

ion of the coccyx may be performed, but often fails to give relief.

It might be well to speak here of the importance of examining the feet in all cases of vague and obscure pains in the legs, knees, thighs, and hips, for the greatest variety of sensations, from constant dull aching or burning to sharp neuralgic twinges, may have their origin in weak or broken-down arches, and immediate relief may be obtained from proper treatment. Metatarsalgia is but one instance of this sequence.

Migraine—*vide* the article on *Headache*.

VISCERAL NEURALGIAS.—The visceral neuralgias are of great importance, both on account of the suffering which they cause, and because of their constitutional significance. They occur, like the other neuralgias, partly from general nervous causes, such as fatigue, gout, and other constitutional diseases of the nutrition, and especially the neuropathic tendency, and partly as a result of functional and organic disorders of the viscera. To what extent actual neuritis occurs as a cause is not yet known, but it is certain that chronic inflammation of the nerves is often set up by organic affections of the organs, such as the heart, to the neighborhood of which the pain is referred.

The pain of the visceral neuralgias is usually deep-seated, vaguely located, and dull, but at the same time intense and prostrating, and sometimes attended with faintness, nausea, sweating, and often disorders of the circulation and secretions. Though not sharply localized visceral neuralgias take their name from the organ in the neighborhood of which they seem to be situated, as the pharynx, the esophagus, the heart, stomach, liver, bowels, ovaries, uterus, rectum, testis, etc.

Angina Pectoris (see Vol. I., p. 227), though a true visceral neuralgia, is so often a symptom of heart disease that it is usually described in that connection. It may, however, be mentioned here that it occurs not infrequently, though hardly in its severest forms, entirely independently of organic disease. In a case known to the writers, for instance, it occurred during a considerable period on the slightest exertion, such as rapid walking, in a lady suffering from temporary debility from overwork, and was each time attended with breathlessness, and with pain and numbness in the left arm, yet eventually passed entirely away. Various other such cases are on record.

Dull pain felt during the intervals of the attacks is looked upon as perhaps indicating neuritis of the cardiac nerves, but in such cases cardiac disease probably exists as well.

It is an interesting question whether nitrite of amyl, which acts so well in angina pectoris of organic origin, would be beneficial also in the functional cases.

The *treatment* should be, in the first instance, tonic, and in the attacks itself diffusible stimulants and analgesics would be in place. Besides the outspoken diseases of the heart, increased vascular tension should be sought for, and signs of Bright's disease, as well as functional irritability of the nervous cardiac apparatus, such as result from physical overstrain and from abuse of tobacco and other cardiac stimulants. Under these circumstances digitalis or other heart tonics might be indicated.

When the attacks are of frequent occurrence electricity, either by the superficial use of the wire brush and faradic current or in the form of galvanism, is said to be of service, as is also counter-irritation over the chest.

Gastralgia (gastrodynia, cardialgia, gastric colic) is perhaps the most common form of visceral neuralgia, and in its widest sense covers a variety of sensory symptoms, ranging from sensitiveness and pain accompanying the act of digestion, and perhaps accompanied by signs of delayed or imperfect digestion, yet not due to gastritis or ulcer, to severe paroxysms of pain entirely unconnected with the digestive process.

The *etiology* is similar to that of the other visceral neuralgias, but it is met with in young children oftener than the rest. It is especially common in gouty subjects and in persons of nervous, mobile temperament, and the

writers have several times seen slight symptoms of this general character at the time of the menopause.

The pain in gastralgia is felt primarily at the epigastrium, and radiates thence upward in the direction of the esophagus, and through toward the back, besides laterally through the abdomen. Allbutt ("Visceral Neuroses") says that it may be associated with anginiform attacks, and it may be attended likewise with superficial neuralgia of the abdominal walls and other parts of the body, as the face.

The relation of gastralgia, as well as of the other sensory visceralgias, to the functional affections of the viscera is very important and calls for further study. There is no question that many digestive disorders which attend gastritis, or even cancer, may also occur as pure neuroses, and it is likewise evident that there is a whole range of nervous disorders, sensory and motor, of which these purely painful affections form only one division.

Treatment (*vide* also under General Treatment).—The vices of nutrition and assimilation should be corrected, such as are seen in gout, and evinced also by a variety of nervous symptoms often described under the head of lithæmia, and sometimes attended with the presence of free uric acid or oxalate of lime in the urine. Constipation should be corrected and the diet regulated, but not necessarily reduced to a very small amount, even if digestion is attended with pain. Sometimes it will be found that one kind of food will agree better than another without apparent reason, and, when the gastralgia is associated with serious disorders of the digestion, it may be that a patient who does very badly at home will get on very well if removed from home and placed under the care of a nurse. Indeed, the most significant fact to bear in mind is that, as a rule, it is a general nervous condition which needs treatment, rather than the special symptoms.

Belladonna and the antispasmodics, such as asafetida and valerian, besides the gastric stimulants, are of more service in gastralgia and the other visceral neuralgias than their anæsthetizing influence would suggest. Morphine must be resorted to if necessary. Deep pressure sometimes gives temporary relief.

It is not necessary to review in detail the neuralgias of the other abdominal viscera and of the genital organs. Attention has already been called to the fact that affections of the *uterus and ovaries* may give rise to neuralgiform affections in distant parts of the body, or in the distribution of the lumbo-abdominal nerves; but besides this the uterine and ovarian nerves themselves are sometimes the seat of neuralgia, not to speak of the pain of dysmenorrhœa, which is, doubtless, in part, of that character.

Neuralgia of the liver is said to be sometimes attended by swelling of the liver and by jaundice; but here, as frequently in the case of the abdominal neuralgias, it is difficult to guard carefully enough against mistaking an organic disease for one of the concomitants of a neuralgic attack.

Neuralgia of the anus and rectum is a well-marked and painful affection, and the tendency to it may be hereditary. The seizures may come on spontaneously, especially after fatigue, or may be excited by slight irritations, such as the passage of hardened feces, or may follow sexual intercourse or seminal emissions. The pain may be accompanied by clonic spasms of the perineal muscles. The rapid injection of hot water into the rectum, or hard and deep pressure with some smooth object will often stop the attack, which otherwise is liable to last for one or two hours.

Besides the more or less typical neuralgias there are a number of other painful affections, of spontaneous origin or provoked by trifling irritations, and of unknown pathology, which occur usually in persons of neuralgic or neuropathic tendency, and are therefore fairly to be classed as neuralgic, although they do not follow the distribution of a special nerve. Such are pains referred to the skin, the muscles, or the joints, not attended by signs

of local inflammation or by any appearance of local congestion or anæmia, and capable of coming and going with greater or less rapidity. The "growing pains" of anæmic children are of this order, together with a similar affection sometimes met with in adults; also the "general neuralgia" of anæmic patients, and those dermatalgias which are not due to the organic irritation of sensitive nerve fibres, such as occur in locomotor ataxia and neuritis. The arthralgic pains of false (hysterical) joint disease might perhaps be included.

The therapeutic indications are, primarily, to improve the constitutional and nutritive condition, and to relieve the pain by local or general baths or liniments, or by anodynes.

James J. Putnam.
George A. Waterman.

NEURASTHENIA.—The term *neurasthenia* ("nervousness," or *nervous weakness or prostration*) has come into general use to indicate certain states of the nervous system of which the anatomical basis is unknown, but which are characterized, on the one hand, by a lack of vigor, efficiency, and endurance, affecting usually a large number of the nervous functions, and, on the other hand, by signs of active derangement, which in part seem to occur as positive symptoms, and in part are due to a failure of the mutual support and control which the different parts of the nervous system afford each other in health.

In its widest sense the term *neurasthenia* is used as covering the groups of symptoms usually indicated by such names as *nervous prostration, spinal irritation, neuropathic or neurotic diathesis*. Even abnormal mental states, such as mild degrees of melancholia and "morbid fears," are often classed as *neurasthenia*, but their relation to a more serious malady should not be forgotten.

Sometimes *neurasthenic* symptoms are secondary to localized pathological affections in one or another part of the body, and this fact has led some observers to recognize in *neurasthenia* only a symptom of errors of refraction, lithæmia, uterine disease, organic disease of the brain or cord, and the like. It would, however, be easy to push this attempt too far, and the writers certainly believe that *neurasthenia* is a useful term to indicate states of nervous weakness which are often primary, and which even when secondary usually imply a pre-existing basis of functional disease.

Since a sense of fatigue is generally one of the chief symptoms in the *neurasthenic* individual, it is possible that an actual pathological change in the nervous system is the cause of this condition. Hodge has shown that fatigued animals show degenerative changes in the protoplasm and nuclei of their ganglion cells, and some such process may be the underlying cause of certain types of *neurasthenia*. On the other hand, the tired feeling may be a purely psychological symptom or the result of an inharmonious working of a brain of which the several parts may be structurally normal.

It has been said with some truth that hysterical and hypochondriacal persons are always *neurasthenic*, but that *neurasthenic* persons are not always hysterical or hypochondriacal; and hysteria has also been spoken of as "nervousness" crystallized into the form of a definite disease. Although typical cases of *neurasthenia* and of hysteria differ widely, yet the two affections run into each other, and the same patient may, at the same moment or at different periods, show symptoms of both diseases.

While it is true that *neurasthenia* should be looked upon—relatively to hysteria and insanity—less as a distinct disease than as a departure from health, and as an expression of the mode in which degeneration of the nervous powers first shows itself, still it must not be forgotten that *neurasthenics* present certain symptoms which are almost as characteristic as those of any other of the neuroses.

SYMPTOMATOLOGY.—The symptoms called *neurasthenic* are conveniently divided into those which arise as a sign that the patient is unequal to the ordinary tasks of a fairly healthy person, and those which are manifestations

of a morbid action on the part of the nervous system over and above the indications of simple inefficiency. These can be called, for convenience' sake, *negative* and *positive* symptoms, respectively. Thus, the *negative* symptoms are those of fatigue or pain arising without sufficient cause, but still due to effort, and, within certain limits, proportionate to the effort made; while the *positive* symptoms are nervous outbreaks or signs of excessive weakness of special kinds, occurring almost independently of effort, and at least out of proportion to it. The negative and positive symptoms may run into each other, as, for example, when, in the place of an oversensitiveness or self-distrust, we find an ever-present sense of anxiety or "morbid fear"; or, when a simple incapacity of the eyes to bear a prolonged strain passes into a high degree of photophobia or asthenopia; or when instead of a simple feebleness of the digestion we have an active nervous dyspepsia, and so on through the whole range of nervous functions. Usually the symptoms of special nervous derangement appear on a background of general nervous weakness. It sometimes happens, however, that some one symptom is so prominent that it seems to stand almost alone. In like manner some cases present almost exclusively mental symptoms, and cannot bear a slight emotional strain without great suffering and yet may show more than ordinary physical strength and endurance; while with others by far the most prominent symptoms affect the muscular and vegetative functions.

The late Dr. George M. Beard, to whom we owe many valuable observations on this subject, attempted to base upon this fact a division of *neurasthenic* symptoms into cerebral and spinal, but this is premature and is not based upon sufficiently well-grounded reasoning.

Individual cases of *neurasthenia* vary so greatly in the grouping of their symptoms that it will be better to study the symptoms themselves case by case rather than to attempt to describe different types of the disease. It is, however, worth while to bear in mind that the term "irritable weakness" aptly indicates the character of many of the conditions met with.

Special Symptomatology.—The *temperament* of *neurasthenics* is essentially mobile. They are usually quick, versatile, and sensitive, and may be talented and intellectual, though they rarely have the robustness and endurance necessary for great success. Often a sense of nervous weakness and effort is present, which gives rise to self-consciousness and self-distrust, and finally to a suspiciousness toward others, and to a vague feeling of isolation and dread.

A healthy organism should respond to calls upon it with an elasticity like that with which the cushion of a billiard-table responds to the blow of the ball.

With *neurasthenic* patients this is usually not the case. A trifling impression arouses an exaggerated *inward reaction* in the form of egotistic or self-distrustful ideas, while the *outward reaction* is correspondingly feeble or unduly delayed. Slight obstacles seem mountains, and some patients can hardly persuade themselves into a decision or an exertion, although under the influence of some slight excitement they may act with energy and intelligence. A similar undue inward reaction is shown in other departments of nervous energy besides the strictly mental. Thus, even with patients who seem well-balanced and of good self-control, trifling causes may excite or maintain neuralgia or dyspepsia, disorders of the sleep, collapse of strength and the like, with provoking and inexplicable readiness.

Instead of the vague sense of anxiety and dread, special "morbid fears" are often present. The variety of these fears is endless. Among the most common is the fear of large open spaces, fear of crowds, of walking alone, or riding in railway trains, fear of contamination from touch, fear of taking food and the like, fear of becoming insane.

In many cases, of course, these symptoms mean something more serious than *neurasthenia*; but often, on the other hand, they represent the natural or "reasonable"

fears of healthy persons acting upon a morbidly sensitive temperament. Such persons begin by being vaguely timorous and distrustful and end by having special "fears."

Sometimes the neurasthenic temperament approaches the hysterical temperament, in exhibiting gross selfishness and fondness for exaggeration and for attracting attention; but, as a rule, neurasthenic patients are docile, patient, self-sacrificing, and intelligent, or if they are selfish, it is because of a life of semi-invalidism, or of habits of painful introspection, and is not due to a lack of moral sense, which is rather characteristic of the hysterical temperament.

On the other hand, it is not uncommon to see neurasthenic patients exhibiting some of the special disorders which are usually considered as peculiar to hysteria, such as hemiplegic disorders of sensation or motion, alteration of the deep reflexes, photophobia, etc.

The *digestive disorders* of neurasthenia may vary from simple feebleness of the digestion, or digestion perhaps sufficiently well performed but attended with pain, to disturbances almost or quite indistinguishable from true catarrhal affections. Such patients are also very subject to visceral neuralgias, which, when they affect the nerves of the digestive tract, are often attended with marked signs of functional disorder of the corresponding organs.

Other symptoms are likewise met with, which are hardly to be called digestive, though affecting the digestive organs. Such are attacks of nausea, not due to the taking of food; attacks of diarrhoea, or, more strictly, discharges of watery fluid, coming on suddenly as a result of slight nervous fatigue or excitement, and passing away as quickly, or perhaps permanently yielding to an improvement in the patient's general condition; or discharges of large quantities of mucus, in masses or strips, with or without faeces.

These nervous disorders of the digestion are of so much practical importance and interest that they have of late years attracted much attention.

Often the only conclusive diagnostic sign to distinguish them from organic affections is the fact that they do not improve under the usual treatment of gastrointestinal catarrh, chronic ulcer, etc., which they simulate, while they are greatly influenced by improvement in the patient's general condition and surroundings. Thus, a removal of the patient from home, or his subjection to the "rest cure" (see under Treatment), may effect what the most careful dietetic and medicinal treatment had failed in years to accomplish.

Finally, it is not to be forgotten that in any given case the symptoms may be in part of organic, in part only of functional origin.

In some cases the neurotic dyspepsias are so severe that, what with the nausea and vomiting and general distress and pain, the patient's strength is greatly reduced, and his life may even be threatened. In two cases under the care of one of us these symptoms were attended with symptoms of insanity of the melancholic type, and with suicidal tendency.

Sensory Disorders.—The most important type and instance of the disorders of special sense is simple *asthenopia*, which is often so severe that some patients, who may have otherwise no more serious trouble than a certain delicacy of health, are, for years together, almost totally unable to use their eyes for any fine work. This may be due in part, or wholly, to weakness of the muscles of convergence and accommodation, and is sometimes remarkably relieved by a systematic method of exercise, combined, if necessary, with suitable glasses. Other patients are much annoyed by sparks of light floating in the field of vision, or by glimmering sensations similar to those which often precede sick headache. Tinnitus aurium is sometimes found, but this is less likely to be a prominent symptom in simple neurasthenia than to occur as a sign of irritation of the nervous centres, such as may imply toxic conditions of some sorts.

Neurasthenic patients are subject to *neuralgia*, or to

neuralgiform attacks, both superficial and visceral, and usually shifting and fugitive in character (see under Neuralgia), and to periodical headaches.

Backache, sometimes with excessive sensitiveness to light pressure over the spine, is very common, and may be associated with some slight uterine disorder, though it may also occur alone. It is usually increased by exercise, and especially by using the arms above the height of the shoulders, and by anything which causes general fatigue.

The pain of the neurasthenic backache may be along the vertebral column, or farther outward, especially about the sacral and iliac attachment of the large muscles of the back. It is often provokingly obstinate under local treatment, and disappears the soonest under such treatment as best agrees with the patient's general condition. Sometimes, in the class of cases to which the name of "spinal irritation" was formerly given, the sensitiveness of the back to slight pressure, combined with the local pain, is the most prominent symptom present. In such cases, besides the local sensitiveness, the pressure gives rise to special peripheral sensations, thoracic, pulmonary, abdominal, etc., according to the level at which it is made.

Pain in the muscles and joints is not uncommon, without it being possible to discover any sign of typical rheumatism, gout, or neuralgia, and this symptom, like so many others, is capable of attaining a prominence out of proportion to the rest. Thus, in the case of a gentleman of whom one of us has had the care, intense muscular pain in the legs, beginning after an interval of quiescence of half an hour and rising steadily in severity, is brought on so easily by the least exertion that the patient has been obliged for many years to give up walking almost altogether.

Another very common variety of pain, not precisely neuralgic, is a distressing *sense of pressure at the vertex or occiput*, often combined with tenderness and stiffness of the muscles of the neck. This is usually a sign of some special fatigue or strain, but some patients suffer from it almost continuously, and find in it a source of serious distress.

Parasthesia ("prickling and numbness") in the extremities, or assuming the hemiplegic distribution, is likewise often complained of, but it is to be remembered that the same symptom is met with in debilitated women who are not especially neurasthenic, in cases of chronic lead poisoning, and in other conditions.

Palpitation and cardiac irregularity are not uncommon, and we have seen one or two patients with peculiar *disorders of the respiratory rhythm*. One of these was cured by systematic exercises of the respiratory muscles.

The writers have noticed that *cardio-respiratory murmurs* occur with great frequency in young male neurasthenics of the thin, poorly nourished type. Sometimes this murmur is very transitory.

Nervous cough is sometimes a marked and obstinate symptom, and may last for months, without any (local) cause whatever, and then pass quickly away. These coughs, like many other of the neurasthenic symptoms, are associated at times with slight irritation in the nose, or pharynx, or ears, or in the genital tract. Sometimes, instead of the cough, we find a veritable *asthmatic seizure*, and in this connection the semineurotic origin of hay-cold is to be remembered.

It is not uncommon to see in patients who cannot be called other than neurasthenic an almost *periodical recurrence of symptoms*, such as migrainoid headaches, attacks of exhaustion, sleeplessness, and the like. Usually some slight overexertion or fatigue seems to act as the immediate cause of these outbreaks, but the cause and the effect are out of proportion to each other.

Neurasthenic patients are, as a rule, very easily affected by *stimulants* of every kind, and at the same time they often feel rather a desire for them. In spite of this, they are by no means always inclined to be immoderate in indulgence, and need not necessarily be advised to abstain altogether from their use.

Insomnia, in one or another form, is almost always present at one time or another, and forms one of the most important symptoms of neurasthenia, on account of its indirect effects as well as for the suffering that it occasions. The early morning period of wakefulness is a time when the depression of spirits, from which neurasthenics often suffer, makes itself most prominently felt.

It is also true, however, that such patients usually sleep more than they themselves believe, and that they do not suffer from an amount of real fatigue at all in proportion to their sensations in the morning after a night of restlessness and unpleasant dreams. Excessive *drowsiness* is a less common symptom than insomnia, and, though annoying, less serious in its results.

Vaso-motor Symptoms.—Besides the fact that nervous patients are prone to blush easily, a fact which usually indicates only a general emotional excitability, they often show symptoms which are fairly attributable to a morbid action of the vaso-motor nervous system. Such are the vascular spasms of *digiti mortui*, chilliness, and urticaria, and the vascular dilatation which causes erythematous patches, burning, and swelling of the hands and feet, and even chilblains.

The general sensation of heat, which leads certain patients to go about with light clothing in the coldest weather, is probably not really of vaso-motor origin, nor have we a right to attribute to this cause the attacks of profuse sweating on the slightest exertion from which neurasthenics occasionally suffer, or the watery discharges from the bowels already alluded to. It is more probable that these are neuroses of the glandular nerves themselves.

The "hot flashes," which are often such a serious annoyance, are sometimes attended with visible flushing of the face, hands, etc., and with distressing sensations of fullness and pulsation in the head—symptoms which are probably vaso-motor in character; but sometimes they are unattended by any such phenomena, and, so far as we know, are neuroses of sensation only, and analogous to the many other morbid feelings with which such patients are liable to be attacked.

The *sexual functions* are apt to be disordered in various ways. Impotence, premature ejaculation, sense of prostration after sexual intercourse, and similar symptoms, are much oftener met with among neurasthenic than among healthy persons; and it is with persons of this class, both male and female, that irritations in the genital tract produce, indirectly, their most serious results. The sexual instincts in neurasthenics are usually active and practically normal, the grave perversion of desire belonging rather to the category of insanity.

The *general nutritive condition* of neurasthenic patients may be good and their muscular strength quite up to the normal. They are, however, usually spare in flesh, and if, as often happens, their appetite, digestion, and power of assimilation are disturbed, they may become greatly reduced in health. On the other hand, many of these patients, and some of the worst cases, are over-fat, and often at the same time anæmic.

The *metabolic functions* are apt to be at fault, and indeed, strictly speaking, it is often impossible to say whether the nervous or the nutritive disorder comes first. Free uric acid, urates, or oxalate of lime are often found in the urine; the phosphates are liable to be increased, and the quantity of the urine may be increased or diminished, or both in turn.

Where such conditions as these are traceable to functional diseases of the liver, or to a gouty inheritance, or to the absorption of products of imperfect digestion, the nervous symptoms which occur may fairly be considered to be secondary.

On the other hand, there is little or no doubt that the nervous weakness may be the primary affection, and, even in many cases of gouty parentage, it is probable that the impaired nervous system is often a direct inheritance.

The *pupils* are apt to be unusually large in moderate light, and very mobile.

The *voice* sometimes shows signs of the universal tendency to irritability and weakness, and lacks the normal firm, sonorous quality.

The *hair, teeth, and skin* of neurasthenics are said by Beard to suffer from premature denutrition; but this is difficult to prove with certainty, though it may be admitted as possible that a lack of nervous vigor should show itself in this direction as well as in so many others.

The following sketch by Dr. Clifford Allbutt may be quoted as giving an excellent picture of one variety of neurasthenic patients.

After speaking of the contrast between the neurotic and the hysterical types, and the absence in the former of the exaggerated selfishness and feebleness of purpose, which are characteristics of the latter, he says: "He enters your room with a brisk step and a quick, observant eye. You see a slightly built, meagre man, of sallow complexion, or, if colored, with the color painted high upon the cheek-bone. The cheeks and temples are hollow, and the temporal arteries are visible under the lean skin, which often shows tanned markings, deepened during attacks of pain; the hair is straight, fine, and sparse upon the scalp; the features are sharp, often prominent; the lips thin, and the skin dry; and some remnants of eczema may be seen about the chin or ears. The bodily frame is lightly and often finely built, the bony fingers and wrists and the visible sinews and radials betraying the absence of fat. Here and there, in later life, a knotty knuckle may tell of gouty parentage. The pulse, when most tranquil, usually ranges between 70 and 80, and accelerates on the least excitement. The clavicles and ribs in like manner are prominent, and the heart's apex may be seen to beat sharply before the eye; its systole to the ear is likewise short and sharp, and the second sound very audible over a wide area. The limbs are small, but often very sinewy; such persons are as active as birds, and the absence of fat in their muscles often gives to these, in states of health, the quality of hardness under the hand. Their conversation, again, is lively and voluble, often keen and brilliant, but impressionable rather than imaginative; you may generally notice in them, too, some little blinking, twitching, or tattooing trick which quickens as thoughts and cords come faster. His companions will tell you that he is subject to great fluctuations of the animal spirits; gay, even fascinating, in society; brisk, orderly, and thorough in business; but at home dejected or fretful. He is a small eater, a light sleeper, and a worn worker. These persons are the heirs of every true neurosis, from insanity to toothache; and, on the whole, when we consider the infinite perturbations of intermarriage, it is surprising how true they run, or how clearly you may detect the neurotic strain in mixed descendants. Of their visceral neuroses I shall have to speak hereafter, and would only say now that in both sexes of them migraine, stomach-ache, and windy colic are frequent and eminent, and receive the name of dyspepsia; and in the women are added to these uterine and ovarian neuralgias and hyperæsthesias. To call these suffering women of the neurotic type hysterical is to confuse all due acceptance of names, and, what is worse still, is to confuse the real relations of things. The neurotic woman is sensitive, zealous, managing, self-forgetful, wearing herself for others; the hysterical, whether languid or impulsive, is purposeless, introspective, and selfish. In the one is the defect of endurance, but in the other defect of the higher gifts and dominion of mind."

Besides this, which might be called the intellectual type of neurasthenia, there is another, in which the element of feebleness, mental and physical, is the predominating characteristic. Many of the "fat anemics" belong to this class, and in them, in lieu of excitability and misdirected force, the nervous symptoms suggest those of hysteria, of a mild type, in their exaggerated response to slight irritations.

INFLUENCE OF AGE AND SEX.—Neurasthenia, unlike hysteria, is almost as common among men as among women. In its full development it is a disease of pu-

berty and middle life, but signs of the neurasthenic tendency are to be found in early youth, consisting in a general mobility of temperament, oversensitiveness, and precociousness, and the occurrence of special nervous symptoms, such as insomnia, somnambulism, chorea, night-terrors, etc.

Still later, especially in young women from sixteen to twenty years of age, various other signs of nervous weakness may make their appearance, such as headache, backache, extreme and causeless lassitude; and these years constitute in fact a critical period, during which many persons are nervous invalids, who may later reacquire good health. Very often these periods of prostration are attributed to special causes, such as falls, overexertion, and the like, but these events are rarely more than exciting causes, and are not necessary to the result. Such attacks are often diagnosed as anæmia, or chlorosis, or as "spinal concussion," but their failure to respond to ordinary tonic or local treatment, and the fact that they are often relieved by means addressed to the general nervous condition, point to their true origin. Of course, true anæmia may complicate this condition of nervous prostration, or even act as its cause, and may require its own special treatment; but the important point is that the nervous element in the case is not to be overlooked.

COURSE AND PROGNOSIS.—Neurasthenia is not likely to shorten life to any marked degree, unless it causes severe disorders of the nutrition. It does, however, occasionally happen that a patient dies from no other apparent cause than a prostration of the nervous functions.

On the other hand, neurasthenia is not, as a rule, an acquired disease, but an inherited weakness of the nervous system, and in this sense is not, strictly speaking, curable. It is, however, often possible to remove the patient from the circumstances which call out the manifestations of this weakness and thus practically to effect a cure. Sometimes even with the best of treatment partial improvement and frequent relapses are the rule. Constant watchfulness and good judgment rarely fail to bring some amelioration. Acquired neurasthenia may pass away with the cessation of its cause, or may overlast this for many years, as in some cases of railway accidents, or similar injuries, and in the case of neurasthenia of the menopause.

Neurasthenic symptoms sometimes constitute the first stage of outspoken mental disease, but, on the other hand, patients may be severely neurasthenic all their lives long without suffering from more serious mental trouble.

The relation of neurasthenia to organic disease is obscure, but very important.

The fact that neurasthenia is so often associated with disordered metabolism, and with impaired nutritive vitality of many tissues of the body, and that its course is often marked by the frequent occurrence of functional disturbance of the heart and vaso-motor system, makes the inference natural that the nervous disorder must sometimes pave the way, or, more strictly perhaps, mark the commencement of more or less serious organic affections.

Our opinion in the matter, as regards chronic neurasthenia, is at present limited to this inference. We do, however, know that acute mental strain may be the starting-point of such affections as chronic nephritis, diabetes, and probably many other disorders.

DIAGNOSIS.—This has been sufficiently covered by the foregoing sections. It cannot, however, be amiss to recall again that the presence of neurasthenic symptoms only shows that the efficiency of the nervous system has received a blow of some kind, and leaves still before us the task of seeking the real source of mischief. It is especially important to recognize that some organic diseases, such as disseminated sclerosis or cerebral tumor, may cause neurasthenic or hysterical symptoms, and perhaps for a time no others.

ETIOLOGY.—Neurasthenia must be distinctly counted as belonging to the great family of neuroses, and is in-

heritable from parents suffering from any one of this group of affections. It stands also in a similar relationship to various constitutional diseases, such as gout, phthisis, anæmia, and other less well-marked disorders of the nutrition (lithæmia), as well as to all of the many influences which impair the vigor of the nervous system, including even organic disease of the nervous centres.

Chief among the causes that tend to develop and maintain the neurasthenic tendency may be mentioned an irregular, unhealthy, and overstimulating life, especially at the time of childhood and puberty, when the emotional nature is so active; and, at a later time, exposure to responsibility and worry greater than the patient is fitted to bear.

Some patients are, in fact, neurasthenic only in relation to their surroundings, and appear healthy when under conditions more suited to their powers and character.

One-sided, or unsystematic education in youth, or in early professional life, which makes success in later years possible only at the cost of undue strain, is a fruitful source of mischief.

It has been said that neurasthenia is more common in America than elsewhere, and that the cause of this consists partly in the peculiarities of the climate, partly in the fact that we have been brought rather rapidly under the influence of an overstimulating state of civilization. These statements and arguments are suggestive, but cannot be asserted positively without further proof.

Among the special causes of neurasthenia may be mentioned disease of the uterus and ovaries in women, and of the prostate gland in men; also concussion accidents, fright, grief, or mental strain. A condition of nervous exhaustion, which may be called acute neurasthenia, may be due to excessive overwork, as has been already alluded to.

Some of the more local neurasthenic symptoms may also be excited by irritations in the sensitive mucous tract, especially of the nose, and by errors of refraction in the eye.

TREATMENT.—The first indication for treatment is, of course, to remove special causes of the neurasthenic state, such as disorders of metabolism, anæmia, errors of refraction, disease of the uterus and prostate, chronic fatigue, etc. It is often found, however, that this attempt is less successful than had been anticipated, because the true relation between the symptoms and their causes had not been made out.

It is also noticeable that the neurasthenic condition can be largely relieved by appropriate general treatment, even while the irritation that caused or maintains it still persists.

The treatment of uterine disorders especially may, on this ground, often be postponed to advantage until the general health has been partially restored by other means, or at least until the confidence of the patient has been fully gained; for, except under these conditions, the local treatment may do more harm than good.

It is certain that benefit often follows gynecological operations on neurasthenic subjects, but it is often difficult to say why this happens, and equally difficult to obtain reliable statistics for estimating the relative number of good and of poor results.

One powerful factor with some patients is the sense that now, at last, the real cause of the long illness has been found. This cause can be counted on the most in cases in which many other treatments have been tried in vain.

It would, however, be unreasonable to deny that pelvic disorders, even when painless, may act as foci of morbid excitation, so that where operations are not likely to do harm they may be advised. The fact should never be forgotten, however, that no surgeon should operate in this class of cases without the advice of a judicious physician or without having made a careful study of neurasthenia.

It should be noted that the statement made above as to the effect of operations as the starting-point of new encouragement, or hope, applies equally to operations

on other organs, as the nose, or eyes, or to the overcoming of morbid mental habits and analogous influences. It is a dangerous practice, however, to undertake operations with encouragement as the sole excuse.

The next indication is to secure that perfection of nutrition for the nervous system which will enable it to work at its best; and to place the patient in surroundings suited to his individual powers and needs. Where this is distinctly impossible, the aim should be to enable him to bear the strain imposed upon him with as little cost as possible.

As has been said, many persons are neurasthenic only in relation to their surroundings, and enjoy good health when leading a simple life, or while in the country, though they cannot stand the excitements and responsibilities of the town. Many persons break down under the strain of emulation and competition, who can do good and active work if freed from these influences. They must learn to estimate their endurance justly, and not to be misled by their excitable temperament into attempting too much.

When the needed change cannot be secured, the time of labor should be shortened by an hour of recreation and rest in the middle of the day, or by early bed hours. Patients who do not sleep well should not work later than the early evening hours.

If exercise can be taken freely, this furnishes an immense resource, where rightly used, and even when vigorous exercise is not well borne, as is very often the case, especially if the patient is at the same time exposed to other sources of fatigue, neurasthenics almost always gain by being a great deal in the open air. The subject of exercise is so important that it must be worked out in detail for each case. Where horseback-riding, rowing, tennis, etc., are to be had, the problem is relatively simple; but for ladies, and in winter, recourse must be had to such amusements as battledore, some thorough system of calisthenics, frequent short walks, and the like, and to rubbing with a wire or hair flesh-brush, either dry or moistened with water, or salt and water.

Neurasthenic patients are, from the want of confidence in their strength, apt to fall into unsystematic habits of life, or to be without a regular occupation, and both these wants should be carefully met. Frequent short intervals of recreation, and frequent change of scene are useful, unless incompatible with proper regularity of life. Almost any change is apt to work well at first.

The strict observance of regular hours of work, rest, and exercise often saves much wear and tear, and makes the difference between an efficient and a useless person. Even a very feeble person can have some real interest, and take some real part in the work of life.

Patients with feeble nervous systems are usually better when taking as much food as their digestions allow, and that is commonly more than their appetites would suggest.

In spite of "delicate stomachs," if the nervous strength is withdrawn from other directions and turned to the service of the digestion, such persons can usually greatly increase their food without much difficulty. As a rule, the most suitable kind of food is that which agrees best with the digestion, but in certain cases great benefit is obtained from special diets. (See article on *Gout*.) In some cases of sick headache I have found a distinct advantage in alternating between the albuminous and the vegetable diets.

Thoroughly cooked and strained oatmeal, or Mellin's food, with warm milk, can be taken as a matter of routine, in the forenoon and afternoon (not always well borne at this latter time) and at bedtime, or one or two eggs, boiled or raw, or scraped meat mixed with bread-crumbs and slightly broiled, may be substituted.

The medicinal treatment of neurasthenia is mainly useful in correcting the disorders of nutrition with which the nervous symptoms are associated. Of the drugs that are thought to improve, directly or indirectly, the vigor of the nervous system, only arsenic, cod-liver oil, nux-

vomica, and perhaps the glycerophosphates, are of much value.

The temptation is strong to exaggerate the anæmic element in neurasthenia and to give iron largely, but this is not advisable, unless distinctly indicated.

Neurasthenia may be the indirect result of conditions which are susceptible of benefit through the so-called *organotherapy*, and the range of this mode of treatment is still *sub judice*. Here, too, in many cases, the physician who believes in the specific treatment cures through the encouragement which his conviction carries.

Electricity, in the form of galvanization of the head, general faradization, the static breeze, and electric baths are sometimes of distinct service. The simplest method of using electricity is to pass the faradic current from the neck to the feet and hands alternately, for fifteen minutes or half an hour, daily.

For the more complicated methods, the special textbooks must be consulted.

A judicious *hydrotherapeutic treatment* is after all the very best method of exciting the vaso-motor activity of the nervous system and thus setting better nutritive processes on foot. Its success depends upon the choice of methods by which a good "reaction" will be brought on and maintained. Usually some warm application (blankets, hot cabinet, hot bath) is used to warm the skin and then the stimulus of cooler water follows. At this stage friction, or some other form of mechanical stimulation, is very useful.

A "powerful reaction" is a good thing, but it is a very easy matter to fatigue a very delicate patient, and so one must often be content with a moderate reaction. A good system of graduated baths might embrace:

1. The blanket pack followed by hard friction with cool or cold water.
2. Hot baths followed by quick, strong affusions.
3. The dripping sheet, preceded or not by the wet pack.

For some cases of neurasthenia, where the patient is able to go about and take part in active duties, the above treatment is sufficient; for others, further means are needed to meet special symptoms, or to overcome an amount of prostration such as confines the patient to the bed or house, or totally unfits him for any active employment.

In order to treat successfully the *mental symptoms* of neurasthenia, the physician must thoroughly win the confidence of his patient by attention, kindness, and by showing self-confidence and authority, and must provide suitable employment for his thoughts, as a basis for special advice.

The *nervous indigestion* is in most cases best treated by a careful attention to the general condition, including, if necessary, removal from home, etc.

The food should be simple and digestible, but it is striking how little these cases, in spite of the violence of the symptoms, are benefited by attention to the digestive functions, such as is required in true catarrhal gastritis.

A similar statement may be made with regard to the other special symptoms of neurasthenia. They may all be helped somewhat by such symptomatic treatment as would naturally suggest itself, but as a rule they are to be taken as a sign of general nervous weakness, and require general treatment.

It has been said, with truth, that neurasthenic patients are cured, not by physic, but by the physician.

Nervous indigestion is often benefited by electricity (faradic or galvanic current, or both combined in one circuit) used as a general tonic, or applied directly to the epigastrium, with one pole at the back of the neck.

Such patients should also abstain from active exercise after eating.

The cases of pronounced invalidism require a special consideration. Although they need to be treated on the lines which have been already laid down, it is for them that the so-called "rest-cure," elaborated and practically invented by Dr. S. Weir Mitchell, is so pre-eminently useful. For patients who are so reduced in strength,

and nervous vigor and self-confidence that they become more deeply implicated the more they struggle to free themselves, the rejuvenation often secured through this means is remarkable. For some of them, it is the moral element in the "cure" which is the most important, for others the opportunity for nutritive improvement.

The "rest-cure" consists of several parts—seclusion, generally with removal from home and complete rest in bed, during six or eight weeks; forced feeding, massage, and electricity. This system may be modified or simplified to suit special needs, but in severe cases there is no part of it that can be safely omitted. The complete removal from responsibility and care, from unhealthy and familiar surroundings, the anxiety of friends, and most of all, from a vague sense of responsibility as regards themselves, which the enforced rest involves, gives a feeling of mental repose, like that afforded by a long sea voyage to a person simply fatigued by overwork.

The food consists at first of skimmed milk,* given in small quantities every two hours, and rapidly increased until the patient takes two quarts daily. Solid meals are then gradually added, so that soon the patient is taking a very large quantity of nourishment, and in the absence of all other calls upon his nervous strength, digests it perfectly well.

Massage† is given once, or even twice, daily, taking the place of voluntary exercise. The latter is absolutely forbidden, even to the extent of feeding one's self, with the result that the patient, having no excuse for feeling tired, soon loses even the apprehension of fatigue. After a time muscular exercises are added to the massage, and eventually substituted for it, and the patient is gradually allowed to walk.

As the patient is obliged to lie constantly in bed, it is important that her time should be sufficiently occupied, and this is not difficult, especially if she has a private nurse of the proper temperament and experience.

The following was the daily schedule of a patient of the writer's, and may be taken as a typical specimen: 7 A.M., small cup of black coffee; patient allowed to brush her teeth. 7.45—Hands and face washed, fire made by nurse. 8—Breakfast, which at this time consisted mainly of a pint of gruel (taken slowly, and kept warm when desired, by table-lamp). 8.30—Sponge bath; bed made. 9.30—Windows open for half an hour (the weather being cold the patient was warmly covered except for the face. 10—Breathing exercises; food. 10.30—Hands and feet exercise, following by reading aloud for fifteen minutes. 11.30—Temperature of body taken, and patient rolled in blankets. 12—Food. 12.30—Bath given. 1 P.M.—Massage and rest. 3—Hair brushed, reading aloud. 4—Food; breathing exercises. 7—Hands and feet exercise; patient arranged for the night. 8—Food. 10—Food.

In some cases we have given patients breathing exercises to carry out every hour or two; and, as a commencement of more vigorous exertion, have had them roll over from one side of the bed to the other a certain number of times. These hints from personal experience are offered, not as constituting material modifications of the treatment as laid down by Dr. Mitchell, but as likely to prove useful where the full treatment cannot be carried out, which so often happens.

The cases which are the most benefited by the rest-cure are those in which the nervous symptoms are caused or maintained mainly by simple anemia or impaired nutrition. Even in the purely "nervous" cases, however, an occasional treatment of this kind often gives a chance to start fresh once more, which is invaluable.

Some cases are not helped at all in this way. This may often be suspected beforehand, but sometimes a fortnight's trial must be given them (Playfair), and if

* Milk mixed with half its bulk of oatmeal jelly answers an admirable purpose.

† The writer has found the application of the wet pack or blanket-pack for an hour or less, as recommended by Dr. Mary Putnam-Jacobi ("Massage and the Wet Pack in the Treatment of Anæmia"), a useful adjunct to the massage.

this is explained to them in advance, they are usually stimulated to do their best.

Perhaps the most indispensable condition for success is that the physician should gain and keep the fullest confidence of his patient. How he will best accomplish this must depend, in the end, upon his own character and temperament. If he never allows himself to be discouraged, and insists on the systematic brushing aside of morbid thoughts on the part of his patients, he will often be agreeably surprised at the results which he initiates.

James J. Putnam.
George A. Waterman.

NEURINE.—Neurine is a ptomain which is frequently found in meat and other articles of food which have undergone a certain amount of decomposition. Chemically, it is a derivative of ammonium hydroxide; is, in fact, trimethyl-vinyl-ammonium hydroxide, $N(CH_3)_3CHCH_2-OH$. It is often confused with choline; the latter, however, is trimethyl-oxyethyl-ammonium hydroxide, $N(CH_3)_3C_2H_4OH$. Neurine was first prepared synthetically in 1858 by Hoffmann by treating trimethylamine and ethylene bromide with silver oxide or potassium hydroxide. The name neurine is due to Liebreich,¹ who is usually credited with having obtained the substance by boiling protagon for twenty-four hours with concentrated barium hydroxide. According to later investigators, however, it seems very probable that Liebreich was dealing not with the vinyl base (neurine) but with an impure preparation of the oxyethyl base (choline).² More recently neurine has been obtained by Brieger³ from putrefying horse, beef, and human flesh. Brieger also obtained it from human brains by boiling with barium hydroxide; it appears probable, however, that neurine occurs in the brain only as a result of putrefactive changes, for Gulewitsch could find no trace of it in perfectly fresh ox brains.⁴ It has also been obtained from decomposing mushrooms; such mushrooms are very poisonous.

The genesis of neurine in the above cases is very obscure; it may be that it is formed from the cholin which is a part of the lecithin and protagon molecule (see articles on *Cholin* and *Lecithin*). Bayer showed that choline chloride could be transformed into neurine by chemical processes; this was done by heating the choline chloride with concentrated hydriodic acid and red phosphorus and then treating the iodine compound so formed with silver oxide. On the other hand, neurine may be converted into choline by first making the iodine compound and then heating this with silver nitrate.⁵ Schmidt and Weiss,⁶ moreover, found that choline and its salts could be converted into neurine by the action of micro-organisms. It is a significant fact that neurine is almost always accompanied by choline; hence it is probable that the latter is, as a rule, derived from the former by the loss of a molecule of water.⁷

Neurine is a colorless syrup soluble in water and alcohol; it has a strongly alkaline reaction and forms easily soluble salts. When heated, either dry or in concentrated solution, it decomposes with the formation of trimethylamine $N(CH_3)_3$. With platinum chloride neurine forms a double compound $(C_3H_7NCl)_2$, $PtCl_4$, which is insoluble in alcohol; this compound is soluble with difficulty in hot water, from which it crystallizes in small octahedra. These crystals melt, with decomposition, at 195.5–198° C. and contain 33.6 per cent. platinum. A similar double salt is formed with gold chloride. A substance isomeric with muscarine may be obtained by treating neurine with hypochlorous acid and then decomposing the resulting compound with silver oxide.

Neurine may be isolated from organic liquids containing it by the method of Brieger. The method is essentially as follows: To an alcoholic extract of the material is added a saturated solution of mercuric chloride in alcohol. The precipitate (which contains most of the neurine) is washed with alcohol and water and then decomposed by hydrogen sulphide; the mercury sulphide is filtered off and the filtrate concentrated and taken up in alcohol.

The neurine is precipitated by an alcoholic solution of platinum chloride; the precipitate is washed on the filter with a little cold water (which dissolves the choline salt of platinum chloride) and the neurine salt is recrystallized several times from hot water.

Neurine is a very poisonous substance; 40 mgm. (injected subcutaneously) per kilogram body weight is fatal to rabbits. The symptoms are very similar to those caused by muscarine. A few milligrams of the hydrochloride injected into a frog causes within a short time complete paralysis of the extremities with, a little later, a diminution of reflex excitability. The heart is greatly slowed and finally stops in diastole, as in muscarine poisoning; atropine will cause the heart to begin beating again. As small a quantity as two milligrams is fatal for most frogs. After the administration of neurine to mammals there are profuse salivation, dyspnoea, diarrhoea (due to increased peristalsis), great slowing of the heart and a fall of blood pressure, and finally convulsions and death from failure of the respiration. Before the depression of the heart and respiration there is often a brief period of stimulation, due probably to the sensation of nausea. Cats seem to be much more sensitive to neurine than are rabbits or guinea-pigs; when a cat is poisoned with this substance there is, in addition to the symptoms noted above, a marked secretion of alkaline sweat from the ball of the foot. Many of the symptoms of neurine poisoning are antagonized by atropine, but even after the administration of this drug there remains a condition of general paralysis. The fatal dose for animals is ten times as great when the poison is given by the mouth as when injected subcutaneously.

Under the name of "neurine" a weak solution of choline was formerly occasionally used as a solvent for diphtheritic membranes. Reid Hunt.

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NEURITIS.—Neuritis is inflammation of a nerve trunk or its branches. As a localized affection involving a single nerve it generally attacks certain nerves, such as the branches of the brachial plexus in the upper extremities, or of the lumbar or sacral plexus in the lower extremities. The cranial nerves may also be attacked by neuritis. When only one nerve trunk is affected, the condition is usually spoken of as "isolated," "localized," or "mononeuritis." When many of the peripheral nerves are involved at the same time, it is characterized as multiple neuritis, or polyneuritis, a condition meriting special description, and which will be discussed later. Neuritis may be either acute or chronic, or the symptoms of acute neuritis may persist for a long time and then become chronic.

The causes of neuritis are numerous. It may be due to traumatism such as direct wounding or contusion of the nerve, or to compression of the nerve by sudden and forcible muscular contraction; to dislocation of joints; to injury to the nerve from fragments of bone resulting from fracture; to compression of the nerve from the formation of callus; to pressure of growths; or, finally, to pressure upon the nerve trunks in the axilla during the use of crutches. Neuritis may also be caused by chemical agents such as ether, osmic acid, or alcohol, coming in direct contact with the nerve through subcutaneous injection. It may also develop from refrigeration through exposure to cold, and as a complication or sequel of various infectious diseases. It may also arise by extension from adjacent inflammation.

Patients who are addicted to the excessive use of alcohol, or those suffering from chronic toxic disorders such as gout, rheumatism, diabetes, chronic nephritis, or syphilis, are more predisposed to the development of local-

ized neuritis after slight traumatism or exposure to cold. Arteritis obliterans and arteriosclerosis may also be considered to be predisposing causes.

Pathologically, there are various types and degrees of neuritis. We thus have: 1. Perineuritis, in which the inflammation originates in the perineurium to which it may be limited. 2. Interstitial neuritis, in which the inflammatory process is located principally in the interstitial structure of the nerve. 3. Parenchymatous neuritis, in which the nerve fibres undergo inflammation and degeneration. The first two forms represent a true inflammatory process. In the third form, the same changes often occur which usually arise as a consequence of complete division of the nerve. As these different processes vary in degree and are frequently found in combination, their clinical differentiation cannot always be accomplished.

Isolated neuritis is generally a perineuritis or interstitial neuritis. There are redness and swelling of the connective tissue enveloping the nerve, the blood-vessels of the nerve sheath are distended with blood, and there may be minute hemorrhages. Sero-fibrinous exudation and migration of leucocytes follow the hyperemia. These changes may be limited to the sheath (perineuritis), or may extend into the substance of the nerve (interstitial neuritis). When the process is severe or of long standing, the nerve fibres may also become involved. In the parenchymatous form the inflammation begins in the nerve fibres, resulting in their degeneration and atrophy.

Symptoms.—Pain in the course and distribution of the nerve is the principal symptom. Its degree varies with the extent and intensity of the inflammatory process. The nerve trunk is sometimes swollen and extremely sensitive to pressure, the pain often radiating to the ultimate distribution of the nerve. The pain sometimes affects the entire extremity, which may become extremely hyperæsthetic. It is variously described by patients as darting, boring, burning, and occasionally shooting through the course of the nerve. It is increased by movement and is usually worse at night. Numbness and tingling may also be present. This may be attended by some constitutional disturbance as increased pulse rate and rise of temperature. Should the nerve fibres become involved, objective sensory disturbances may arise, such as varying degrees of anaesthesia in the area of the distribution of the affected nerve, with weakness or muscular paralysis. Herpetic eruption or glossy skin may also be present. In severe cases anaesthesia, paralysis, and atrophy usually take place. The faradic irritability of the nerve and muscles is at first increased, but gradually it diminishes, and is finally lost when the nerve fibres undergo degeneration.

The neuritis may ascend a nerve ("ascending neuritis"), reaching the plexus from which the nerve arises, and thus extend to several or all of the nerves of the limb. The inflammation has also been known in rare instances to extend to the spinal cord, causing subacute or chronic myelitis.

Prognosis.—Acute neuritis may disappear in a few weeks if the cause can be successfully removed. The most favorable cases are those due to slight traumatism. More commonly the affection persists in a chronic stage for many weeks or even months. The most protracted forms arise in patients with gout or rheumatism, or in such toxic cases in which the toxin cannot be removed at once. When the axis-cylinder processes are involved, as in degenerative neuritis, the condition may last for many months, paralysis and atrophy becoming permanent if the nerve fibres do not undergo regeneration. An opinion as to the prognosis often depends upon the changes in the electrical irritability of the nerves and muscles.

Treatment.—When a nerve is divided by a wound, the separated edges should at once be approximated and sutured. In compression or injuries of nerves from luxation, fracture, callus, tumors, inflammation of soft parts, abscesses, etc., it is the first duty of the physician to insist upon immediate surgical measures to free the injured nerve if possible.