the fourteenth, the seventeenth, and rarely the twenty-first.*

Various districts in the kingdom of Naplès were invaded in the winter and spring of 1840. The disease made its appearance differently in different cases. In some persons the first symptom was a sense of formication, beginning at the feet and extending over the whole body; others suffered from general uneasiness, pain in the head and neck, particularly in the cervical and dorsal region, attended with difficulty on stooping forward or bending the neck. Sometimes the disease was ushered in by an apoplectic seizure, with loss of speech and consciousness, lasting for some hours, and followed by a kind of febrile reaction. Other persons fell down in convulsions, with trismus, the neck being drawn forcibly backward, the whole trunk rigid, spasms of the extremities and efforts to vomit, sometimes without anything being rejected, while at other times the patient would throw up some lumbrici.

"The stage of reaction was accompanied with fever, a hard, quick and frequent pulse, cephalalgia and a painful sense of retraction of the head; the pain in the head increasing in severity, affecting principally the occiput and extending to the neck and along the spine. In some instances the pain in the spine was dreadfully severe, and the sacrum was referred to as the seat of the greatest suffering. When very violent the pain was followed by opisthotonos so complete as to bend the spine into the form of the Roman S. Trismus, difficult deglutition, with disinclination for all drinks, subsultus, a tremulous state of the limbs, existed in the severest cases. The tongue was dry, the teeth were coated with sordes, the patient could scarcely speak. The bowels were costive, and lumbrici were voided by stool, or crept out of the mouth."

On *post-mortem* examination the vessels of the meninges of the brain were found much congested; the thoracic viscera also engorged; the blood dark and liquid, with similar changes in the abdomen.†

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* Rev. Med., t. lxvi., 1838.

† Med. Examiner, N. S., vol. i., 1842, Rev. of account by Prof. de Kenzi.

In 1840, and again in 1845, Douéra in Algeria was visited by an epidemic in many respects resembling the disease under consideration; it prevailed especially during February and April, 1845.†

In France this disease prevailed more or less in some of the departments from 1843 to 1849. In 1843, in the department of Seine et Marne, and one case is recorded which was observed at Paris; in 1844 in the Haute Loire, and also one case at Paris; in 1847, at Val de Grâce, Avignon and Orleans; again at Orleans in 1848 and also at Versailles, Petit Bourg, Luneville, and Dijon; in 1849, at Val de Grâce again.

It is hardly necessary to give the accounts of each of these epidemics as related by various authors. An abstract of the symptoms and *post-mortem* appearances as described by M. Valleix in his Guide du Médecin Praticien will be sufficient to show the identity of the disease with what we now call cerebro-spinal meningitis.

Precursory symptoms were more frequent than in the late epidemic in this country, existing in nearly half the cases, according to M. Tourdes; they were cephalalgia, chills, nausea, and vomiting, pain in the spine and limbs, vertigo, malaise, diarrhœa, delirium, trembling, feverishness; though M. Valleix thinks that most of these ought to be considered not as precursory symptoms, but as phenomena of the settled disease.

Cephalalgia was a constant symptom, sometimes preceding all others and persisting to the end of the attack. It was generally very severe, occupying the forehead usually, becoming more severe towards evening. Pain in the spine was not so constant as the headache, though very frequently seen, especially in the cervical region. The pain extended to the extremities, and there was increase of cutaneous sensibility. The pupils were generally dilated, sometimes contracted; the sight was occasionally lost; the eyes were inflamed. Deafness or abnormal sounds were observed. There was trismus, and cramps of the legs and thighs. M. Forget observed a trembling similar to that of delirium tremens. Paralysis was not common, and was observed only at a late stage of the disease. A delirium almost always existed, sometimes very violent, but usually easy enough to overcome momentarily by questioning. The delirium finally changed to coma. There were nausea and vomiting, loss of appetite, great thirst and constipation, succeeded by diarrhœa; the stools were fre-

† Dr. Magail in Rec. de Mem. de Méd., de Chir. et de Phar. Mil., t. lix.

quently involuntary. Petechial eruptions occurred, and also herpes labialis.

"Je ne peux m'empêcher de joindre à cette description detaillée un tableau succinct de la maladie tracé par M. Tourdes, parce qu'il résume parfaitement tout ce qui vient d'être dit.

"*Tableau de la maladie.* 'La maladie débute, dit cet auteur, par une céphalalgie cruelle accompagnée de vertiges, de nausées et de vomissements. La douleur se propage à la nuque et au rachis; elle envahit les extrémités, les idées s'égarent, la connaissance se perd; le malade est en proie à une agitation convulsive; la tête est renversée en arrière; la face, rouge ou pâle, offre l'expression de la douleur; la température de la peau est normale ou diminuée; le pouls naturel ou ralenti. Cet état dure jusqu'au troisième jour, époque à laquelle se développent l'éruption labiale, les pétéchies, les taches lenticulaires et les épistaxis; l'urine devient abondante et sedmenteuse, la constipation est opiniâtre.

"'Bientôt la connaissance reparaît, et avec elle le sentiment des douleurs. Une amélioration légère se manifeste; elle fait naître des espérances qui se réalisent rarement. Les phénomènes cérébraux et rachidiens reprennent leur acuité; la réaction fébrile s'allume, la langue jaunit, rougit et se sèche. La diarrhée succède à la constipation. Tantôt les symptômes nerveux conservent leur violence jusqu'au dernier moment, tantôt ils se calment et persistent opiniâtrement avec une intensité moyenne. Leur marche est entrecoupée des remissions et d'exacerbations. La faiblesse et l'amaigrissement font d'effrayants progrès. La réaction fébrile revêt une forme typhoïde ou hectique, et le malade expire dans le marasme après une tranquille agonie.

"'Si l'issue doit être heureuse, les accidents ne se calment qu'avec lenteur. Une longue et périlleuse convalescence précède le rétablissement de la santé.'"

The duration was sometimes very short, a few hours; at other times very long, eighty or a hundred days before death. When recovery took place, convalescence was long and tedious. The mean duration of fatal cases was fifteen days, of recovery twenty-five days. The disease was usually fatal.

The anatomical lesions were injection of the membranes, deposit of lymph and formation of pus in various portions of the encephalon and spinal canal, occasionally also softening of the cerebral sub-

stance or the cord. In the intestines Peyer's patches were sometimes abnormally prominent, and there were slight traces of inflammation.

At Versailles, lumbricoides were found in almost every case, and were considered as one of the pathognomonic symptoms, but at Strasbourg and other places they were wanting.

M. Lefèvre believed that he found in the muscles a peculiar nauseous odor, entirely *sui generis*.

The disease prevailed also elsewhere than in France. It was met with at Gibraltar, under the name of epidemic meningitis, a report of which was drawn up by Dr. Gillkrest, Deputy Inspector-General of Army Hospitals. It prevailed during the first five months of 1844. In a population of 16,000, 450 were attacked, and of these 45 cases were fatal. "The invasion of the disease was in many instances sudden, while in others certain prodromes existed. In some the commencement of the attack was indicated merely by slight disturbance of the cerebral functions, with a little rigidity of the muscles at the back of the neck, and vomiting; these symptoms, perhaps, yielded to treatment in two or three days. In many, however, the headache, particularly frontal or occipital, but sometimes general, was most intense from the commencement of the attack; the head being thrown back, and so retained by the rigidity of the muscles, for perhaps several (in some many) days; extreme anxiety and restlessness for the greater part of the time, frequently with spasms or convulsions, or both; pulse not always disturbed in a degree corresponding with the gravity of the other symptoms; injection of the adnatæ, with high febrile movement, only taking place in a very limited number. Vomiting and costiveness, in the early period of the attack, have been among the most constant symptoms; and it has been observed that after the vomiting had ceased for several days, during which the patients seemed likely to do well, this and the other acute symptoms have recurred, followed by a fatal termination. The absence of thirst throughout was among the most remarkable circumstances accompanying the attack."

Before and during this epidemic, it was noticed that in other disorders there was a tendency to headache, usually of the occiput.*

In Dublin and vicinity, principally if not exclusively in the workhouses and hospitals, a disease called by Dr. Robt. Mayne "cerebro-

* London Medical Gazette, vol. xxxiv.

spinal arachnitis," made its appearance in January, 1846, and continued throughout February, March, April and May, and a few cases were met with in June; also, in March, 1847, Dr. Mayne had two cases under treatment. In this epidemic the spinal arachnoid suffered more severely than the cerebral.*

In 1849, Logrono and Ribafrecha, in Spain, were visited by the epidemic under consideration; the natives called it *clavo* or *sarmiento*.†

From this date no mention is made in any of the journals to which I had access, of any disease similar to this until 1856, when an epidemic appeared at Niort, in the Hospice des Enfants Trouvés, which in many of its features resembled it, but which was wanting in its fearful mortality.‡

A similar disease appeared in Sweden in 1857.§

During the last few years only sporadic cases have been noticed, especially at Paris. A case is recorded in the *Lancette Française*, 1860, which occurred in La Charité; another case, which was observed in 1861, is recorded in the same Journal for 1862; and another case at Hôtel Dieu in 1861, in the same Journal for 1861. In October, 1862, M. Axenfeld exhibited to the Medical Society of the Hospitals, specimens obtained from the examination of a young woman, 26 years of age, who died after four days, with symptoms of meningitis. There was found serum mixed with pus, not only in the cerebral meninges, but throughout the spinal pia mater. He did not think it a case of epidemic cerebro-spinal meningitis, though he understood that similar cases were then frequent, especially among females. It is, indeed, difficult to decide whether these cases were really the disease under consideration or merely cases of simple meningitis.‖

In 1865, an epidemic disease appeared at Dantzic and other cities in Germany, and as there was a great deal said with regard to that and another epidemic in a neighboring empire, known as the Russian fever, and some fears lest it should be communicated by commerce and thus invade England, the Lords of the Privy Council appointed a committee to investigate it. Dr. Sanderson, a member of the Com-

* Dublin Quarterly Journal of Medical Science, vol. ii.

† London Lancet, Dec. 8, 1849.

‡ Lancette Frangaise, 1858.

§ Dr. Wistrand on the Epidemic Diseases of Sweden in 1857, Dublin Quarterly Journal of Medical Science, vol. xxviii.

‖ Gazette Hebdomadaire, 1862.

mittee, made a report to the Pathological Society of London. He considered it cerebro-spinal meningitis. Herpes labialis was seen; he saw only one case with petechiæ on the skin; hypostatic pneumonia was common; generally, the blood was found uncoagulated after death; in two cases the spleen was excessively hyperæmic and soft, as in typhus, though he considered the two distinct diseases.*

It is not unlikely that some of the epidemics recorded in the previous pages were typhus fever; but the majority, and all those of which it has been possible to obtain accurate accounts, correspond very closely with this disease, not only in the symptoms, but also in the changes discovered after death. Those early epidemics which are recorded as instances of the disease, have been mentioned on the authority of Buserius, Sprengel and others, who have given descriptions agreeing with the appearances found at the present day. Where it has been possible, contemporary authors have been quoted; or, if their accounts have been abridged, care has been taken to give all that is important for forming a correct diagnosis.

## SECTION II.

### History.

*Domestic History.*—Having reviewed the history of this disease as it has appeared in foreign countries, we now come to the history of its prevalence in this country, which, though extending over a shorter period, is even more important, and concerns ourselves at the present day more nearly. Its importance is increased by the fact that in this country, during the present century, the disease has shown itself in its different varieties and with complications more frequently than in foreign countries.

Some have supposed that this disease was seen in this country during the last century, but most of the accounts do not seem to fully sustain such a conclusion. A "malignant pleurisy" was observed on Long Island in 1749, and had some resemblance to the pneumonic form. "The patient was first seized with a shivering or rigor, which is soon succeeded by a pain in his back and head, an early disposition to vomit, with great oppression and anxiety. Soon after the fever is formed, these appearances are followed with an attack of pain in the

* London Lancet, May 6, 1865.

breast and side, resembling peripneumonic symptoms, attended with a labored and painful respiration, a frequent cough, by which a crude, glazy, frothy spittle, slightly tinged with blood, is discharged; light deliriums through the whole progress of the disease, not constant, but frequently returning; the tongue for the most part parched and dry, but the skin inclined to be moist and sweaty, which, if encouraged, the skin and coats of the eyes become extremely yellow; the blood appears rather dissolved and thin than viscid; the pulse in most cases soft and frequent. This disease ends generally in the death or safety of the patient on the fifth day, sometimes on the third or fourth from the invasion of the distemper. In those that have died it has been observable that, some hours before death, they have recovered their senses and appeared easy, but soon after have unexpectedly and suddenly expired."*

Dr. J. Comstock, in a letter to Com. Perry, which was published in the *Medical Repository*, new series, vol. iii., states that a few cases of a similar disease were seen in Connecticut during 1799, but it did not then become epidemic.

It was not until March, 1806, that the epidemic form was seen; then it first appeared in Medfield, Mass. "Without any apparent predisposition, the patient is suddenly taken with violent pain in the head and stomach, succeeded by cold chills, and followed by nausea and vomiting; matter discharged from the stomach of no unusual or morbid appearance; respiration short and laborious; tongue a little white toward the root, and moist; velocity of the blood increased, with a very sensible diminution of momentum in the radial, while in the carotid arteries it was much augmented; and in a child of 15 months old, a very violent pulsation was discovered at the fontanelle; the eyes have a wild, vacant stare, without much, if any appearance of inflammation; the heat of the skin soon becomes much increased, yet the skin is not remarkably dry; these symptoms are accompanied by a peculiar fearfulness, as if in danger of falling from the bed or the nurse's arms, and continue from six to nine hours, when coma commences, with increasing debility; extremities become cold; livid spots, resembling petechiæ, appear under the skin, on the face, neck and extremities; pulse small, irregular and unequal; spasms occur at intervals, which increase in violence and frequency in proportion as the force of the circulation decreases; at this time the eyes ap-

* Dr. John Bard, in American Medical and Philosophical Register, vol. i.

pear glassy, and the size of the pupil varies suddenly, from almost wholly obliterating the iris down to the size of a millet seed, and then again as suddenly dilating. These symptoms seem to mark the second period of the disease, and continue from three to five hours. The third and last stage is distinguished by a total loss of pulsation at the wrists; livid appearances become more general; spasms more violent; coma more profound; death! The patient has, in general, continued in the last stage from six to twelve hours."*

On *post-mortem* examination, there was found serous effusion between the membranes, which adhered to each other and to the brain in several places; congestion and softening of the brain. The stomach was partially softened, and the lungs were darker than usual.

In the fall of the same year it appeared in Mayslick, Ky., and continued to prevail through the winter.

In the spring of 1807, Hartford, Conn., was visited by this disease, and a short time after it appeared in Windsor, and subsequently in other towns in Hartford and Litchfield Counties, and continued to be noticed for three or four years. It was most prevalent during the last of the winter and the spring months.

A very good description of this epidemic, by Dr. Sam'l Woodward may be found in the *Medical Repository*, 3d hexade, vol. i., or in Dr. North's treatise, with other papers equally interesting. He says:— "This disease appeared in the town of Winchester, in Litchfield County, in April, 1807, when the frost was dissolving and the ground breaking up, and was noticed to make the attack most frequently in rainy weather. Young people, under the age of 20, were most liable to it; and among adults, females more liable than males. No age nor sex, however, were free from the attacks. It assumed, in different subjects, all grades of disease, from a mild fever to a perfect plague. The symptoms were various, according to its inveteracy. It attacks with lassitude, chills, great prostration of strength, eyes red and watery, pupils dilated in some cases, in others small, like dying persons; often delirium, with exquisite pain in the head; great anxiety at stomach, with tossing of the body, nausea, and often a troublesome vomiting; a pain and lameness in some of the limbs often ushered in the disorder; there was a soreness of the flesh, and generally spots on the skin, the size of half a common turkey-shot,

* Drs. Danielson and Mann, communicated to the Massachusetts Medical Society, February, 1809.

were scattered over the body, resembling blood-blisters; likewise efflorescences, of various sizes and shapes, in different parts, which were dark or florid; and a dark or light color of these spots and efflorescences gave a clue to a favorable or unfavorable prognosis. The darker, the more dangerous. In some, after the chills, there was great heat, which was of the thrilling, stinging kind. The pulse, like other symptoms, was various, sometimes considerably full, but generally very weak, quick and irregular. The disease sometimes in this season assumed the inflammatory type, sometimes the synochus, but generally the typhus. The violent symptoms were: great lassitude, with universal pains in the muscles; chills; heats, if any, were of short duration; unusual prostration of strength; delirium, with severe pain in the head; vomiting, with indescribable anxiety at the stomach; eyes red and watery, and rolled up, and head drawn back, with spasm; pulse quick, weak and irregular; petechiæ and vibices all over the body, and a cadaveric countenance and smell. Death often closed the scene in ten or fifteen hours after the first attack; some, however, survived all these symptoms. Those who died generally appeared to sink away under the load of disease, became cold and low, and died comatose, with all the marks of general mortification; others went off suddenly, apparently apoplectic. The body, near the fatal period, and soon after, became as spotted as an adder, and demonstrated a general dissolution of the fluids. When the vital flame began to be rekindled in the system, some grievous external affection most certainly appeared—such as inflammations of the joints, like the acute rheumatism, or an erysipelatous affection of the skin, or racking pains, without any morbid external appearance, convulsions, spasms, &c. These external affections often proved very lingering and tedious. This, however, generally proved a manageable state of the disease."

Dr. Elisha North has given an account in most respects resembling the above; but it will be interesting to notice a few symptoms which he met with, and which are not mentioned by Dr. Woodward. "If I have not deceived myself, almost all had a kind of œdematous feel of the skin, especially about the hands and wrists."

"Upon inquiry, almost all would tell you that they had, in the commencement of the complaint, a slight sore throat, although few would mention it of their own accord. In a few, but very few, however, I have been able to discover aphthæ on the tonsils. In gene-

ral, they would tell me the soreness was a little lower down in the throat.

"In the bad cases, the most distressing symptoms were, pain of the head and universal distress and agony, which would cause children to draw back their heads, and toss and throw about their limbs."

Petechiæ were by no means constant. He speaks of a "sinking state," but does not describe it further. He seems to refer to the condition mentioned above by Dr. Latham (see page 96), and which was subsequently noticed by Dr. Miner, in 1825. The worst form this disease ever assumes, particularly in children, is that of coma, or cholera morbus."

During the summer of 1807 and 1808, the disease was seen at Hallowell, Me., by Dr. Page.*

At Minisinck, Orange Co., N. Y., in 1808–9, it was seen and described by Dr. Arnell. He speaks of an "indescribable distress about the præcordia," and says sight was at times temporarily lost.†

In 1810, this disease was seen in York County, Maine, and was observed until 1812; it was again seen in the autumn of 1814 and spring of 1815. It is said to have "differed from all other diseases, and yet it assumed in different subjects the livery of all."‡

It was in 1810 that a committee was appointed by the Massachusetts Medical Society to receive communications and report on this then new disease. The committee consisted of Drs. Thomas Welsh, James Jackson and John C. Warren, and on the 21st of June they made their report, which was afterwards published. It appeared in Dana at the beginning of that year, and more cases after the middle of January. Also, it appeared at Petersham in the latter part of February; at Barre, Oakham, Rutland, Paxton, Hardwick, New Braintree, Brookfield, Spencer, Sturbridge, Winchendon, Athol, Gerry, Leicester and Worcester, during March; Cambridgeport on the 24th of March, and at Lancaster in April; in April and May at Boston, and also in many towns in Worcester and Middlesex Counties; during May in Springfield. The headache is noticed as a universal symptom and as one of the first, or the very first occurring. Delirium seems to have attracted more attention than in previous years;

* Medical Repository, N. S., vol. iii.

† American Medical and Philosophical Register, vol. i.

‡ New England Medical Journal, vol. iv.

the varieties of the disease, the following is given as a description of some cases which occurred, especially among females. "Universal, deadly coldness; skin white as polished marble, and smooth; countenance perfectly placid, not one distorted muscle; pulse at the wrist imperceptible; motion of the heart scarcely to be felt; respiration visible only by gasping, and that not frequent; and, as it were, only a step between this imperfect state of life and death." Even from this state of deadly stillness patients were restored to life and health.

A good description of the usual eruption is given, together with some anomalous appearances of the skin. "The spots on the skin are of various descriptions. They occur in all stages of the disease; less frequently, however, on the first than on the subsequent days. Frequently a rash or miliary eruption only appears, or a few blotches on the inside of the elbow and other similar parts; and it has been suggested that these may be produced by the mode of treatment usually adopted. The blotches are florid, or red and fiery. An appearance like measles has also been noticed, and likewise vesicles and pustules, which have been compared to the vaccine and variolous eruptions. In some cases these spots and eruptions have appeared at succeeding periods, two or three times in the course of the disease. The vesicles and pustules are very frequently torn by scratching; after which, or without being torn, they are commonly followed by scabs of a brown color, but occasionally they are followed by ulcerations, which do not heal until after recovery. These affections of the skin are often attended with itching; and independent of them itching very frequently occurs, especially on the third day, when the symptoms become more favorable at that time. This itching is sometimes extremely violent, so that the patient will almost tear up his skin in endeavoring to alleviate it. All these affections are frequently noticed at the time when the more important symptoms abate or subside. In a few cases, vesicles containing a bloody fluid occurred in the county of Worcester. These vesicles were compared to blood-blisters, and were about the size of a large pea; they appeared on various parts of the body and limbs; in a few days they broke, discharged a bloody fluid and scabbed over. In one case, in which the attack was very violent, blisters resembling those produced by cantharides appeared on the second or third day on the breast and on one foot. They were about five inches in length and nearly one in breadth. On the fourth

day from the attack, some of those on the breast and that on the foot became black and dry, and the skin was sphacelated. The eschars, with due treatment, left clean ulcers, which healed without scars."

The petechiæ and vibices "occur in comparatively few cases of the disease. They are of worse portent in proportion as they are more dark colored." They were not always found in fatal cases nor confined to such.

In the appearances upon examination after death, there was a close resemblance to the disease as seen at the present day. When the cranium was separated from the dura mater blood was discharged; serum was found beneath that membrane, being sometimes of a red color. The sinuses, especially the longitudinal, were filled with blood; there was also congestion of the surface of the brain. Between the arachnoid and pia mater there was found an opaque substance—coagulated lymph—which followed the course of the vessels. The hemispheres were sometimes adherent to the dura mater and to each other. There was serum in the lateral ventricles; and the choroid plexus was thicker and harder than usual.

The blood was unusually dark in the heart.

"In one case the cavity of the thorax was the seat of very considerable disease. The heart was inflamed, and exhibited a large, thick flake of yellow lymph on its anterior face. The pleura of the right side, both of the ribs and lungs, was covered with the same substance, and the cavity of the pleura contained a very large quantity of half-formed pus. The color of the lungs externally was an ill-looking purple, and the pleura over them seemed to be shrivelled, and adhered to the diaphragm. Their consistence was uniformly firm in this case.

In 1811 Dr. Elisha North published his treatise on "Spotted Fever," extracts from which have already been given. In speaking of the diagnosis, he says:—"It is obvious, however, from the great variety of symptoms which this disease exhibits, that there will be great liability to mistake it for several other diseases, particularly cynanche maligna, scarlatina, common typhus, rheumatism, hydrocephalus internus, cholera morbus, hysteria, mania, phrenitis, apoplexy, nettle-rash, colic, &c."

Until this time the epidemics had borne a very strong resemblance to what we have seen in our own day, the nervous centres being especially affected; but during the next three or four years the pneu-

monic form was in many places prevalent, sometimes to the exclusion of all others.

During this time the disease was seen, in the spring of 1812, in various towns of Vermont and Maine, and in Salisbury and other towns of New Hampshire; in the State of New York, especially in the vicinity of Albany among the soldiers, in the pneumonic variety, and at Blackrock, near Buffalo, in the autumn of the same year; at Burlington, Vt., Granville, N. Y., and at Niagara in the winter of 1812–13. It appeared in Maine, at Lyme and Waterford, Conn., in Western New York, Philadelphia, and Winchester, Va., during the winter and spring of 1813; in Southern Virginia, at Chowan River, N. C., Natchez and in Eastern Mississippi in the autumn of 1813; at Bardstown, Ky., and in Talbot and Queen Ann's Counties, Maryland, during the winter of 1813–14; at Hallowell, Gardiner and Kennebeck, Me., Malone, N. Y., Natchez and in Eastern Mississippi during the winter and spring of 1814; at Berwick, Me., York County, Me., Edenton, N. C., and in Southern Virginia during the summer and winter of 1814; at East Greenwich, R. I., at what was called Northern Neck, Va., at Falmouth, Richmond and Middlebury, Va., in Southern Virginia, at Salisbury, N. C., Columbia, S. C., and Milledgeville, Ga., during the year 1815.

During this period the type of the disease was rather more sthenic in its action than that previously observed. This change in the grade of the fever was coincident with a change in the part affected. The lungs received the weight of the disease, and pneumonia was very generally observed: so general was this, and so free were the patients from all affection of the head, that the disease was considered by many as differing materially from the so-called spotted fever of former years.

Dr. James Mann, in his "Medical Sketches of the Campaigns of 1812, '13 and '14," has left us valuable information with regard to this epidemic as it appeared among the soldiers in Greenbush and other places. He says:—"It has been already observed, the sudden change of weather in October (1812) introduced additional forms of disease among the men. We have to notice one of more formidable and more questionable symptoms—pneumonia, or inflammation within the breast. This disease was, in some instances, accompanied with diarrhœa, or supervened where diarrhœa previously existed which last disease had not entirely disappeared. The following are

the most prominent symptoms:—pain in the chest; in some cases one side, in others both were affected; short and difficult respiration; dry cough; the pulse of those whose condition was most alarming was small and hard; the heat of the body and extremities not above the standard of health, sometimes below.

"This disease, when it first appeared at Greenbush, was not considered as being connected with an epidemic state of the atmosphere.

"In proportion to increase of cold, this disease became more frequent and severe.

"It may be necessary to observe, the winter epidemic of 1812–13 was a form of disease distinct from that which, in the northern districts of the Eastern States, the preceding winters, had been known by the name of *spotted fever*, although the exciting causes may have been similar. In the *spotted fever*, mental derangement was an almost general concomitant of the disease. In many instances, this affection of the brain was the first symptom of morbid action. Whereas, *pneumonia*, especially among the troops, was never accompanied with mental derangement, at its first attack, and but seldom in its more advanced stages; nor until the laborious respiration, which was a most prominent symptom at its first attack, had somewhat subsided, or the patient was at the point of death.

"This epidemic appeared under the forms of both sthenic and asthenic diathesis; although under the last it was often, if not always deceptive. In many of the first cases at Burlington, the disease proved fatal in two, three and four days, by the violence of the first attack; in some instances, in less than twenty-four hours after the first symptoms of indisposition supervened.

"The following were the most conspicuous features of the disease under its most deadly form. At the first attack the heat of the body and extremities was below the standard of health; the pulse contracted and hard, sometimes scarcely perceptible; respiration extremely laborious—not apparently so much from sharp pains through the sides and breast, as from a sense of suffocation. The patients say, upon inquiry, that they do not suffer from extreme pain, but a weight upon the chest—an oppression from inability to inhale the air.

"This epidemic was wide spread in its influence, prevailing from

Lake Erie down to Lake Champlain; over Vermont, the northern counties of Connecticut, Massachusetts and New Hampshire."

"In the second stage of the disease and where there was a weak, soft pulse, bleeding was injurious; yet the antiphlogistic regimen was necessary. Here the respiration was difficult, but not suffocated, accompanied with pain in the side, and expectoration of bloody mucus; the bronchiæ were so crowded as to be incapacitated to free themselves from the load with which they were oppressed; the heat of the body was never much above the common standard of health. This form of the disease was frequently accompanied with diarrhœa.

"The third form of this disease showed itself with less questionable symptoms. At the first onset of the disease, there were strong rigors, with acute pain through the chest. The rigors were soon followed by much heat, strong pulse, cough, and no expectoration. The efforts of coughing always increased the pain in the breast."

Dr. Silas Fuller, stationed on the Niagara frontier, observed the same disease, which was not so much confined to the army, but spread more among the citizens. He says:—"The disease appears evidently to depend on some peculiar state of atmosphere as a remote cause; and an exposure to wet, cold and fatigue as an exciting cause. In proportion as these causes have operated, a more or less violent form of the disease is produced. The most common form under which it has presented itself is that of sthenic pneumonia; the most fatal and unmanageable of the pneumonia notha of the old books. Under this last form it has seldom appeared.

"The asthenic form most commonly commenced with cold shivering. After some time there is a sense of heat. In some instances, the common symptoms of *pyrexia* are noticed. The pulse, however, for the most part is small, and the heat not higher in degree than natural. During the course of the disease respiration is extremely laborious, with slight erratic pains through the chest.

"A sense of weight and fulness is felt through the whole extent of the thorax, which are increased to an insupportable degree, while the patient is in a horizontal position. There is a peculiar paleness and wildness not easily described.

"This epidemic, in its sthenic form, is not always a pneumonia. The fever has sometimes appeared without any local affection, under the type of *synocha*. In a few instances, the inflammation has attacked the brain and its meninges, producing *phrenitis*. Inflammation,

with suppuration in the throat and frontal sinuses, are varieties of the disease.

"The sinking stage of the disease is known by the smallness of the pulse, coldness of the extremities, dark or shining appearance of the tongue, extreme debility, with some degree of delirium, and subsultus tendinum."

Jaundice during convalescence, discolored fæces, and hæmorrhages from the intestines also occurred.

During the campaign of 1814, Dr. Mann met with the same disease at the Malone Hospital:—it "was accompanied with all the same symptoms under which it appeared the preceding winter, but its attacks were less frequent. There were a few cases of disease which assumed the form of spotted fever—in which the brain seemed to be the seat of the disease; a mental derangement having been the first alarming symptom, without any pneumonic affection. All of these died within the first twenty-four hours; two of the number within six hours."

In an account of the epidemic of 1815–16 at Sharon, Mass., and vicinity, he says:—"In four or five instances this epidemic made its assault upon the head." Afterwards pneumonia supervened. Three cases out of seventy had symptoms of erysipelas.

"At Rochester, County of Plymouth, there were cases where the disease was not confined to the lungs; but the inflammation appeared under the form of cynanche trachealis, pharyngea and parotidea, as the trachea, tonsils and parotid glands were successively or simultaneously affected."

"It should be understood that, notwithstanding all the above conditions, the most prominent symptoms of typhous fever do not exist in this complaint—as debility and low delirium. In a very few instances, delirium has accompanied the other symptoms of the disease, but it is always phrenitic."

I have given such copious extracts from this work by Dr. Mann, because by his position in the army he had great advantages for the study of the disease as it appeared among the soldiers, and more clearly than any one else has given the symptoms and the objections against considering it spotted fever. It must be acknowledged that its action was much more sthenic; but the head symptoms were not absent; they did not appear at Greenbush, but were seen at Niagara, and again in another year at Malone, and afterwards at Sharon.

Other symptoms, too, were present which are often found to accompany spotted fever, as sore throat, and even debility was noticed in some cases. We shall see, by other accounts, that elsewhere the disease yet more closely resembled that which we are considering; and even in the vicinity of Albany the pneumonic form was not invariably met with. The following *post mortem*, which was performed at that city in the last part of March, 1812, presented no morbid appearances in the lungs. The young man was attacked March 28th, and died in thirty-two hours. "The claret color on the surface appeared to have been produced by a slight effusion of blood into the cellular substance; the omentum was of a pink color; the bloodvessels of the mesentery and the vena portarum were distended with blood; the spleen was about four times its usual size, but of a healthy color and consistence. On cutting into it, a great quantity of grumous blood of a very fœtid smell oozed out of it; the stomach was empty; the gall-bladder full of yellow bile. Nothing further was discovered in the abdomen differing from a healthy state. The lungs were of a healthy appearance; the heart and large vessels connected with it, particularly the aorta, were distended with blood; the coronary vessels were as minutely injected as I have ever seen them in the best preparations. On removing the skull-cap, the dura mater and brain were distended with blood; on making incision into any part of the brain, the cut surface was instantly covered with the blood which oozed from its vessels; the right lateral ventricle contained about a tablespoonful of serum."*

Dr. Southwick, of Albany, has given an account of the symptoms as he found them in his practice. His first case occurred in October, 1812, a young man who had been living at Greenbush; his second case was seen in November. Afterwards the disease became more common, and he treated many who were thus attacked. In his account he says:—"The patients now complained of pain in different parts of the body—the heels, ankles, knees, hips, small of the back, shoulders, breasts, sides and head—a heavy, painful sensation in the eyeballs; they suffered under these pains at different times, and often at the same time.

"The most distressing chills ushered in the disease. My patients told me the chills were different from anything they ever felt before;

* Medical Repository, 3d Hexade, vol. iii.

they were peculiarly agonizing in some, and in the language of two, 'they were like throwing cold water on their hearts.' The tongue at first always pale, and its secretions inactive. This paleness of the tongue continues in the worst stages; pulse in almost all these cases little different in frequency from natural, but the sensation given to the finger by the artery *peculiar* and *new* to me; it appeared that during the intermission of each pulsation the vessel had completely emptied itself. The pulsations, though they appeared to distend the artery to its usual capacity, were weak and languid. In short, it exhibited every mark that would deter a prudent physician from bleeding.

"In the majority of cases they complained of pain in the right side and across the breast; with the last symptom a slight but frequent cough was frequently attendant."

"In the second stage the pulse became quick, feeble, and often hardly perceptible. This generally took place on the third day.

"If no favorable crisis had taken place at this time, the pain in the head or side would return sometimes with a burning sensation at the stomach attended with more or less nausea; now the breast suffered the most distressing sensations from an incapacity to fill the lungs by inspiration."*

Dr. Hunt, of the U. S. Navy, writing from Washington, says concerning the cases which came under his observation:—"The disease frequently comes on in the form of a common cold, attended with cough, sore throat, redness of the eyes, and a pain in the right pap. In about forty-eight hours a fever takes place, with increased pain in the breast, and frequently delirium. The pain is so severe for several days as to keep the patient in a state of constant agony." "This disease was certainly a pneumonia, attended in the commencement with typhoid symptoms, which quickly changed to a typhoid state."†

Dr. Robert Dunbar, of Winchester, Va., under date of February 22d, 1813, says that the subjects were generally from 12 to 20 years of age. "The symptoms were not uniform, but varying in proportion as the disease was marked with malignancy or mildness. Its attacks were accompanied with great lassitude, rigor, long-continued chills, great prostration of strength, unusual depression of spirits; eyes suffused, with a slight tinge of redness, accompanied with a glassy appearance. The pupils, in the cases I attended, were but

* Medical Repository, N. S., vol. i. † Ibid.

little dilated; stupor, delirium and coma, with pain in the head, stomach a little affected with nausea, occasionally amounting to a propensity to vomit."

There was soreness over nearly the whole body; in almost every case sore throat and difficult deglutition were found. In a few hours after the attack the jaws were sometimes fixed; opisthotonos existed, the head being drawn back and the spine curved. The pulse was irregular, generally weak, and often not perceptible. Petechiæ and vibices were seen generally over the whole body.*

A committee of the Medical Society of the County of Saratoga made a report in regard to what was called the "winter epidemic," in which they say:—"The bilious pneumonia became epidemic in some towns in this County early in December, 1812, in most others in January, 1813. In one or two it did not appear earlier than the first part of February.

"The first stage commenced with a cold chill, which has sometimes lasted from four to twenty-four hours or longer, but it generally continued from thirty minutes to two hours.

"During the continuance of the chill, the patient is generally affected with a violent pain in the head, back, loins and some part of the thorax. It sometimes, at the first, extends to the limbs, resembling acute rheumatism; at other times to the bowels, resembling enteritis."

There were pneumonic symptoms—pain, cough and bloody sputa. Nausea was common. The pulse during the cold stage was weak, small, and sometimes imperceptible at the wrist.

"Second stage. When the fever did not terminate about the fifth or seventh day by a favorable crisis, the following symptoms generally ensued:—the pulse became full, soft and weak, from 90 to 100 strokes in a minute; the tunica adnata of the eye and skin became yellow, the tongue dry and coated with a dark brown, except in a few cases where it was smooth and glazed, of a dark red; heat and dryness of skin much more considerable than in the former stage; the bowels swollen and elastic."

They did not consider it different from the pneumonias of fifteen or twenty years before.†

Dr. Job Wilson, in his treatise on the "Nature and Treatment of

* Medical Repository, N. S., vol. i.

† Ibid., vol. ii.

Spotted Fever," has given an account of the disease as it appeared previous to 1815 in New England. February 16th, 1812, he was called to a case in which sudden and violent pain in the head was the first symptom; this was soon followed by severe pain in the right side of the thorax. The patient recovered. In March, Dr. Wilson saw other cases, in which the lungs were affected. He describes the symptoms of the disease thus:—"Extreme cold shivering, acute pain in the side or head, but occasionally in the hands or feet. Sometimes it affected the bowels and back in the form of colic or dysuria. In other cases, the most acute pain would be felt in the ear, the jaw, or even in a tooth. The breathing was in most cases difficult, attended with cough, and often with a bloody expectoration. Delirium was frequent, but not a uniform symptom. Some were affected with an unmanageable, furious delirium, similar to that which attends phrenitis. Others were affected with low muttering and comatose delirium, attended with a disposition to sleep. Some few, as the disease declined, became insane; but the insanity was of short duration, and entirely left them on the recovery of their strength. Difficulty in voiding the urine was almost a constant symptom; the hands and face were generally of a leaden color, and moderately swollen; a very slow motion of the blood in the capillaries was very perceptible, by making a slight pressure on these parts with the point of the finger; effusion of blood or lymph in the rete mucosum and cellular membrane, as likewise effusions in the sockets of the eyes (the eyeballs were occasionally suffused with blood); deep effusions in the extremities, lying in immediate contact with the periosteum, and occasionally occupying the whole limb, and extending from joint to joint; effusions of blood and lymph in the cavity of the thorax, in the cells of the bronchiæ, and in the brain, &c. Blood was occasionally discharged with the urine, and in some cases from the bowels, resembling dysentery. Raising blood from the lungs was frequent. A discharge of blood from the nose was frequent, and not an unfavorable symptom. He mentions, also, an eruption of hard, white pimples, and likewise a rash "similar to ring-worms."

In 1813, the same disease occurred in New Hampshire and Vermont; in some places with great mortality, in others in a very mild form. "In 1812, the lungs were almost universally affected, and death was caused by suffocation, &c. In all the cases which I witnessed in 1813, the lungs were not so generally affected; the head appeared

to be the part which suffered most, and the patients appeared to die in convulsions, apoplexy, palsy, &c." Subsequently this disease occurred less frequently and was less fatal.

Dr. Wilson gives two *post-mortem* examinations, which have not yet been noticed. One was of a lady, who was attacked April 27th, 1812, and died on the fourth day, from suffocation. On opening the thorax, there was found extravasation of lymph of a yellowish appearance in the cellular membrane; and also extravasations of blood into the substance of the lung, having a dark color. The same was seen on the internal surface of the pericardium, though much larger. The pericardium contained nearly a pint of serum. The upper portion of the lung was heavy, sinking in water; the air-cells were filled with a yellowish lymph. "This viscus was of a dark red color, and adhered, throughout its whole surface, to the pleura and diaphragm, saving the posterior surface, where there was a large collection of lymph." The cavities of the heart were distended with very dark blood. The liver was very much engorged and of a dark red color, except in spots where it seemed to be healthy.

In another case where the patient, a young man, 17 years of age, died on the eighth day of the disease, there was found extensive extravasation of blood into the lungs, some of which had been absorbed; the upper portions were very much engorged with blood. In the brain also was found more or less extravasation in the membranes, and several small deposits of lymph on the surface; much of the blood which had exuded from the vessels had been absorbed.

Dr. Utley, of Lyme, Conn., recognized two varieties, one where pneumonia existed, the other without any affection of the lungs.

The second was "ushered in with a sense of distress at the præcordia or pit of the stomach, thence ascending to the head, as a pain or dimness of sight; this returned down along the spine, attended sometimes with universal paralysis." Prostration was extreme.*

Dr. Kercheval, of Bardstown, Ky., says, "It happens in a certain proportion of the cases that the head is the primary seat of the disease; the chest at the same time remaining free from any local disorder."†

Dr. Ira Bascome, of Granville, N. Y., says that petechiæ seldom appeared. He found the lungs more severely affected than in the spotted fever described by Huxham, Pringle, and others. Among

* Medical Repository, N. S., vol. ii. † Ibid.

the symptoms, he mentions, chills, a low quick pulse, languor, pain in one side, nausea, dull pain in the head, livid countenance, soreness across the temples and eyeballs. The sickness, vomiting and headache were sometimes severe from the beginning. In others common catarrh first appeared; suddenly it assumed the most alarming symptoms; a violent pain, most frequently in the right side. These are the principal symptoms; "but others too numerous to mention have appeared in various parts of the country." "As far as I have been able to learn it is the same disease which had prevailed in some parts of New England and New York for several years previous, under the various denominations of spotted fever, catarrhal fever, peripneumonia notha, &c."*

Dr. B. Vaughan, of Hallowell, Me., found the spots to be usually wanting. He adds to the list given by Dr. North of the diseases for which it may be mistaken—"pleurisy and other diseases of the chest, nervous headache, palpitation of the heart, earache, sometimes followed by discharges from the ear, lethargy, stretched and shining skin as in dropsy, and stiffened muscles," sometimes epilepsy. He mentions the affection of the throat. The head was not specially affected.†

The disease occurred in Maine in 1811, '12, '13 and '14. Dr. Hazeltine considered it the same as spotted fever, and the symptoms agree with the description given by Drs. North, Woodward, &c.‡

Ennalls Martin, M.B., of Maryland, in the winter of 1813 and '14, found headache a very prominent symptom and the pain in the thorax less marked.§

Dr. Joseph Trent, of Richmond, says that the force of the disease was sometimes expended on the throat and fauces. The muscles of respiration and the glottis were spasmodically affected. Large glandular swellings occurred about the neck.‖

Thomas P. Hereford, of Middlebury, Va., found that it appeared under varied forms affecting the lungs, brain and throat, and generally of a typhoid character.¶

Dr. E. Simpson Davis, of Milledgeville, Ga., met with cases from April 21st to April 28th, 1815. Glandular affection of the throat was common, and there was no apparent congestion of the lungs.**

Dr. John Kerr notices the disease as it appeared during 1813 and

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* Medical Repository, New Series, vol. iii. † Ibid. ‡ Ibid. § Ibid.
‖ Ibid. ¶ Ibid. ** Ibid.

'14 in Natchez and Eastern Mississippi. In the winter of 1814 he saw many cases of unusual malignancy where the breast, head and throat were affected. The disease was not so frequent nor so severe as at the North. *

Dr. E. Hale published a work on the spotted fever as it appeared in Gardiner, Me., in the spring of 1814. His account of the symptoms is very full and interesting. He noticed the sudden and violent manner in which it frequently made its attack, and the great variety in the symptoms. "In the earlier part of the epidemic period the disease always commenced with severe pain in some part of the body, which, if it did not begin there, soon extended to the head and back; and in a few cases the pain increased, till in a short time it produced a delirium. Later in the season, however, pain was a less constant symptom." "Besides the varieties of pain which I have mentioned, there was in several cases, during the first day or two, acute pain in the chest, accompanied by a cough and expectoration of thick mucus, often streaked with blood. Early in the season this symptom was pretty common, but afterwards it seldom appeared. The cough and expectoration were considerably common in cases where there was no pain in the thorax." Nausea and vomiting, thirst, chilliness and a weak, rapid pulse are mentioned among the symptoms.

He mentions a second stage, in which vomiting was the principal symptom, the pain being in many cases removed. There was often a feeling of lightness about the head; diaphoresis occurred, and the countenance was less expressive of anxiety. The vomiting was obstinate and required remedies to control it.

His third stage was the comatose, in which the patient gradually became unconscious, and after a while it was impossible to arouse him; his breathing became stertorous and he died.

He does not seem to have met with many cases in which there remained, after the acute stage, the state of chronic ill health so often seen elsewhere.

He mentions seven or eight cases in which the lungs appeared to be more or less affected, but as no *post-mortem* examinations were allowed, it is impossible to say how far the disease of the lungs extended. It does not seem generally to have been severe, and was in each case, except two, attended with symptoms referable to the head.

* Medical Repository, N. S., vol. iii.

Dr. James Davis, of Columbia, S. C., published an account of the disease as it appeared in that section of the country during 1815 and '16. He states that the disease commenced as an epidemic of common cold in November, 1815, was at its height during the middle of January, and had nearly subsided by the second week of February. Not a single case of a formidable nature occurred without a chill; after the chill there was more or less fever and pain in the thorax. The pneumonic form, with the usual symptoms, was the most common and prevalent. Next in frequency was the form with a determination of the disease upon the brain and meninges, with violent pain in the head, suffused countenance, redness of the eyes and delirium.

"In another form, the disease fixed on the bloodvessels only, in the form of a violent fever; and in the third, but in very few instances, there was a local determination to the throat, producing cynanche pharyngea."*

Under date of February 22d, 1815, Dr. J. Comstock wrote a letter to Com. Perry, which was published in the *Medical Repository*, New Series, vol. iii. Though it does not give a detailed account of the symptoms, it touches upon many points of interest. He considered the disease which prevailed at that time in the Southern States a modification of that which had for nine years been epidemic in various parts of New England.

His reasons for believing the two diseases essentially the same are:—"1st. The unity of period in which the disease first invaded. 2d. The complaint being aggravated in both sections of the country by bloodletting. 3d. Its being in both places a disease of great malignancy and mortality, at a very unusual season of the year, viz., in the winter—the greatest number of deaths happening in cold weather and diminishing at the approach of summer, contrary to most fevers, and just the reverse of what happens in yellow fever, a disease of hot weather, and which is checked by cold, and which, I may add, requires a very opposite method of cure. 4th. The case of Gen. Washington (who, he thought, died of the disease) shows the tendency of the complaint *there* to affect the throat from the first in a greater degree than here; yet a slight sore throat is thought by some accurate observers amongst us to be the most certain sign of

* Medical Repository, New Series, vol. iii.

the disease, and I have had several cases in which it put on the form of malignant sore throat."

"It is now proper to observe that very little uniformity has taken place anywhere in this very eccentric disease." "From different symptoms attending it, it has in different places been called by other names, as *spotted fever, pneumonia typhoides, typhus fever, cold plague, malignant pleurisy, cholera morbus, bilious pleurisy, palsy, dysentery,* &c. &c. And it is an acknowledged fact that it has attacked in almost every shape and form that any human malady ever assumed, among which I may reckon toothache, common cold or catarrh, sore throat, numbness, pain in one of the fingers, a sensation like the stinging of a bee, sudden blindness, a failure of senses, loss of the use of the limbs, convulsions, coldness, paleness and shrinking of the features, and, on the contrary, with fulness of the face and redness, sometimes with and sometimes without heat, rheumatism, &c.

"Sometimes a vomiting of a thin black matter, resembling soot-water, or rather bilge-water, takes place early or late in the disease, and denotes such a tendency to gangrene as leads to an unfavorable prognosis." "With this, sometimes without it, are pitch-like dejections, and often those of a bottle-green color, sometimes foaming, as though in a state of active fermentation. I believe from hence that in some places it has been denominated a violent bilious fever."

"In two patients, the vomitus resembled blue dye; more frequently of a green or bottle-green, and once claret. In other cases, nothing unusual in any of the discharges, and these were cases which yielded most readily to the stimulant treatment—viz., to bark, wine, opium and alcohol. Some other cases required stimulants for the first day or two, because the debility was extreme, and afterwards emetics and cathartics to cleanse the first passages."

"Morbid matter was not always brought up by vomiting, but in the worst cases by eructation or belching."

"There was a tendency to intestinal hæmorrhages, especially in 1810."

Dark, bloody and frothy matter, and sometimes small particles of the lungs, were coughed up. The fever was sometimes converted into complete mental derangement, upon cessation of which the fever returned."

It "seems difficult to find anything specifically diagnostic to distinguish it from other distemperatures. The pulse, however, is the

guide." "It may not always be quicker than it is in health, which is the case perhaps in all other fevers, and yet it is sometimes extremely quick, even to 130 or 140 in a minute. It may not at first seem much weaker upon a slight examination than the pulse of a person who is able to be about, although it is often very much so. But one thing in all cases is certain—viz., that it is easily *compressible* and always void of that *full, high, hard, resisting* beat, which is the plainest indication of inflammatory disease. The feeling of the flesh also has often something peculiar. It has a soft, flabby feel, somewhat like velvet; and if there is much heat, it is of a penetrating, prickly kind, instead of giving a burning sensation, like the skin of inflammation. The softness of the flesh has been noticed in dissections, the muscular parts having lost their tone, like meat that had been frozen and suddenly thawed. It is from hence that there is a tendency to those effusions which constitute danger and cause death, and which seems to be in that particular part, as we suppose, in which the loss of energy is greatest. If this be the brain, the consequence of the effusion may be apoplexy, palsy or convulsions; if in the thorax, symptoms like pleurisy and peripneumonia; if under the skin, spots; if in the throat, swelling, even to strangulation, or a sudden sphacelation; if in the stomach, it may be so abundant as to waste the body with marasmus, accompanied with puking or diarrhœa."

"That particular form of the disease which affects the lungs may have its origin from effusion into that viscus, with cough and bloody expectoration, and perhaps some peculiar symptoms which may have given rise to the appellation of *lung fever*."*

In 1815, Dr. Joseph A. Gallup published a work on the "Epidemic Diseases in the State of Vermont." He devotes a portion of this to spotted fever. His account of the symptoms agrees in most respects with what has been already given. "The eyes are generally dull and heavy, inclining to shed tears without being conscious of it." "The lungs are pressed with blood, but seldom any cough. Respiration is often laborious, and patient inclines to be quick of speech." "The region of the heart is sometimes the principal seat of the disease, and not so violent in the head." "The eruption which has given name to this disease, is not a constant attendant." "It was very common for relapses to occur, or for the disease to be repeated,

* Medical Repository, New Series, vol. iii.

after the patient had returned to his ordinary employment." He does not mention the pneumonic form, though his next article is devoted to peripneumony, in which he says:—"The disease of 1811 and 1812, called petechial fever, and the present epidemic, seem to have many things in common." "The chief difference seems to consist in the locality of the principal affection."

The *post-mortem* appearances were those so often observed in other places where the head was affected—congestion and exudation. "The thorax exhibits similar traits of membranous inflammation. The heart is most commonly the seat of its greatest violence, when the seat is in the thorax; the small bloodvessels seem beautifully injected." "The outer coat is frequently covered with extravasated lymph of different degrees of consistence or firmness." The pleura was also at times inflamed.

In considering these various accounts of the epidemics of 1812–16, we see that in many of them the symptoms differ from what was seen before and from what we witness at the present time. The question arises, is it the same disease in both cases? There is not only a difference in the particular organ affected, but in many cases the grade of action is different. In some places the fever ran high, with a full, hard pulse, and depletion was useful; in others, the pulse was small and weak, or if full was easily compressed and soft, and depletion was rather injurious. In some places the head was not at all affected; in others, the lungs were entirely free. Were they, then, the same disease?

Dr. Hunting Sherrill, in an address before the Dutchess County Medical Society, delivered in November, 1819, speaking of the diseases which had prevailed in the County during the previous ten years, says:—"We met with cases putting on nearly the character of usual phlegmasial fever; and we saw it receding from that, through the varied grades of excitement, to the typhoid state of disease. It may now readily appear why the disease was called and described by the different names of peripneumonia, peripneumonia notha, peripneumonia typhoides, bilious pleurisy, bilious fever, typhus fever, spotted fever, and many others, either of which was probably more correct than the delusive ones of *typhus fever* or *spotted fever*." And so it was elsewhere, the disease took varied forms and degrees of action; in one person being a frank open fever with quick, hard pulse; in another being essentially asthenic; and both occurring at

the same time and in the same place. The affection of different organs was also noticed at the same time, in the same place; even in the same individual both forms were seen. Dr. Gallup says, "Neither of the diseases was strictly confined to one of these parts or the other (head or lungs). When most in the head, the diseased affection would be slightly traced in the thorax; and when in the thorax, some could be traced in the membranes of the head." *

It may be worthy of notice, that when the lungs were affected the fever was more severe and had more of a sthenic character, than when the brain was the principal seat of disease.

Both forms occurred during the same years and during the same season, being most frequently seen in the winter; both occurred in the same immediate vicinity; both were acknowledged to depend on the same causes—atmospheric changes, assisted by fatigue, cold, wet and other debilitating influences; both required nearly the same treatment, allowance being made for the greater debility in one than in the other; symptoms peculiar to each occurred in the same individual; the symptoms which were not strictly local were similar in each; both were marked by the peculiar erratic character of their symptoms; they were recognized and spoken of by many able practitioners, who saw and treated cases of both, as only different forms of the same disease. Hence it may be safely concluded that the two forms we have been considering are only different manifestations of the same complaint.

It will not be necessary to consider so minutely the symptoms observed in succeeding epidemics, as they are not materially different from what has already been recorded.

In 1816 and '17, the disease we are considering appeared in various parts of South Carolina, in Salem County early in 1816, and in Claremont during the winter of 1816–17; from 1818 to 1822 it was seen in Mecklenburg, Lunenburg, and Brunswick, Va.; in some parts of the Western States during the spring of 1819, and also in North Carolina and the mountainous parts of Virginia; in 1821 in Franklin County, Penn.; in 1823 it was recognized at Saco, Me., Berlin, Conn., in the Shenandoah Valley, Va., and possibly at Marietta, O., though the account of that epidemic is not very satisfactory. In 1823, '24 and '25, it was seen in the vicinity of Middletown, Conn., also in some parts of that State in 1826, and likewise at New Orleans

* Epidemics of Vermont.

and Fort Adams; and in 1827 in Trumbull County, O. In 1832, sporadic cases occurred at New London, Conn., which in many respects resembled this disease; there was extreme exhaustion and great sinking at the epigastrium; a chronic state of debility and nervous exhaustion frequently remained after the attack. There is no mention made of this disease from that date, till in 1845–46 an epidemic pravailed in Clark County, Ill., called "black tongue," thought by Dr. McCoy to be cerebro-spinal arachnitis on account of the post-mortem appearances. In the early part of 1847 it was seen in Mississippi, Tennessee, Missouri and Arkansas, and "resembled a modified pneumonia;" in the winter of 1847–48 at Washington, D. C. Dr. Ames has given a very interesting account of it, as it appeared in Montgomery, Ala., during the winter and spring of 1848. He saw cases which were attended with inflammation of the fauces; others with pneumonia; and two patients had at the same time roseola, which was then prevalent. Dr. Sargent read a paper before the Massachusetts Medical Society on this disease as it manifested itself in Millbury and Sutton during 1849; it was also noticed, the same year, at Mecklenburg, N. Y. Again, a few cases were seen in New Orleans during the last days of January, 1850; in central and western New York during 1857, as recorded in the Transactions of the New York State Medical Society, for 1858. In October, 1859, there commenced an epidemic at Castle Craig in Virginia, which continued nearly a year. Dr. R. T. Lemmon, who gives a report in regard to it, considered it to be dengue, but the severity of the disease was much greater than is usual in that complaint, and the symptoms seem to more nearly resemble cerebro-spinal meningitis.

One symptom is more fully described by Dr. Miner than by any other American writer. In a little work on the Spotted Fever of New England in 1825, he speaks of the variations in the pulse, finding it usually less rapid than in health; in less than twelve hours he found it to vary from 40 to 130. He describes the symptoms usually seen, and speaks more fully than most of the peculiar sensation in the region of the stomach. "A very prominent symptom which occurred in some degree in almost every instance even in mild cases, and probably without exception in all the severe, and happened in every stage, sometimes constituting the first access of the disease, consisted of paroxysms of subsidentia or a death-like sinking sensation in the epigastrium, sometimes very distressing, attended with

coolness or numbness of the skin, and lividness of the extremities." Subsidentia is also mentioned by Dr. Keit, in an account of the epidemic in Trumbull County, O., about 1827. *

The earliest records of the late epidemic, which I have been able to find, are during the winter of 1861–62, when it was seen in the army of the Potomac, and in Livingston County, Ind. In the fall of 1862, it appeared among the negroes who were taken to Memphis, Tenn., by the Union Army; and one or two cases were met with among the soldiers in the vicinity of Newbern, N. C.; during the winter of 1862–63, and spring of '63, it appeared in La Grange County, and other portions of northern Indiana, at Newbern, N. C., during January, February and March; and during those months and also April, at Newport, R. I., among the midshipmen at the Naval Academy; in February and March it was seen at Philadelphia, and during the latter part of the year at Cambridge, O. During the two successive winters of 1862–63 and 1863–64 it was epidemic in Morgan County, Ill.

The year in which I have found the largest number of accounts of this epidemic is 1864. During the winter of 1863–64 the negroes at Memphis were again visited by it, and during the same winter and succeeding spring, Darwin in the southern part of Clark County, and York in the northern part of Crawford County, Ill.; in the north-western part of Pennsylvania and parts of New Jersey it was noticed during this year, and also in 1862 and in 1863; only a few cases occurred around New York. During January it was in Brattleboro', Vt., during January and February in Philadelphia and at Benton Barracks, near St. Louis, Mo. During March it was seen in Brandon and St. Albans, Vt., and Louisville, Ky., and during January, April and March, cases were seen in Boston, Mass.; during May at Chicago, at Leland and in Williamson County, Ill.; during the last part of July three cases occurred at the Stanton General Hospital, Washington, D. C. In October, Mechanicsburg was visited by it, and in November, Marshall, Ill., and during the latter part of the year, St. Paul's, Ind. During the winter of 1864–65, a few cases were seen at the City Hospital, Boston; in January, 1865, at Greenwich, and in April at Palmer, Mass.; in the latter month at Kewana, Fulton County, Ind., and early in the year at Palestine, near Indianapolis, Ind.; in May at Nittany Hall, Penn. From September 1864,

* Medical Record, vol. xiv.

to May 1865, this disease appeared among the troops on Gallop's Island, Boston Harbor, Mass.

During February, 1866, Dr. D. W. Cheever, of Boston, had charge of a case of this disease.

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## CHAPTER III.

### Treatment.

It is necessary to quote only a few authors to show the similarity between the treatment adopted previous to the late epidemic and that which is now followed.

General bloodletting was not considered judicious; Dr. Woodward says: "Bleeding was tried, but, I believe, always did harm."

Dr. Gallup, however, considers that bleeding may in some cases be employed with advantage, but he does not advocate its indiscriminate or excessive use. "As it has fallen to my lot to speak in favor of bloodletting and against opium, some might begin to think that my whole intention might be to trust the cure to evacuations and debilitating remedies. But when reference is had to the indication laid down in the first number, this will be set right."

Dr. Hale says:—"I mention evacuation among the remedies for this disease, although I did not employ it myself, nor see any case in which it had been employed; because it has generally been considered a powerful remedy, and because it gives me an opportunity to say that I have had no experience of its efficacy. I was deterred from practising it by the great tendency to debility which I witnessed in the disease, as well as by the reports which I had heard of the disastrous effects which were said to have followed its use in other places."

M. Valleix quotes M. Tourdes, who is in favor of bloodletting, and then adds:—"If, now, we inquire what has been the effect of these losses of considerable blood, we see that they have been scarcely noticeable, and that in spite of copious and numerous bleedings, in spite of leeches, in spite of wet-cups, the disease did not the less continue its course, and, which ought to be noticed yet more

particularly, the principal symptoms were not essentially amended. Here is, moreover, how M. Tourdes judges definitively in relation to the value of this remedy.

"'To deny absolutely, says he, the utility of bleeding, would be to fall into an exaggeration as false as the unlimited confidence in the employment of that remedy. The facts would contradict this unjust proposition. There are a certain number of cases in which leeches applied at the commencement and in the two first stages have caused the happiest cures. We could add several successful examples to those which have been mentioned above. In spite of the too frequent inefficacy of bleedings, they have rendered us, in this sad epidemic, more real service than other medicaments.'

"This conclusion does not appear to me as exact as could be wished. It was important to quote the cases in which the recovery has been attributed to blood-letting; for it is difficult to understand how a means, which remains without action on all the symptoms, and which in so many cases has no real influence, can succeed in producing in some prompt and rapid cure."

The Committee of the Massachusetts Medical Society did not advocate bleeding, as it was generally thought to be injurious.

Dr. Mann, it will be remembered, saw the disease in its most sthenic form; he says, "the practice was warranted by repeated and acknowledged success, which followed bloodletting."

Dr. Miner recommends to avoid "every thing that might waste the vital powers."

Dr. Ames, of Montgomery, thinks "blood-letting not very satisfactory."

Casimir Broussais was in favor of bleeding, and considered it the only means of treatment during the early stages likely to be attended with success.

Prof. Forget is in favor of general and local depletion, considering the local preferable.*

So also with regard to emetics and cathartics, the opinion of the profession was generally opposed to their employment. Stimulants and tonics were more commonly favored. Sweating, by the application of external heat, was by many held in much esteem.

In the account of Haskell, Spooner and Holmes, it is said, "From

* American Journal of Medical Sciences, New Series, vol. v.

these facts it is easy to conceive how cautious we should be in the use of emetics and cathartics in this very singular disease."

Dr. Hale says, "The only object for which I ever prescribed cathartics in the epidemic, was to avoid costiveness. For this purpose, those were always preferred which would be the least likely to give pain in their operation, and would produce the least prostration of strength." He was more favorably disposed to emetics. He also considered that diaphoretics, tonics and stimulants were beneficial, and favored the application of blisters.

Dr. Gallup advises the cautious use of emetics and cathartics, and says in regard to opium and other stimulants, that their indiscriminate use ought to be discountenanced, but "it will be acknowledged that in certain conditions a judicious use of them may be useful."

Dr. North says, "That the tonic and stimulating method of cure, as opposed to the debilitating plan, is the correct one, I have not the least doubt."

Dr. Woodward says, "Having no guide but experiment, bleeding, vomiting, purging, sweating and stimulating were all tried; sweating appeared to give the most relief." "Bark, opium, ether, peppermint, ardent spirit, wines, stimulating teas, and sweating, with external heat, have been the remedies used, and when applied in season, have seldom failed of success."

So also the Committee of the Massachusetts Medical Society recommend sweating by both internal and external means, and the judicious use of stimulants, as cordials and opium.

Dr. Jared P. Kirtland, of Trumbull County, O., favors light cathartics to move the bowels and obviate costiveness, artificial warmth, tonics and stimulants. He says, with regard to opium: "Opium is almost the sole remedy for general irritability, and when correctly managed, supersedes the necessity for other support even in the most inveterate cases of fever of this variety. It must be so given as to control the system, and continued till the morbid action be subdued."*

Dr. Ames, of Montgomery, Ala., does not consider blood-letting very satisfactory, thinks blisters are beneficial, and does not value opium very highly.†

M. Chauffard considered opium the principal if not the sole remedy

* Medical Recorder, vol. xiv.

† American Journal of Medical Sciences, New Series, vol. xvii.

necessary. The account which he gives of the manner in which he was led to try that drug is very interesting. He reports cases wherein he failed of success in treating with antiphlogistics and refrigerants, including bleeding, purgatives, emetics and calomel; he also found tonics powerless, either alone or combined with the previous methods. At length he was influenced by the failure of other remedies and the character of the symptoms to employ opium, and was successful. He then remembered that in other cases opium had seemed to check the progress of the disease; and even when given in large doses, instead of aggravating the cerebral symptoms, seemed to have a quieting influence and produced refreshing sleep. Subsequently he used opium in many cases, sometimes combining it with quinia, and found that in large doses it was beneficial, if not producing a cure, relieving the pain and rendering the patient much more comfortable. He employs from four to seven grains of opium in twenty-four hours.

Valleix does not consider blisters beneficial, and quotes Tourdes in opposition to their use. Quinia is thought to be rather beneficial than otherwise. Other tonics he would postpone until the period of convalescence.

Thus we see that there was a diversity of opinion on many points. This may have arisen partly from a diversity in the character of the epidemics, or, what is perhaps more probable, from the different systems of practice employed in different countries or at different times. Depletion was generally condemned. Cathartics, except the mildest to merely open the bowels, and emetics, were likewise generally discountenanced. Diaphoresis, especially when procured by external means, was advocated on this side of the Atlantic; not so much in Europe. The opinion was divided with regard to stimulants and especially opium, though generally in their favor.

## CHAPTER IV.

### Causes.

The cause of this disease is generally considered to be atmospheric change; there are other influences, which are better known, and which coöperate with this in producing the disease: such are the predisposing causes.

The atmospheric change is not perceptible by any of the means of analysis at our command; its origin may be from sudden changes in temperature, unusual dampness or warmth, or, on the other hand, cold and damp weather, or it may arise from circumstances not now considered related to it. M. Faure Villar says, with regard to the prevalence of this disease at Versailles:—"The epidemic had two outbreaks—one in April, the other in May. They appeared to arise from atmospheric variations, and from the fatigue of military exercises."*

"No particular change in the atmosphere that can be discovered, though probably the disease sprang from atmospheric causes."†

"It could so much the more properly be attributed to the influence of the air, as it attacked every station and different quarters of the city and of the country, without any trace of contagion."‡

It is frequently epidemic, prevailing with great violence, and at such times is very mortal. Such epidemic seasons have been seen in this country during 1807–14, 1819–27, 1847–50, and since 1861. But the disease has been noticed during other years, as the previous pages abundantly show, in a less severe form; indeed, since its first well-authenticated appearance in 1806, there have been only twenty-four years in which it has not been found to exist in some part of the United States, and it probably prevailed during many of those years, but no records have been left to testify with regard to its presence, at least none have been found by the author. In foreign countries the same epidemic seasons have been encountered, as in France from 1837 to 1849.

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* Revue Médicale, t. lxxi.

† M. Vieusseux on Cerebro-spinal Meningitis at Geneva, in the Jour. de Med., Chir., Phar., &c., t. xi.

‡ At Geneva, in 1850, Jour. de Med., Chir., Phar., &c., t. xi.

Sporadic cases are comparatively mild, and it is only when this disease rages with the violence of an epidemic that the notice of the public and of large numbers of the medical profession is attracted to it sufficiently to record the results of their observations. During epidemics, the mortality has been sometimes very great, even as high as 60 or 80 per cent., generally more than 50 per cent. The question then arises, is the disease contagious, or can it in any way be propagated from one individual to another perfectly healthy? The general opinion among those who have seen much of the disease is, that it cannot be thus communicated; though many consider it slightly so, and give instances where it certainly seems to have been communicated, though most of the persons affected by that means have been a long time residing with the sick, in the same houses, even in the same rooms, as nurses and attendants.

The Committee of the Massachusetts Medical Society, in 1810, reported that it was very generally agreed that the disease was not contagious.

Dr. Daniel Hudson, of Niagara, says:—"I am, from actual experience, enabled to assert that it is not of that class of diseases which may be communicated by contagion."*

Dr. J. L. Miller, in speaking of the epidemics of Virginia, says:—"I saw nothing to justify the opinion of its being contagious."†

Dr. Vaughan, of Hallowell, Me., writes:—"If the disease be contagious, the contagion fortunately so operates that the humane attendants on the sick scarcely suffer more by it than those who shun their duty in this respect."‡

Dr. Hale, of Gardiner, Me., says:—"The epidemic which has so extensively ravaged our country is generally believed not to be contagious. This is fully my own opinion." "That contagion was not the sole cause of the extension of the epidemic, is obvious from only a very slight attention to the facts mentioned in the chapter upon the character of the disease. It often attacked persons who previously had never been within the sphere of its influence, however contagious it might be supposed to be. At the same time, it frequently happened that one individual in a family was affected and went through a course of it, while all the rest of the family escaped; and in two

* American Medical and Philosophical Register, vol. iii.

† Philadelphia Journal of Medical and Physical Science, vol. v.

‡ Medical Repository, N. S., vol. iii.

instances the fever proved fatal to the only person in the family who was attacked. These facts are not consistent with the supposition of a very active degree of contagion.

"It is indeed true, that when the fever appeared in a family, there seemed many times a disposition to extend the number of its victims beyond those first attacked. But besides that they all must probably have been equally exposed to the remote cause of the disease, this may be accounted for by the great fatigue and anxiety which a state of sickness occasions. Wherever this happened, those members of the family who had been the least constantly in the sick room, were as frequently attacked as others who had been uniformly engaged about the sick bed. There were a few persons who were almost constantly employed, through the whole period of the epidemic, in attending upon the sick, and occasionally in performing the last offices for the dead, without being at any time attacked by the fever. These facts appear to prove, as strongly as a negative can well be proved, that this was not a contagious disease."

M. Valleix says, in his "Guide du Médecin Praticien," "In no locality has it been possible to verify the evident existence of contagion."

During an epidemic of this disease among the galley slaves at Toulon, of which M. Fleury has given an account, there seemed to be no tendency to spread by contagion beyond those in immediate contact with the sick and residing with them. He says:—"Those who went out in the morning from this galley to return thither only at evening, have been employed with, and have had constant intercourse with their comrades and the free workmen from the 15th December even to the end of January, and nothing resulted from that communication.

"The same observation was made at St. Mandrier, where, although separately lodged, they have been employed in works in common with those who have dwelt there a long time. There was no patient who entered the hospital on that account; they came from the foci of infection; and it was in approaching them to keep them constantly clean, to administer to them the consolations of religion, to watch the employment of medical prescriptions, to apply and dress blisters and sinapisms; it was in breathing near them a heavy, nauseating odor, which affected unpleasantly the sense of smell, that an ordinary, three sisters of charity, twelve officers of health, agents of inspec-

tion and several servants were attacked. More than twenty days had elapsed before an appearance of contagion was manifested, and it must be remarked that none of the persons treated in the city in the midst of their families, or in the principal hospital, have transmitted the disease either to their relations or to their nurses. A chaplain, an officer of health and a servant have been the only victims of their zeal."

At Blakaton, near Ashburton, one family was attacked, and one other person who had not been near them while sick, but the disease did not spread farther.*

Dr. Savage, in his account of the epidemic which occurred in New London, Conn., in 1832, says that no trace could be discovered to favor the idea of its introduction from abroad, and the physicians of the town were unanimously of the opinion that its origin and progress were entirely unconnected with contagion in the proper acceptation of that term.†

"As to infecting causes, none of my observations have furnished me with proof that they have had the least influence on the development of encephalo-meningitis."‡

At the present time, and during the late epidemic, Dr. Gerhard, of Philadelphia, writes:—"In this State it has struck particular localities, not, however, rigidly confined to them, but extending to detached habitations, and attacking persons who had not been in the neighborhood of any sick. It presented a tendency to be confined to families. It did not necessarily extend itself to the neighbors who were constantly engaged watching the sick, nor was the reception of one patient into a house at all the cause of attack of disease to others. There is no reason to conclude that it is in any way contagious."§

Dr. Liddell says, in regard to three cases which occurred at the Stanton General Hospital, Washington, D. C., in 1864:—"These cases occurred in portions of the hospital widely separated from each other, and that no relation by contact whatever can be traced between them."‖

Dr. Luther Parks, jr., of Boston, in the Boston Medical and Surgical Journal, vol. lxii., gives as a reason why this disease is not the

* Medical and Physical Journal, vol. xxviii.
† Boston Medical and Surgical Journal, vol. viii.
‡ M. Rollet, in Mem. de l'Acad. de Méd., t. x.
§ American Journal of Medical Sciences, vol. xlvi., July, 1863.
‖ Ibid. January, 1865.

same as scarlatina, "that there has been no evidence of contagion among the cases. My case, it will be remembered, occurred in a school of thirty-five boys, among whom there was no second case."

Some of the above opinions are expressed strongly in opposition to the doctrine of contagion; but, on the other hand, instances have been known where there seemed to be reason to suspect contagion, at least in a slight degree. The cases of nurses and attendants at Toulon, who suffered with the disease after taking care of the sick, would favor the doctrine of contagion; but it was not communicated by the galley slaves who lived near the sick and worked with those who were healthy. It was only those who lived in the midst of an impure atmosphere, who were constantly engaged in attending the sick, and who may be supposed to have been exposed to many of the influences which first aroused the disease into action, who were attacked.

Dr. Mistler says, with regard to the disease at Sélestat:—"The epidemic of cerebro-spinal meningitis which prevailed at Strasbourg for some time past, has been brought to us, at least according to all appearances, by the battalion of the 29th regiment of the line, which left Strasbourg about two months since and came to garrison Sélestat." A few soldiers had the disease after their arrival, and then it appeared in the neighborhood of their barracks, and afterwards extended to the interior of the city. He says:—"The 1st, 2d, 5th and 6th companies of the 3d battalion of the 29th regiment of the line left Strasbourg on the 4th of last February and arrived at Sélestat the next day, the 5th, after having passed the night at Estein, where they lost a man from the meningitis. On the 7th, that is to say two days after their arrival in our city, a drummer attacked with that disease was admitted to the hospital, and died there. On the 9th, I saw the first case, in a public house which is exclusively frequented by the troops of the line. In short, it is in the quarter called the Quai des Pêcheurs, and in the neighborhood of the barracks, that nine tenths of the cases have been observed up to the present time. However, that quarter was not found in worse hygienic conditions than all the lower part of the city, comprising the Rue des Fèves, the Quai des Tanneurs, the Place de la Prison, which are thus far exempt. This epidemic coincided perfectly with the arrival of the above-mentioned battalion, and it prevailed exclusively among that corps, without attacking the squadron of the seventh lancers, which also keep

garrison here, and who as yet have had only one man sick with the meningitis."*

M. Corbin, of Orleans, speaking with regard to contagion, says that, during the epidemic of the winter of 1847–48, a young woman, mistress of a soldier, sickened and died, but it is not certain whether the soldier was attacked. This girl was the only civilian who had the disease well marked, though three children seem to have had it, two of whom lived distant from the soldiers.†

M. J. B. Comte, who saw the epidemic at Grenoble in 1814, says: "Several persons living in the country, who quartered Austrian soldiers, died of the disease. A young woman of Grenoble, who had been to visit her sick relations in the country, returned to the city, where she died of the disease, with complications of tetanic rigidity.‡

The epidemic at Cambridge, Eng., during the spring of 1815, spread, apparently by contagion, more than some others. A servant girl who was employed in one of the colleges returned home, where she had the disease; some members of her family sickened, and her father died. Other cases of a similar nature are said to have been known; but nurses and medical attendants did not suffer more than others.§

M. Poggivli says that, during the prevalence of the disease at Saint Etienne, in the month of October, 1848, "two men of the 22d regiment of the line, occupying the same bed, were attacked in town, one two days after the other, and died; when I was called to the first, his comrade presented none of the prodromes of this disease.

"From the barracks of Jarre a man was carried to the hospital affected with the disease in a very severe form; a soldier, who comes off guard, lies in his bed, and is also fatally attacked twenty-four hours after."‖

M. Leroy Dupré, Surgeon to the 55th regiment of the line at Avesnes, states, in confirmation of the doctrine of contagion: "In the month of February last, a man was taken all at once, and without known cause, with violent pain in the head, accompanied with fever and vomiting. Forty leeches and a proper diet caused these symptoms to disappear, and convalescence commenced, when the

* Encyclographie des Sci. Med., 1841, t. vi.
† Encyclographie des Sci. Med., 1845, t. v.
‡ Recueil Gen. de Med., t. lviii.
§ J. Haviland in Med. Transactions of the College of Physicians in London, vol. v., 1815.
‖ Bul. de l'Acad. de Med., t. xiv.

same phenomena were seen in his son. They were so intense that they put his life in the greatest danger. All the symptoms which characterize what is known as meningitis, left no doubt in regard to the certainty of the diagnosis. The little patient recovered under the influence of a treatment in which the antiphlogistics were employed only with reserve. During the course of his disease, the house servant was herself confined to her bed, complained of an acute headache, with fever, which showed itself by a frank inflammatory angina. Certainly there was nothing very remarkable in this; but that which is not uninteresting to mention is the following fact. The comatose state of the young man having necessitated the application of a blister on the head, I passed nearly an hour in stooping over the patient to shave his hair. The length of the operation, the fatigue, together with an abundant perspiration, caused in me considerable languor, to which succeeded a cephalalgia, which lasted three days. At length, in the commencement of the month of May, the sister of the young patient was taken in her turn with an intense cephalalgia, with vomiting and fever. This was the only person of the family who had not been sick, for the mother herself had been for a certain time subject to pain in the head and vomiting. The cephalalgia of the young girl lasted several days; it was the prelude of an eruption resembling scarlatina and miliaria, which was happily cured by a rational treatment. Taken alone, these facts are far from being convincing, but joined with the documents, already numerous, presented by M. Boudin, I believe that they can only contribute to clear up the origin and method of propagation of the disease."*

M. Gaultier de Claubry, in his report to the Academy of Medicine on the memoir of M. Boudin, says:—"With regard to contagion, M. Boudin has collected numerous documents which show the meningitis affecting sometimes in an exclusive manner the soldiers of different garrisons, sparing completely the civil population, who have little or even no intercourse with these soldiers; sometimes, on the contrary, existing in the heart of the civil population and not extending among the soldiers; here circumscribing its action on the soldiers of a barrack, sparing the military prison, whose inmates have no intercourse with their comrades remaining free; there attacking exclusively the prisoners, and sparing the soldiers in the barracks; elsewhere seeming to travel with the regiment, so that, starting from a

* Bulletin de l'Acad. de Med., t. xiv.

city where the disease prevails, and going far away to garrison another city, where the affection had hitherto remained completely unknown, it was manifested in a short time after the arrival of the regiment, it may be among the companies into which the new arrivals were incorporated, it may be even among the inhabitants who had had intercourse with them; then again, the disease seems as if it was permanently settled in certain garrisons, in spite of the frequent changes of the troops; and, on the other hand, seeming to follow everywhere the same corps, in spite of frequent changes of garrisons; besides, M. Boudin shows the disease of the soldiers propagated among the surgeons, the sisters of charity, the ward tenders, the sutlers, the women who frequently visit the soldiers of the regiments where it prevails.

"Considered *in globo*, these considerations give matter for reflection, because of a certain analogy which they seem to indicate with that which takes place in the case of typhus of the armies. On the other hand, if they are examined more critically, it is found that some of these documents are purely administrative, coming from the council of administration of a regiment, or from the bureau of an intendant, and hence of medium value for physicians somewhat particular with regard to facts for proofs; others indicate only in a laconic manner the wanderings of various corps from one garrison to another, without indicating the number of the sick, the ratio of these to the healthy portion of the regiments, or the civil population; a small number contain the formal opinions of some physicians. Several of these agree with M. Boudin; a large number cannot admit contagion."

M. Claubry does not think the disease contagious.

After quoting thus much of the report, it is hardly necessary to give the statements made by M. Boudin.

In the early part of this century, during the prevalence of the disease in one of the towns in the interior of New York, search was made to discover its origin. It was learned that a young man who had just arrived from a village in Connecticut, where the disease prevailed, was the first person attacked. Afterwards, others who lived near where he was during his sickness, became sick, and subsequently it spread to other parts of the town.*

Dr. Walter F. Atlee, speaking of an epidemic which occurred

* The reference to this case was mislaid.

among the children in a charitable institution in Philadelphia during 1864, says:—"It is worthy of mention that the disease broke out two days after clothing had been placed upon the children, that came from Manayunk. It is impossible to find, however, that this clothing had been in contact with any persons affected with the so-called spotted fever, which is said to prevail in that part of the country. The sister (of charity) who was attacked was not the one who was attached to the infirmary, or one more in contact with the sick than another."*

Dr. Wm. T. Cleland, of Kewana, Fulton Co., Ind., under date of July, 1865, says:—"My observations, although limited, have convinced me that this disease, under an epidemic condition of the nervous system, and a vitiated condition of the secretions and circulation, is contagious.

"In proof of this assertion, I will present a case or two which came under my own observation. On the 12th day of April last, I was requested to visit Wm. H., æt. 15 years, who was taken with a violent chill in the night, after an excessive day's labor. At 2 o'clock, April 14th, he died.

"Miss J. M., a schoolmate, who was in attendance upon this young man during his sickness, was attacked on the 16th in a milder form, there being not as much excitement of the nervous system. On the fifth day, she died.

"In another locality, some five miles southeast, I was, on May 9th last, requested to visit the infant child of Dr. S. In two days after I visited this child, two of the older children of the same family had a violent attack of the disease while in the field."

The above facts show that the disease which we are considering is not generally contagious; but if a large number of patients are collected under circumstances favoring such a result, it may be communicated to persons apparently healthy, especially if fatigue, anxiety, or any depressing influences coöperate. The contagious principle is, however, very slight, and readily dissipated, so that only occasionally does a single patient in a family cause it in others, and no instance has been found in which it could be proved that the disease was conveyed by means of clothing or other fomites, and there seems to be no danger that a person after attending upon the sick will communicate it.

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* American Journal of Medical Sciences, July, 1864.

The high rate of mortality and the extensive prevalence of the disease during an epidemic cannot, then, be due to contagion, and other cause must be sought.

In many cases in foreign countries, and in some instances in our own, especially where the disease has appeared in the army, the attendant surgeons have asserted that unusual fatigue, together with neglect of hygienic rules, seemed to be the principal predisposing causes which were found most frequently among the new recruits, and hence the conscripts who had lately joined their regiments were the most frequently attacked during the prevalence of the disease in France.

"Its severity in the army (of the United States in 1812–14) is to be attributed to the sudden change of the mode of living of the newly enlisted soldiers, to intemperance, and to exposure to the weather."*

M. Rollet says:—"There can, then, be mentioned as predisposing causes, the recent incorporation of young soldiers and their want of training in military exercise. It is necessary to observe, also, that it is among soldiers arrived in the corps since less than a year, that the greatest number of grave cases is found—ten out of fifteen whose time of arrival is noted."†

M. Claubry, in his report before the Academy of Medicine on the epidemics which occurred in France during 1848, says of this disease:—"The garrison of St. Etienne was composed of two squadrons of dragoons, all old soldiers; of 1100 men of the 13th regiment of light infantry, and of an equal number of the 22d light; the greater part of the latter were novices.

"The barracks of the 22d were in favorable hygienic condition, well aired, sufficiently ventilated, without crowding in the chambers; the food of the soldiers was of good quality and abundant. There was a ration of wine. The discipline was mild.

"It is a curious fact to note relative to the epidemic of St. Etienne, while the 22d has had 107 men attacked with cerebro-spinal meningitis, and has lost thirty of them; it was when this regiment presented no new cases that the turn of the 13th regiment came, which has had only five sick, of whom two have died; and the dragoons had only one case, which was fatal. What is otherwise remarkable is, that the barracks where were lodged these two last corps of the gar-

* New England Journal of Medicine and Surgery, vol. ii.

† Mem. de l'Acad. de Med., t. x.

rison of St. Etienne were far from offering hygienic conditions as favorable as those where the 22d was lodged."*

Valleix, after mentioning that new recruits were most frequently the victims, says:—"Fatigues to which the young soldiers were not accustomed, exposure to inclemencies of the weather, prolonged exercises, are the causes which, according to all appearances, have determined the appearance of the disease."

Dr. Frothingham, who saw several cases while connected with the Army of the Potomac during the winter of 1861–62, speaks of this cause as follows:—"Here was a large army, living under almost exactly the same circumstances as to food, beds, ventilation, clothing, &c., and within a few miles of space; yet a few cases (enough to indicate some common cause) of an unusual disease occurred in one brigade (as I did not hear of any other cases, I take it for granted there were none). Malarious and continued fever prevailed in all the camps throughout the army. The only circumstance influencing disease in which this brigade differed from others, was in the severity of its labors. Under Gen. Daniel Butterfield, a stern disciplinarian, who always, sick or well, did his own entire duty and would receive no less from his subordinates, the men were drilled to the full extent of their powers—often to exhaustion. I did not at the time recognize this as a cause of the disease in question, but I learn that in the present epidemic in Pennsylvania, the attack generally follows unusual exertion and exposure to cold."†

Thus, in civil life, great fatigue has been mentioned as the cause of the appearance of this disease, and this was likewise noticed by Dr. J. Norcom, of Edenton, N. C., in 1815, who gives as the causes—excessive fatigue and long-continued exposure to cold, violent exercise, sitting up nights, irregularities of living, intemperance of every kind, more especially intoxication; everything that has a tendency to debilitate.‡

Here he mentions other influences as cöoperating with fatigue and violent exercise; and so in other places there were found influences which seemed to predispose to the disease: badly ventilated residences causing a vitiated atmosphere, unwholesome food, sudden changes in temperature, dampness, &c.

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* Mem. de l'Acad. de Med., t. xvi.

† American Medical Times, April 30, 1864.

‡ Eclectic Repertory, vol. v., 1815.

M. Corbin, in regard to the epidemic at Orleans, in 1847–48, says, "The principal cause in our eyes is crowding, which supposes the alteration of the air, combined sometimes, for the soldier, with unhealthy habitation, and often, during the winter, with a temperature too elevated in the guard-houses or in the quarters. The barracks of St. Charles, which has furnished the greatest proportion of sick, is an old building, situated below the level of the ground. The lower story, it is true, is uninhabited; here are cellars which serve for magazines; the first story had been inundated the year before to a very great height; the walls were damp, even so that the water dripped from them." The troops were removed into the upper stories; and then they crowded together, and saving wood by using only one or two rooms, heated those excessively, keeping the doors and windows constantly closed.*

MM. Porral and Raphael consider the cause of the disease at Puy and Vannost was, that the inhabitants became warmed by their labor in the valley, and then ascending the mountains became too suddenly cooled.†

M. Valleix says, "At Rochefort fatigue has not been greater than usual, but it was learned from an extensive examination made on this point, that the convicts were badly clothed, badly shod, and that the place where they passed much of their time was remarkable for its dampness. These are the only circumstances to which can be referred the appearance of the epidemic."

M. Rollet considers as determining causes—cooling after having been heated by the sun, or succeeding to a violent exercise, and vicissitudes of temperature.‡

At Toulon, previous to the outbreak of the epidemic of 1829–30, among the galley slaves, they were confined on board three old hulks. M. Fleury says in regard to the one on which the disease appeared, that it was moored near a dock, where much refuse had accumulated, lying half decomposed, and which was being cleaned out. The thousand convicts quartered in this old hulk were distributed in nearly equal proportion among the three decks, of which the lowest was almost on a level with the water. These decks were sixty feet long, forty-four and a half feet wide, and five and a half feet between.

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* Encyclo. de Sci. Méd., 1848, t. v.

† Report of M. Claubry, in Mem. de l'Acad. de Med., t. xiv.

‡ Mem. de l'Acad. de Med., t. x.

The men lay in four ranks on mattresses of tow eighteen inches wide. The air ports were open during the day, but frequently closed at night. During the night the decks became very filthy, and though cleaned every morning, the planking must have become saturated with excrementitious matters. In addition to this, the upper decks were imperfectly caulked, and allowed the rain to pass through more or less freely. The food and clothing seemed to be sufficient for health.

Dr. Savages says of the disease which appeared in New London, Conn., in 1832, "The streets of the low and intemperate were its birth-place, and their dwellings its *cradle;* and upon this class of persons was its fury spent, for theirs was the condition most congenial to its evidence and growth."*

But these causes did not operate everywhere, and many looked upon a malaria as concerned in the production of the complaint. Dr. Latham, who observed the epidemic at the Millbank Penitentiary, thought that malaria was probably one of the causes; and so also Dr. Sanderson, with regard to the disease at Dantzic, during the last year (1865).

By examining the reports of the weather during the prevalence of this disease, we may be able to find some peculiarity in the temperature, the dryness or dampness of the atmosphere, which, with other influences, bears a part in producing it.

It will be remembered that Sydenham mentions the severity of the winter of 1683, exceeding any that could be remembered; and that of 1684 was very severe, but not so much so as the previous one. In February, 1685, the "Febris Nova" appeared.

Dr. Rush remarks: "Upon the recurrence of cold damp weather, the cases immediately multiplied, and those who had been previously ill never failed to become worse. Exposure to the external atmosphere and cold seemed constantly to predispose to the disease."†

Dr. Folchi, writing concerning the epidemic resembling cerebro-spinal meningitis, which prevailed at Rome during the winter of 1817, attributed its spread to the extraordinarily mild temperature of the atmosphere during that winter.‡

Dr. Hazeltine, of Maine, gives as one cause, "coldness and humidity of the spring, summer and autumnal seasons.§

* Boston Medical and Surgical Journal, vol. viii.

† Medical Repository, N. S., vol. iii.

‡ Quarterly Journal of Foreign Medicine and Surgery, vol. i.

§ Medical Repository, New Series, vol. iii.

M. Vieusseux says, with regard to the climate of Geneva, that the winter preceding 1805 was long, cold, not very severe. The spring was very cool and vegetation was singularly retarded. In 1805, this disease appeared.*

Dr. Henry Fish, of Hartford, Conn., says that "the winter of 1808–9 was unusually severe, the cold weather commenced earlier and continued longer than in the six or eight years preceding. The snow fell in December, in large quantities, and was not wholly removed until late in March. It was generally a foot or more in depth, and the air was intensely and uniformly cold. Snow-storms were frequent and severe, without being succeeded by thaws." This disease appeared in 1807, and was seen again in 1809.

The Committee of the Massachusetts Medical Society in 1810 reported that the previous summer was cold; the weather from November to the 12th of January was calm and moderate, with more heat than usual; after December 1st, there was considerable rain and but little snow; occasionally the change in temperature was very great. In January the epidemic commenced.

J. Wilson, of Salisbury, N. H., says: "It seems probable that the changes of temperature have for five years past (preceding 1813) been much greater than ever before were known. That many animals expired by its immediate operation, is a fact. That the organization of vegetables suffered a derangement which eventually proved fatal to many of them, is a circumstance that any person may ascertain.†

J. Haviland says, with regard to the temperature of Cambridge, Eng., that the winter of 1814 was mild; in the latter part of January the epidemic commenced, which so much resembled cerebro-spinal meningitis.‡

At Toulon, during the winter of 1829–30, the weather was extremely variable, and presented differences of temperature unknown to aged men who had preserved the remembrance of the most severe winters. "In December the winds blew from the east and west; there were six rainy days, the weather remained moist and cold, and the thermometer gave, at its greatest elevation, 13° and some tenths centigrade, and at its lowest 3° below 0. In January, there were the same winds; snow and hail fell, and there were six sunny days;

* Jour. de Med., Chir., Phar., &c., t. xi.

† Medical Repository, New Series, vol. i.

‡ Med. Trans. of Col. of Physicians, London, vol. v.

the moist and cold weather was constant. The greatest elevation of the thermometer was 12° and its lowest 7° below 0. In February, the prevalent winds were the same. Snow fell during the beginning, rain followed so as to preserve the same temperature. The thermometer, which had descended to 3° below 0, rose to 17° towards the end of the month." It was during these three months that the disease prevailed.

M. Rollet, in a memoir read before the Academy of Medicine, says: "As to the changes of temperature, I will observe, that since the commencement of May, even to the end of July, the atmosphere has been frequently charged with electricity, that the heat, without being very elevated, has often been oppressive, and sudden variations of temperature have been quite frequent."*

M. Claubry, in a report on the epidemics of France during the years 1841–46, says, that to the very warm summer of 1842 had succeeded a very cold and wet autumn, and a very severe winter. In February, 1843, appeared the cerebro-spinal meningitis.†

Job Wilson, of New Hampshire, has given extensive observations on the climate of New England for about twenty-five years. He says, "From about 1792 to 1804, a period of about 12 years, the winters, with a few exceptions, appear to have been shorter and milder than the preceding winters were, and the summers longer and hotter than those of former years."

"On the 8th of October, 1804, a new era appears to have commenced. On this day a most tremendous snow storm happened." "The first permanent snow did not happen till near the 20th of December; but the quantity of snow that fell from this time to about the middle of February, 1805, was immense." "The spring and first summer months were unusually cool." In the preface he says, "Our climate (particularly the climate of New England) though at best very changeable, for many years prior to 1804, has been comparatively mild and steady." "But since 1804, a new era has commenced. The changes of our climate have been greater and more frequent. The effects of these changes have been very remarkable, both in the animal and in the vegetable kingdoms. To many individuals of each of these kingdoms, they have proved immediately fatal." "The late changes, or some other cause, have produced a

* M. Rollet, in Mem. de l'Acad. de Méd., t. x.
† Mem. de l'Acad. de Med., t. xiv.

disease, or rather diseases, with which our mother country appears never to have been acquainted, as she never suffered so great and sudden extremes of heat and cold."

In regard to 1806 he remarks, "This year I conceive to have been rather more changeable than former years have been, when compared with succeeding years; it was comparatively mild and temperate." "The ten last days in February were uncommonly warm; the mean temperature of the days was 41, and the nights 28. On the 26th day, the mercury fell suddenly from 40 to 12 at night; and rose the next day to 50." It will be remembered that it was in March of this year that the so-called "spotted fever" appeared in Massachusetts.

"The mean variations in the month of February, March and April, are 35, 36 and 34; but in this year (1807) they are 39, 53 and 55; the diurnal variations are comparatively great, which great changes of temperature we should readily conclude would produce violent disease, which indeed we find has been the case." August was changeable, rainy and chilly. In 1808 there was less variation of temperature, with rains in February. In 1809 also there was nothing unusual except an uncommon low temperature. In January, 1810, the variations were greater. During these years, from 1807 to 1809, the "spotted fever" appeared in many parts of New England, especially in Connecticut. In the early part of 1810 the disease appeared, especially in Massachusetts, where it was noticed by the State Medical Society, in Connecticut and Vermont: it was also seen in Canada.

The summer and autumn of 1810, and the whole of 1811, were moderate, without great variation and generally warm. No extensive epidemic prevailed during that time.

January of 1812, and also February, were subject to great variations of temperature. In the former month there were seven exceedingly cold days, commencing about the middle of the month. In the latter month "seven extraordinary variations happened." "The variations will stand thus: 48, 36, 33, 33, 35, 40, 43; and the period of most of these great variations is from 12 to 18 hours only." In March also there were great variations of temperature. "It should be remarked, that the periods of these variations are but little more than 12 hours. The number of degrees of variation are as follows: 34, 46, 30, 38, 30, 31, 35, 36, 46, 31." Rain fell in

both February and March. The other months were not essentially different from usual. Cerebro-spinal meningitis prevailed, especially in New Hampshire, Vermont and Maine, during the spring.

In February, 1813, there was one variation of 61° and several others of less amount. "March was not so pleasant a month, but more stormy." "No less than six great and sudden changes happened; as great as 61, 50, 35, 30, &c." April was warm, with chilly nights. The other months were in no way remarkable. "Spotted fever" appeared in January, and by the middle of February prevailed extensively in New Hampshire. It extended its ravages into the summer months, but was then much less severe.

During 1814 the winter and spring months were quite moderate, without any remarkable changes. In June there was a variation of 45° in 31 hours, and from then till September less variations about once a fortnight. In the latter month there was a variation of 55° in 32 hours. In October there were also several variations, and November was more changeable than usual. During this time the disease appeared in New England.

Dr. T. F. Prewitt, in the St. Louis Med. and Surg. Journal, vol. 2, says that the disease which we are considering "first made its appearance among the soldiers stationed at Chillicothe, during an unusually severe and protracted spell of dry, cold weather."

Dr. Frothingham found it to prevail during mild and damp weather in the winter.*

This record of the weather and temperature is not very full, and hence extensive generalization would not be proper; but if we take into consideration that the sudden variations mentioned by J. Wilson were usually attended with wet weather, and then notice that eight out of fourteen of the authors quoted in the previous pages mention the occurrence coincident with this disease of changeable and damp weather, or of coldness and dampness, we shall find some reason for believing that such a state of the atmosphere is favorable to the action of those influences which produce this disease. It would, however, be gratifying to have more facts upon this subject.

Not only cold and damp and variable weather were favorable to the production of this disease, but situation seems also to have had some influence.

Thus the Committee of the Massachusetts Medical Society remark

* American Medical Times, April 30, 1864.

that most of the places where the disease occurred are inland and elevated, with ponds and streams. In Cambridgeport most of the cases occurred near a marsh, and in Boston in that portion of the city exposed to the flats and water.

The town of Minisinck, N. Y., is bounded on the east by the great drowned lands of the Wallkill, which renders the inhabitants liable to intermittent, remittent and bilious fevers in the fall of the year.*

Dr. Rush says that it "prevailed most in the interior; the sea coast was exempt or suffered little. And yet in the interior of the State, the most swampy situations, margins of rivers and places the most subject to the endemical, autumnal, bilious fevers have suffered most severely."†

Dr. Mann, in his work on the diseases of the army, already referred to, gives a description of Greenbush where the pneumonic form appeared, and also of Albany where there were some cases of the cerebral variety. He says, "Greenbush is a township on the east bank of the Hudson, directly opposite Albany. The town, which occupies eight miles square, has a diversity of soil and surface. Alluvial flats border the river. Hills present themselves in the rear, distant from the bank of the river from one quarter to one mile, gradually rising until they gain an elevation of 200 feet or more. The soil in some places is clay, in others a mixture of clay, loam and sand.

"The cantonment is on an elevated plane, one mile east of the Hudson. Here are barracks for the troops of the United States army, sufficiently capacious to accommodate 4000 men, with adequate quarters for their officers. On an eminence 60 feet higher, is the Hospital, which may accommodate 100 patients. The wards of this hospital are too small in their dimensions, both for health and convenience, being only 20 feet by 16, and 9 feet in height.

"The elevation of the hospital is so great above the surface of the river, that the fogs, which, during the hot season, are suspended over the flats and villages on the banks, seldom rise to its summit.

"The temperature of the climate on the Hudson is more regular than in the same latitude on the Atlantic shores; where are experienced greater and more sudden transitions of weather than here. The cantonment, at Greenbush, has the reputation of being healthful; and the country in its vicinity salubrious.

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* Dr. D. R. Arnold, in American Medical and Philosophical Register, vol. i.

† Medical Repository, New Series, vol. iii.

"The city of Albany, the capital of the State of New York, is situated one mile in length on the west bank of the Hudson. It rises from the river by a gradual ascent nearly 200 feet to the elevated plain. The width of this city is from one quarter to one half a mile. On the margin of the river, the lands are alluvial and rich; while those more elevated and uneven, are a mixture of clay and sand, and barren. That part of the city, on the alluvial flats, has the reputation of being less salubrious than that on the hill. The want of a rigid health police is manifested by the filthiness of some of the streets; more especially of the back yards connected with stables and kitchens."

Dr. Lucas, of Brunswick, Va., thus describes the topography of Mecklenburgh, Lunenburg and Brunswick, Va., where the disease appeared in 1818–22. "The country is one, as to elevation, tolerably high; although not mountainous, yet it is uneven and broken. There are few, if any marshes at all to be found, but many mill-ponds and two rivers. The Roanoke runs through part of Mecklenburg, has extensive low grounds on each side of it, varying from a quarter to a half mile in width. The Meheria divides Lunenburg from Mecklenburg and runs through a part of Brunswick, in which country there are a few places having low ground of a few hundred yards in width. The low grounds on both these streams are well drained by means of ditches. The country lying generally hilly, the mill-ponds are not very broad but tolerably long. The water commonly used is fine spring-water. A line running north and south, would about place the part of the counties that have suffered most by this disease, on a parallel with the head of tide water in the Appomattox river; perhaps ten or fifteen miles above it."*

There is some doubt with regard to the identity of the disease which occurred at Marietta, O., in 1823. The situation of that town is at the confluence of the Muskingum and Ohio rivers. The former divides the town into two unequal parts. The soil is alluvial. The houses are wet during floods.†

At Toulon, in the winter of 1829–30, the convicts who were quartered on shore escaped; but those on board the centre one of three old hulks were attacked. It will be remembered that this was not only unfavorably situated for ventilation, but was also in close proxi-

* Medical Recorder, vol. v.

† Dr. Hildreth, Philadelphia Journal of Medical and Physical Sciences, vol. ix.

mity to an old dock, where the deposit of many years was being cleaned out. This galley was also the most dilapidated, allowing the rain to penetrate through the decks; and it is not improbable that much bilge water was constantly present.

Prof. Rienzi, speaking of the epidemic which occurred during the spring of 1840, at S. Marzano, mentions that in January, 1840, the Saono overflowed its banks, and left S. Marzano as an island.*

In 1843, the province of Seine et Marne, and in 1844, Haute Loire, were attacked with this disease. M. Claubry, who made a report with regard to it to the Academy of Medicine, says: "The village of Bannost (district of Provins) is situated on a hill in the midst of valleys which it overlooks, and in the bottom of which the rain waters collect.

"The village of St. Vénérand (district of the Puy) is, on the contrary, situated on a hill sufficiently elevated above the course of the Allier, from which, however, it experiences damp vapors. Placed on that hill, about 1,200 metres above the level of the sea, this village enjoys a naturally cold temperature, by reason of the long duration of fogs and snows which surround it during the winter season. The inhabitants of this village are in the habit of descending from it into the plain below, to engage in agricultural labors. There they generally encounter moderate temperature, and after being warmed by their rural occupations, ascend again to their village upon the approach of night, and are exposed to a very cold temperature." †

We see here that those who live at a distance from marshes or bodies of water may feel the influence of their presence by means of fogs and vapors; and also may by their daily occupation be obliged to expose themselves to unhealthy influences at a distance from their homes, or by changes of place may experience great changes of temperature.

Montgomery, Ala., where this disease appeared in 1848, is situated on a bend in the Alabama river. An amphitheatre is formed by the hills, which are in the back part of the town and circle round to the river on either side. The land on the opposite side of the river is alluvial, and is often overflowed; above the city, on the same side, are prairie lands. Thus a part of the city is on low land in the immediate neighborhood of inundated and flat land; a part is also ele-

* Medical Examiner, New Series, vol. i.

† Mem. de l'Acad. de Med., t. xiv.

vated, well drained and dry. About 250 cases occurred, and only 100 of these were above the base of the hills.*

During the late epidemic, a few cases have been recorded in which the situation of the places where this disease occurred was noticed.

Dr. J. B. Upham gives a very full account of the circumstances in which the subjects of the epidemic at Newbern were placed. The town of Newbern is described as "built on a flat and sandy soil, raised but a few feet above the water. The country around is level, alternating with sandy plains and swamps for the distance of a mile or more from the outskirts of the town, beyond which begin the endless pine forests, almost impenetrable, with marshes and tangled undergrowth." The troops were protected partly by tents and partly by barracks. The latter "were built late in the autumn. They were made of green stuff—hard pine mostly—the logs being taken newly cut from the forest, or drawn out from the water, where they had been lying for a few weeks, sawn into joists and boards, and used in the fabrication of all parts of the building. Thus constructed, they were necessarily cold and damp, and redolent of pitch and paludial moisture." He describes the manner in which the barracks were built and the internal arrangement, and then says:—"In the best of circumstances it will be seen, the supply of air is entirely inadequate and the ventilation imperfect; while light and warmth, owing to the projection of the bunks, cannot be generally diffused throughout the apartment." The regiments which suffered most were those recently enlisted and that were quartered in the barracks. "The 44th (Mass.), which suffered most, was nearest the bank; quite near the camp lay a couple of marshy bogs, small in extent, through which flowed a sluggish stream to the river." Some cases occurred also among the troops quartered in tents, but there were only a few such.†

Dr. Robert Burns says:—"The first point requiring consideration is the hygienic condition of the dwellings and the locality in which patients reside." He then mentions these circumstances with regard to the residence of his first case, an Irishwoman, 36 years old, who lived in a frame house without any cellar; on one side of the house there was a lane with very imperfect drainage, having at all times in its deep gutters stagnant water. Hog-pen and other outbuildings were in position close to the house. On the lower story one room

* Dr. Ames, American Journal of Medical Sciences, vol. xvii.

† Boston Medical and Surgical Journal, vol. lxviii.

was occupied as a vegetable store and grocery, the other as a kitchen. The second case reported was that of a woman who lived near the first one, in a brick building, very damp, with water in the cellar. His third case resided in a low, wet situation, and had exerted herself in taking care of several fatal cases of the disease about 150 feet in the rear of her house. The fourth case was that of the brother of the second, and he was with his sister much during her sickness.*

Dr. Stillé reports the case of a young man, who resided in a healthy situation and was employed in a wholesale dry-goods store; nothing unhealthy seems to have been connected with his business.†

Prof. J. S. Jewell, of Chicago, gives a brief account of the disease as it appeared in Williamson County, Ill. He describes that portion of the State as generally level and somewhat low, though occasionally broken, and furrowed by sluggish streams, which are frequently bordered by extensive alluvial bottoms, with marshes interspersed here and there, and as a general thing heavily timbered, except when removed for the purposes of agriculture or interrupted by occasional oak openings, or barrens and small prairies.‡

In nearly every instance above recorded, and which are the only cases where the nature of the locality in which the disease occurred has been mentioned, lakes, rivers, swamps and low ground likely to be inundated, or damp houses with water in the cellars are noticed as found in the places where the disease appeared. Can it be doubted that such situations are favorable to its prevalence?

The influences, then, which have been recognized as causes of this disease are—unusual fatigue, which seems to have a peculiarly powerful effect on soldiers lately enlisted; all debilitating influences; over-crowding in badly ventilated apartments; want of cleanliness; sudden variations of temperature, especially when combined with damp and wet weather; a situation near marshes or considerable bodies of water, and lack of proper drainage. Contagion has but little influence, except, as previously stated, under very favorable circumstances. Malaria has been mentioned by some observers; but if they mean that condition of the atmosphere which causes periodical diseases, and not a peculiar influence, *sui generis*, upon which this epidemic depends, there is no evidence of its existence.

* American Journal of Medical Sciences, April, 1865. † Ibid, July, 1864.

‡ Transactions of the Illinois State Medical Society, 1864.

Undoubtedly an epidemic condition of the atmosphere is the principal cause of this affection. The other causes do not all exist at the same time, and sometimes none of them can be discovered; and, again, most of them may co-exist without giving rise to this peculiar disease. We must, then, refer it to some hidden and hitherto undiscovered cause operating upon all and producing the disease only in those most susceptible to its influence, or who have been most exposed to the predisposing causes, and that cause has been called "an epidemic condition of the atmosphere," which will answer well enough until its true nature is discovered. Whatever this influence is, it has frequently affected other diseases, assimilating them more or less to this one.

Dr. Comstock says, with regard to the epidemic which occurred in Rhode Island in the early part of this century:—"It has a great aptitude to combine with other diseases, and even to modify and alter those of the most stationary kind, as consumption. It has been known to combine with bodily injuries."*

Dr. Hale says, "It influences the nature of all diseases."†

Dr. Miner remarks:—"For eight or nine months it was difficult to find a case of acute disease that did not partake of the epidemic constitution, under whatever head it might be nosologically classed."

Prof. de Rienzi says that almost all the inhabitants of Mignano, in February, 1840, were affected by the epidemic influence, and suffered from giddiness, lassitude and great depression of spirits.‡

At Gibraltar, in 1844, both before and during the epidemic of meningitis, it was noticed that in indisposition from any cause, there was a tendency to headache, more or less severe; the occiput being oftener than usual the seat of pain, and the muscles of the back part of the neck being also frequently affected with aching.§

Dr. Nivison says that this disease "impressed its own character on other diseases, so that a decided typhoid tendency was visible in almost all diseases." He also mentions that it appeared in one case during an attack of mumps. The mumps disappeared, and returned after recovery from this disease.‖

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* Medical Repository, New Series, vol. iii.

† Philadelphia Journal of Medical and Physical Science, vol. i.

‡ Medical Examiner, New Series, vol. i.

§ Dr. Gillkrest, London Medical Times and Gazette, vol. xxxiv.

‖ New York Journal of Medicine, September, 1849.

At New Orleans, January, 1850, the negroes were principally affected, yet among the whites several patients presented strange head symptoms.*

I have found no notice of this tendency to influence other diseases during the late epidemic, though in a few cases persons otherwise healthy have been troubled with severe headache.

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## CHAPTER V.

### NATURE.

Cerebro-spinal meningitis is usually considered a disease of debility. The name is, perhaps, unfortunate, for there is not a simple inflammation of the meninges; indeed, sometimes they are not in the least affected, the force of the disease being expended upon other organs.

This disease seems to be dependent, at least in part, upon a change in the character of the blood. What the change is, we cannot say; but we know it exists, for we see its effects.

In a large majority of the cases where the condition of the blood was noticed, it was much more fluid than natural and of a very dark color; where clots existed they were unusually soft. Moreover, similar morbid appearances were found in different parts of the body, as the brain, lungs, heart, abdomen and glandular structures; in each of these there were marks of inflammatory action; they were not all found in the same person, but in one there was effusion of lymph in the cranium, coating the membranes and penetrating into the ventricles; in another, the lungs were inflamed, as in pneumonia, and in others lymph was found in the pericardium surrounding the heart; again, the intestines exhibited marks of inflammation and even ulceration, or the glands—the parotid, the lymphatic and mesenteric glands—were inflamed and even suppurated.

Now here are different organs, situated in distant parts of the body, affected in almost precisely the same manner. Evidently the cause of these changes, whatever it may be, must exert an influence,

* Fenner's Southern Medical Reporter, vol. ii.

direct or indirect, wherever the diseased action is found. The blood and the nervous influence, so far as we know, are the only agents which can do this. We can realize that blood whose visible character is so much changed as is the case in cerebro-spinal meningitis, may produce an abnormal influence. The derangement in the nervous power we do not so easily recognize nor so fully understand, yet it is very reasonable to suppose that it coöperates with the abnormal blood in producing the changes referred to. The tissues may, doubtless, by their condition be so circumstanced that in one person one organ, and in another person some other organ may be first affected; they are predisposed by previous disease, hereditary influence, the influence of occupation, one part being excited and overworked, while another is allowed a larger proportion of rest, or by the peculiar epidemic condition of the season, to yield more readily to the exciting cause found in the morbid blood. And a change having commenced, they may react on the blood so as to perpetuate its diseased condition.

Paget says:—"We may speak much less equivocally of the influence of the state of the blood itself in causing inflammation; for there can be little doubt that a very great majority of the so-called spontaneous or constitutional, as distinguished from traumatic inflammations, have herein their origin. In all these cases local inflammations are the external signs of the general affection of the blood.

"If it be asked why a morbid material is determined to one part or tissue rather than another, or why, for example, the skin is the normal seat of inflammation in smallpox, the joints in rheumatism, and so on; I believe we must say that we are on this point in the same ignorance as we are concerning the reason why the materials of sweat are discharged at the skin, those of urine at the kidneys. We cannot tell why these things are so, but they are familiar facts, and parallel with what I here assume of the incorporation of the morbid materials derived from the blood."

It is worthy of notice, however, that in many cases where seemingly different organs have been affected, it was the serous membrane which suffered most. If it could be proved that that membrane was alone affected, the argument with regard to the influence of the blood would be weakened; but other portions of the organs besides the serous lining have usually been found changed: in the brain, the cerebral substance; in the lung, the parenchyma; in the heart, the mus-

cular fibre; in the stomach and intestines the mucous membrane, have been found softened or otherwise diseased.

That there is inflammation of the brain or its membranes, the symptoms and *post-mortem* appearances indicate; and so likewise when the disease attacks especially the lungs, there are evident signs of inflammation; the swelling, pain and suppuration in the vicinity of the parotid and lymphatic glands, or in the neighborhood of the joints, would under other circumstances be called inflammation.

It may be objected that the disease is not active enough to be inflammatory; possibly not, as that term was formerly understood, but now it is admitted that it may coexist with a general decrease in vital power, with debility, in fact.

Dr. Tanner says, in the last edition of his Practice of Medicine:—"In many instances of inflammation there is depressed nervous power and impaired action of the heart."

Mr. John Simon says:—"Further, the quality of the pulse during inflammation, and generally that look of vehemence in the febrile process which depends upon the circulatory system taking an active part in the production of symptoms, will be almost unlimitedly influenced by the more or less vigor of the patient. With weakened nerve power, with feeble heart structure, there can be no strong, hard pulse; nor can the pulse be otherwise than soft or small when the bloodvessels are half emptied of their contents."*

Paget remarks:—"So far, then, as the proper substance of the inflamed part is concerned, there appears to be decreased action; that is, decreased formation. There may be, indeed, an increased absorption; but this is also, in one sense, characteristic of decreased exercise of vital force; since all absorption implies a previous degeneration of the part absorbed. Nor can we justly call this, in any sense, 'increased action,' till we can show how absorption is an action of vessels."

"From these considerations we may conclude that the productive part of the inflammatory process is not declaratory of the exercise of a large amount of formative or organizing force; and this conclusion is confirmed by observing that development, which always requires the highest and most favored exercise of the powers of organic life, does not occur while inflammation lasts. The general conclusion,

* See Holmes's Surgery.

therefore, may be as well from the productive, as from the destructive process, that it is accomplished with small expenditure of vital force; and that even when large quantities of lymph are lowly organized, such an expression as 'increased action' cannot be rightly used, unless we can be sure that the defect of the formative power exercised in the proper tissue of the inflamed part, is more than counterbalanced by the excess employed in the production and low organization of lymph."

Dr. Chambers, in his book entitled "Renewal of Life," also advocates that all diseased action is diminished action, that there is no increased vitality in parts abnormally changed.

If this disease is, as has been supposed, dependent upon an altered condition of the blood, whether produced by the introduction of a poisonous principle from without, or by a change within itself in its usual constituents, it would not be reasonable to expect this altered blood to sustain as great vitality and as high action as healthy blood; debility might be expected.

We have, then, evident marks of local inflammation, and there is nothing in this naturally opposed to debility as the two terms are now understood.

It may be concluded that cerebro-spinal meningitis is a disease of debility, accompanied with or complicated by local inflammation, caused by an altered or morbid blood. What the alteration is, how the morbid material is communicated to that fluid, whether it is cryptogamic, as has lately been discovered with regard to the cause of measles and of periodical fevers, or whether it is animal or gaseous, we do not know. Probably the condition of the tissues and the nerves also operates largely in producing the disease.

Cerebro-spinal meningitis has been considered by some identical with influenza. But the symptoms are not the same; coryza is wanting, and sneezing is not general in cerebro-spinal meningitis; the head symptoms are not so severe in influenza; the rate at which they travel over the country is entirely different; influenza is rapid, passing quickly from one place to another, and not remaining long anywhere; cerebro-spinal meningitis, however, passes from place to place with much less rapidity, and sometimes remains so long as to become almost endemic. Influenza, also, is a slight affection, when the small number of deaths in proportion to the number attacked is considered; and the fatal cases are found principally among the very young or

very old. Just the reverse of this is seen in meningitis—it is very fatal among all classes and ages.

There is more similarity between the disease we are considering and typhus fever; indeed, many have concluded that it is only a species of that disease, with determination to the head.

The following table will show at a glance wherein these diseases are similar and dissimilar.

| *Symptoms of Typhus resembling Cerebro-spinal Meningitis.* | *Symptoms of Typhus not resembling Cerebro-spinal Meningitis.* | *Symptoms of Cerebro-spinal Meningitis.* |
|---|---|---|
| Sometimes prodromes; often commences suddenly. | | Occasionally prodromes; usually commences suddenly. |
| | Eruption rarely absent. Eruption appears on the 4th to 7th day. | Eruption often absent. Eruption appears on the first or second day. |
| Purpura and vibices. Herpes on lips and elsewhere. Tongue generally black or brown. | | Purpura and vibices. Herpes, especially on lips. Tongue occasionally dark colored. |
| | Occasionally nausea, rarely vomiting. Delirium seldom before end of first week. Delirium often furious. | Nausea and vomiting not uncommon. Delirium early, often on first day. Delirium usually talkative and quiet. |
| Pupils sometimes dilated. | Delirium becoming coma on ninth or tenth day. When delirium sets in, pupils contracted. | Delirium becoming coma much earlier. Pupils usually dilated. |
| Tenderness of surface. Subsultus tendinum. | Headache ceases when delirium commences. | Headache continues after delirium begins. Tenderness of surface. Subsultus tendinum, tho' not so common. |
| | Convulsions not earlier than seventh day. | Convulsions earlier. |
| Rigidity, especially of the flexors. | | Rigidity of muscles. |
| | Opisthotonos very rare. Rarely inflammation of the brain. | Opisthotonos common. Inflammation of the brain common. |
| | Skin usually dry. | Skin not often very dry. |
| Pulse 80 to 140. | Pulse generally regular. | Pulse 80 to 140. Pulse generally irregular. |
| Great prostration. Usually constipation; occasionally diarrhœa; stools often dark. Urine often diminished. | | Great prostration. Usually constipation; occasionally diarrhœa; stools often dark. Urine sometimes diminished. |
| Sometimes albuminuria. Sometimes complicated with pneumonia. Accompanied by sore throat. Inflammatory swellings and buboes, especially of the parotid and submaxillary. | | Sometimes albuminuria. Sometimes complicated with pneumonia. Complicated with sore throat. Inflammatory swelling of the parotid, lymphatics about the neck and in other places. |
| | Amendment on tenth to sixteenth day. About one in five dies. Fatal between twelfth and twentieth day, sometimes on first day. | No stated period of amendment. About one in three dies. Fatal earlier, between second and sixth day, not unfrequently on the first day. |
| Moderately contagious. | | Moderately contagious. |

| *Pathology in Typhus resembling Cerebro-spinal Meningitis.* | *Pathology in Typhus not resembling Cerebro-spinal Meningitis.* | *Pathology in Cerebro-spinal Meningitis.* |
|---|---|---|
| Blood fluid and dark. | | Blood fluid and dark. |
| Lungs rarely healthy; usually hypostatic congestion, sometimes amounting to consolidation; both equally affected; œdema at times. | | Lungs, when affected, showing hypostatic congestion; sometimes exudation of blood into their parenchyma. |
| | Pneumonia not common, 43 in 288 cases. | Pneumonia not so common, except when that form is epidemic. |
| | Occasionally recent pleurisy. | Pleurisy not observed. |
| | Not mentioned. | Effusion of lymph into the pericardium. |
| | Rarely signs of inflammation in heart. | Marks of inflammation in heart. |
| Spleen enlarged and softened. | | Spleen enlarged and softened. |
| Liver softened. | | Liver softened. |
| | Liver not enlarged. | Liver enlarged. |
| | Peyer's glands healthy; no signs of inflammation in the intestines. | Inflammatory spots on the intestinal mucous membrane; Peyer's patches enlarged and sometimes ulcerated, though not as in typhoid fever. |
| | "*Post mortems* show that inflammation of the brain or its membranes rarely if ever occurs, even as complication, in typhus." | Principal and most frequent lesions show inflammatory action within the cranium and spinal canal. |

THESE two diseases resemble each other in almost every respect, except in reference to the eruption and where the functions of the brain are implicated; also, cerebro-spinal meningitis is by far the more severe, being fatal in a shorter time and in a larger proportion of cases.

Murchison, speaking of the convulsions which are often met with in typhus, says, "No appearance is ever found within the head to account for the convulsions." "It is now tolerably certain that convulsions occurring in the course of typhus have always a uræmic origin." Again, in speaking of the cause of the palsy which sometimes occurs, he says:—"Although the nervous system may be primarily at fault, the palsy is really due to an exaggeration of the muscular atrophy which, to some extent, is always produced by typhus." He remarks, with regard to the *post-mortem* appearances found in the head, that they rarely, if ever, show that inflammation of the brain or its membranes has been present, even as a complication. "The

cerebral membranes often exhibit increased vascularity, but never any deposit of lymph or pus, indicative of recent inflammation." "The increased vascularity of the cerebral membranes in typhus must not be regarded as a sign of inflammation, and does not account for the cerebral symptoms observed during life." "In the majority of cases, where there is increased vascularity of the cerebral membranes in typhus, some impediment will be found in the pulmonary circulation, or there has been evidence of greatly impaired cardiac action. The congestion, in fact, is mechanical or passive, never active." Hæmorrhages on the arachnoid occur, but have no connection with cerebral symptoms. "Increased effusion of serum within the cranium is one of the frequent morbid appearances." "It never contains any flakes of lymph or exudation corpuscles." "The increased amount of serosity within the cranium is no sign of inflammatory action, and accounts, in no way, for the cerebral symptoms during life."

These are the strongest statements I have been able to find opposed to the presence of inflammation within the cranium during typhus; and if they were correct, it would be necessary to admit that what has been called spotted fever, or cerebro-spinal meningitis, is a disease distinct from all others. But other authors do not agree with Dr. Murchison, and he has published an article in the London *Lancet* for April 22d, 1865, wherein he declares himself to have been in error with regard to the presence in typhus of inflammation of the brain. He says:—"In rare cases, typhus fever is complicated with unmistakable inflammation of the membranes of the brain. At the time of the publication of my work on Fevers, I was under the impression that this complication never occurred, but subsequent experience has convinced me that I was mistaken. In the interval I have met with two unequivocal cases of typhus complicated with true meningitis and the effusion of lymph on the surface of the brain." He also mentions having lately noticed tetanic contractions and opisthotonos.

Dr. Bartlett notices the symptoms referable to the head, pain, delirium, coma and perverted sensations; he mentions, also, the lesions of the brain observed by Gerhard, Reid, Jenner and Shattuck—engorgement of the sinuses and larger vessels of the brain, effusion of serum under the arachnoid and into the ventricles, and the presence of

extravasated blood within the cavity of the arachnoid; and Dr. Clark, the editor of the fourth edition of Bartlett's "Fevers of the United States," says:—"The morbid condition of the cerebral membranes corresponded with the severity and duration of the coma." He noticed, also, a loss of transparency in the arachnoid, which was "in many instances dotted over with opaque white or yellowish white *spots*, without perceptible elevation, sometimes with distinct elevated grains." He noticed, occasionally, softening of the cortical substance.

Dr. Watson says:—"The unnatural conditions that have been sometimes noted are—slightly diminished consistence of the substance of the brain; congestion of its bloodvessels." "Now to what conclusion do these facts lead us? Why, in the first place, to the conclusion that those pathologists are in error who maintain that the essence of continued fever is *inflammation of the brain*." "Nevertheless, there may be, and there not seldom is, in these fevers, actual inflammation of the brain or its membranes; but this is an incidental complication."

Dr. Wood says:—"No clearly ascertained connection exists between the stupor and the anatomical appearances of the brain. Sometimes, however, clear evidences of encephalitis, such as injection of the membranes, opacity of the arachnoid, fibrinous exudation, and injection and softening of the substance of the brain, are presented in cases which have exhibited signs of active cerebral inflammation during life."

Cerebral inflammation is, then, acknowledged to occur in typhus, but it is a very rare complication.

The other point in which there is a dissimilarity, is the time at which the spots appear. The character of the eruption is nearly the same in both diseases. Dr. Murchison says:—"It is composed of numerous spots of irregular form, varying in diameter from three or four lines to a mere speck, which are either isolated or grouped together in patches, presenting a serpigenous or very irregular outline, and often closely resembling the eruption of measles. At first these spots are of a dirty pink or florid color, and very slightly elevated above the skin, and they disappear upon pressure; but after the first or second day, they usually become darker and more dingy, they resemble reddish-brown stains, are no longer elevated above the skin, and do not disappear, but only become a little paler on pressure. They have no defined margin, but merge insensibly into the

color of the surrounding skin. These spots usually come out first over the abdomen and spread thence to the chest, back, shoulders, thighs and arms." He mentions elsewhere that in the centre of the spots there occurs at times a change into petechiæ, giving rise to three stages in their progress, though the last may not always be seen. Other accounts of the eruption of typhus so nearly agree with this that it is unnecessary to quote them.

We find almost precisely the same description of the eruption in cerebro-spinal meningitis. Surgeon Wales, U.S.N., says:—"The spots assumed the form of small, round ecchymoses, of various sizes, from the head of a pin to the size of a split pea, of a light red color, like the bites of fleas. As the case advanced, the splotches increased in size and coalesced, forming larger ones, or, properly, patches, and in bad cases assuming a livid or purplish color. Again, the form was that of reddish streaks, as if caused by striking the parts with a bundle of twigs. In all cases the eruption was even with the skin, and appeared first upon the extremities, generally the upper, and then on the face and trunk."*

Dr. Woodward, of Brandon, Vt., in an article in the *American Medical Times* for May 14, 1864, says, "The spots from which the disease has taken its name are not unlike the spots seen in enteric and typhus fever, presenting in a few cases all grades, from the rose-colored rash to the deep and permanent (under pressure) petechiæ." Many mention that the eruption resembled that of typhus. Dr. J. B. Upham notices the similarity. "Petechiæ were not an unfrequent manifestation—in appearance almost identical with the true typhus eruption, and like that seen upon every part of the body, except the face."† The color, as noticed by others, was sometimes light and sometimes dark. Dr. Burns, in one of his cases, found it bright colored, like rubeola.‡ Dr. Gerhard gives a very minute description of the eruption. They varied in size from the head of a pin to a quarter of an inch—were sometimes confluent. "Each spot was of a dull-red color, almost purple in some cases, varying in shade, for the most part not at all affected by pressure." "The spots were not in the slightest degree elevated above the surface." "The spots ap-

* American Journal of Medical Sciences, Jan., 1864.
† Boston Medical and Surgical Journal, vol. lxviii.
‡ American Journal of Medical Sciences, Jan., 1865.

peared usually at the end of twenty-four hours, but sometimes even sooner."*

In previous epidemics, the eruption is also described as being sometimes light colored and sometimes dark. The committee of the Massachusetts Medical Society, in 1810, described the spots as "florid and fiery. An appearance like measles has also been noticed." Dr. North says, "they varied from a common to a very dark purple." Dr. Gallup says, "they sometimes resemble petechiæ, or flea-bites, as described by writers, happening in other diseases, of a dark hue; sometimes of a brighter color."

Foreign observers do not so frequently mention the color, merely saying that petechiæ were present. Maillot says:—"The skin is very warm, dry, and presents disseminated over the body and limbs, a large enough number of spots of a deep red, irregular in form, unequal, not disappearing under pressure."†

The eruption was, then, if not identical, at least nearly so, in the two diseases, not only during the late epidemic, but in former times and in other countries.

It is necessary to account for the difference of time at which it appears. It has been stated that the eruption is due to an effusion or extravasation of blood beneath and into the cutaneous tissue. The earlier and more thoroughly the blood is disorganized the sooner this extravasation might be supposed to occur, and the darker would the eruption be, even in the first instance. The fearful rate of mortality and the very short duration of the fatal cases would lead to the conclusion that this disease causes more sudden changes in the tissues and blood than common typhus. Supposing it, then, to be only an unusually severe form of that affection, the early disorganization of the blood would be expected to occur, and the early appearance and darker hue of the eruption follows as a natural sequence, and can no longer be stated as an argument against the identity of the diseases.

The eruptions in the two diseases being identical in character, the difference in the date of their appearance being explained by the much greater severity of the disease in one case than in the other, there remain no differences between typhus and cerebro-spinal meningitis to be reconciled, except those which refer to the lesions of the brain and spinal cord.

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* American Journal of Medical Sciences, July, 1863.

† Gaz. Med. de Paris, 1848.

The earlier appearance of convulsions and delirium would depend on the brain being directly affected at that time, whereas in common typhus these symptoms are not usually exhibited until a later stage, when the blood has been charged with urea or ammonia. It has, however, been mentioned that lesions of the encephalon have been noticed as one of the complications in typhus.

The difference in the regularity of the pulse may also depend on the affection of the cerebral centres.

There is one appearance which has not been explained, the effusion of lymph in the pericardium, which occurred in two cases, and has not been mentioned in connection with typhus. But ecchymotic spots on the heart and softening of that organ have been noticed; also pericarditis and endocarditis, by Jacquot.

With regard to the treatment of typhus, Dr. Murchison, after speaking of the means to be used to prevent the generation and extension of the disease, considers the means of cure. He advocates free ventilation, supporting diet and pleasant, cooling drinks. He discountenances bloodletting. "Modern observation has shown that the effect of bloodletting in typhus is to increase the mortality; while even in the patients who recover after it, the nervous symptoms occur sooner, and with greater intensity, and are of longer duration, the eruption is darker and more copious, and convalescence is greatly retarded." He is in favor of alcoholic stimulants only to a moderate extent, and when the heart's action is weakened. Emetics are useful only at the commencement, and violent purgation is injurious. He does not speak of opium in such high terms as some who have employed it in cerebro-spinal meningitis, but he recommends its use when there is delirium, restlessness or sleeplessness; that is, when cerebral symptoms appear.

Dr. Graves advises the employment of nearly the same course of treatment.

And so, also, other authors advocate the judicious use of stimulants and a supporting diet; discountenance all that debilitates, and allow abstraction of blood only to counteract local affections.

By referring to the treatment of cerebro-spinal meningitis in the preceding pages, it will be seen that essentially the same method of treatment is used in that disease as in typhus.

If we compare, also, the causes of the two diseases we shall find a striking similarity. "Typhus is often observed to be most prevalent

in the latter half of winter, in the spring and beginning of summer, and many epidemics have declined rapidly towards the end of summer;" but "epidemics of typhus appear to commence and progress irrespective of the season, so long as other known causes of the disease continue in operation." Again, "the ordinary variations of temperature, in this climate, have little influence over the prevalence of typhus."* The same author enumerates the causes of typhus—debilitating influences, as intemperance, fatigue, previous illness, destitution and privation; "exposure to cold and wet, especially if long continued, has a depressing influence on the nervous system, and so favors the advent of typhus."

"Over-crowding of human beings, with deficient ventilation, is one of the most powerful predisposing causes of typhus."

All the influences here enumerated have been noticed in preceding pages as predisposing causes; the evidence would rather indicate that season and the state of the weather had more influence than Dr. Murchison concedes to them; but the facts are not, perhaps, sufficiently numerous to make any positive statement.

The principal agent, in many cases, in causing typhus, the exciting cause—contagion—is thus mentioned by Dr. J. B. Upham in his little book, "Typhus Fever in Great Britain":—

"And yet the disease should not be held as contagious in the same sense that smallpox is contagious; i. e., that it is invariably and virulently so. Certainly the sphere of action is more limited—the communication of the poison more dependent on circumstances—and the morbific influence more within the control of sanitary laws and regulations, than in the usual zymotic or so-called contagious maladies. It may be stated as a general rule, that the contagion, to be effectual, must be concentrated by the crowding together of patients—or accumulated and aggravated in ill-ventilated and pent-up rooms—or stimulated by the conjunction of other unfavorable hygienic conditions—ill draining, filth, effluvia, &c. &c.—or the recipient have been previously subjected to the predisposing causes by deprivations, hardship and want, excesses, anxiety, fear, despondency, mental and physical exhaustion or debility from any cause, till his system has been brought to a point below the power of resistance." In a note he adds:—"I am aware there are many apparent excep-

* Murchison.

tions to this rule. Instances are on record, some of which have occurred in the experience of the writer, where persons exposed to isolated cases have received the contagion."

It is hardly necessary to extend the quotations; all authors agree on these points in every important respect. Possibly Dr. Upham does not lay so much stress on the influence of contagion as some.

If it is possible to classify any epidemic under a disease already described and recognized, it would be erroneous to establish a new species on account of slight differences which are easily accounted for.

There is almost an exact agreement between these two diseases in the symptoms and *post-mortem* appearances, except in reference to those dependent upon lesions of the cerebro-spinal system. The causes and treatment are essentially the same. We must conclude, then, that epidemic cerebro-spinal meningitis is only epidemic typhus, wherein, from some cause, the cerebro-spinal system is the principal seat of the attack.* By this classification the great variety in the symptoms is more easily explained, and the epidemics in which the pneumonic form was most frequently seen were true typhus, less frequently complicated with lesions of the brain.

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* It may not be uninteresting to notice that about the time when the cerebral form has prevailed, on each occasion, there has been a subject which agitated the people very generally, and caused much public discussion. Thus between 1807–14 there were the difficulties with Great Britain; from 1819 to 1827 there was more or less discussion of the slavery question, resulting in the Missouri Compromise in 1821, and parties were so nearly equal that no election of President was made in 1824, and the choice devolved upon the House of Representatives. In 1846, the war with Mexico commenced and continued two years. In 1861 was the commencement of the late epidemic, synchronous with the late rebellion, though excitement existed previously in a slighter degree. In France, from 1836 to 1848, political excitement existed, which ceased only after Louis Napoleon became Emperor. Later, at Dantzic and other German cities, where the disease has prevailed, there has been the Schleswig-Holstein question, which has aroused the people.

Thus, we see that, during each of the great epidemics, there has existed one or more questions upon which the people thought much, having their sympathies and passions excited. Had this mental agitation any influence in causing the cerebro-spinal form of the complaint?