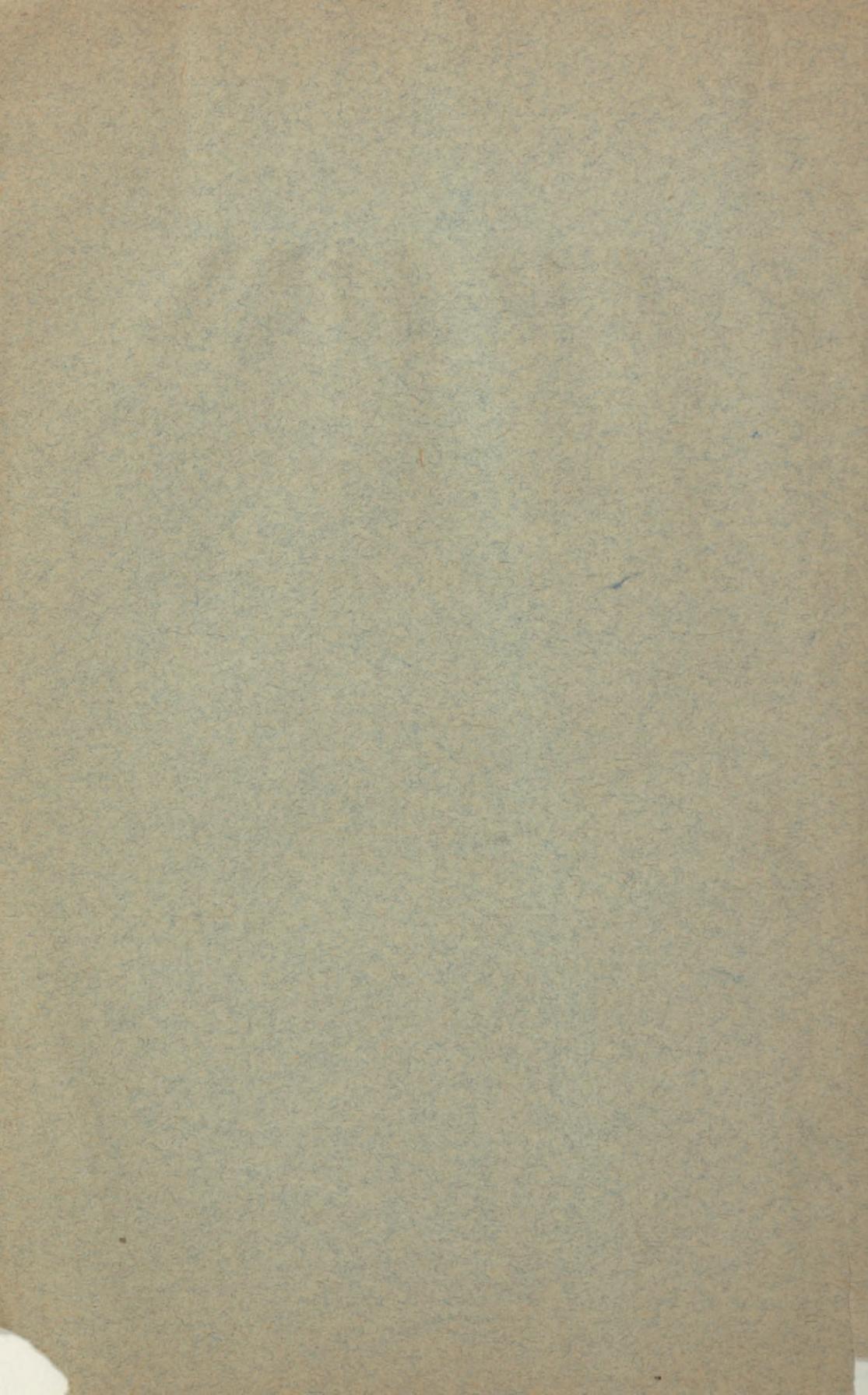


WEBBER (S.G.)

Diseases of the peripheral
Cerebro-spinal nerves

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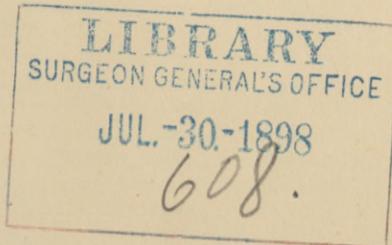
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DISEASES OF THE
PERIPHERAL CEREBRO-SPINAL NERVES.

BY

S. G. WEBBER, M.D.,
OF BOSTON,

CLINICAL INSTRUCTOR IN DISEASES OF THE NERVOUS SYSTEM, HARVARD UNIVERSITY; VISITING PHYSICIAN TO DEPARTMENT FOR DISEASES OF NERVOUS SYSTEM, CITY HOSPITAL, BOSTON; CONSULTING PHYSICIAN, CARNEY HOSPITAL, BOSTON.



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NEURALGIA.

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Attempts are still made to explain the nature of neuralgia. It is scarcely worth while to notice mere definitions, but there have been more elaborate efforts made by *Uspensky*, *Jewell* and others. *Uspensky* considers that the change in the nervous system which depends upon the sense of pain most probably remains always the same, and is not modified by the peculiar nature of the irritation. Every pain is either caused by or at least accompanied with the formation of a certain quantity of the products of metamorphosis in the nerve tissues and by the action of this product upon the nervous system. This product is acid, and the pain will disappear only after the neutralization of this acid by the alkali of the blood and its subsequent absorption.

He explains the periodicity of neuralgia thus: the production of this acid irritant is continuous, but pain arises only when it is present in excess; if absorbed as fast as produced, there is no pain; hence, if too rapidly produced, or if the absorbing power of the blood-vessels is diminished, this irritant accumulates. Hence weakened function of the vasomotor nerves is one element in the etiology of neuralgia.

Every neuralgia is based upon irritation of the central terminal apparatus of the affected nerve, and the pathological changes are to be sought there, especially in a change in the size of the blood-vessels. In course of time the resorption of the irritant is diminished, as the result of previous overaction, and then it accumulates, until finally there is first tetanic vascular contraction and later paralytic enlargement. This disturbance of circulation, frequently repeated, may give rise to atrophy of the sensory nerve-cells and change in the calibre of the vessels with loss of their tone.

Dr. *Jewell* refers neuralgia to a lesion of the central nervous system

—the sensory tract, lying within the confines of the gray matter of the cerebro-spinal axis. Its essential seat is not in the peripheral nerves. The essential morbid condition in a neuralgia he claims to be a nutritive lesion of the central apparatus of cells which are the seats of true nervous sensibility. This state is frequently caused by disease of the peripheral nerves, but even in such cases the more irritable state of the sensory tract is the main factor. In this condition it reacts with pain to even trivial impressions made on the sensory nerves, which terminate in the affected region. A nerve-fibre cannot be brought into such a structural state by disease as to augment its conductivity beyond what is natural to it in a condition of health.

The attack of pain may be due to over-excitation, and hence overwear and waste of the affected centre, produced through the channel of its sensory nerves, or by changes in blood pressure in the affected centre, caused by loss or increase of tonus of the peripheral vessels, or a change in cardiac action, or by changes of posture, or of temperature, or of barometrical pressure, or by influences acting on the vaso-motor nerves, distributed to the diseased centres, and which may be affected from either the peripheral nervous system or from the cortex cerebri.

Lange considers that projected pain, or pain referred to the periphery, may originate either in the cord or in the peripheral nerves, not in the brain, except by direct influence of the peripheral nerve-fibres (unless in case of trigeminal neuralgia). Projected dysæsthesia may occur in brain disease, but not projected pain. If with brain disease there is pain felt at a distance, it is indirectly caused by disturbance of nutrition, inflammation, etc. The nerve tracts from the brain to the cord are not irritable to painful impressions; even in disease of the cord, pain is projected only in those nerve tracts which arise from the point of disease; below this there is only projected dysæsthesia.

Irritation of centripetal nerve-fibres may be projected by the central cells to other nerves, hence reflex neuralgia; this is most likely to arise from irritation of nerves of vegetative organs. Reflex pain caused by irritation of the pharynx is most likely to be felt in the lower jaw, neck, shoulder, and upper part of the chest; irritation of the nerves of the heart is felt in the same places and also in the upper extremities, and the entire thorax, more severely on the left; irritation in the stomach is felt in the thorax, often the arms, in epigastrium and hypochondrium; irritation in the gall-bladder and ducts is felt in the right arm and right side of the thorax; irritation in the intestines is felt in the lower part of the body and lower extremities; in chronic kidney and uterine disease the pain is felt in the lower extremities, with uterine irritation more as arthralgia than as sciatica. When the male genitals are affected the pain is felt in the legs. Disease of the digestive organs most frequently gives rise to severe reflex pain. Uterine irritation also frequently causes reflex pain.

S. W. Mitchell reports a very interesting observation of the influence which the weather may exert upon the occurrence of attacks of neuralgia. The patient was a very intelligent, educated gentleman who suf-

ferred from attacks of neuralgia in the stump of an amputated limb. Excepting during the paroxysms he was free from pain. The attacks were more frequent in the spring and autumn than in summer and winter. Neither falling temperature nor rising was alone sufficient to cause an attack. By color test during December to February the ozone was at 1 only twice during 18 attacks; generally it was at 0, or at most $\frac{1}{2}$. When the atmospheric pressure diminished—during the fall of the barometer and before it was complete—an attack of neuralgic pain occurred, and this was the more likely to take place when the lessening pressure culminated in rain. Sometimes with marked, sudden, and decided falls in the barometer, the pain seemed no greater nor continued longer than in slighter depressions.

The intensity of the neuralgia did not seem proportionate to the amount of rain-fall. At the exterior of a storm-disturbance the pain was usually less severe and might be only just perceived. A storm, reinforced by another at an angle say of 90° , producing great eccentricities in the curves, did not seem to produce a corresponding intensity or duration of the neuralgia. Abruptness of the fall of the barometer did not seem to have much to do with causing the pain; nor was the length of the attack dependent on the length of the storm. An atmosphere surcharged with moisture may be looked upon as the next most favorable single condition for the production of neuralgia. The separate factors of storms, as lessened pressure, rising temperature, greater humidity, winds, seemed as a rule incompetent, when acting singly, to give rise to attacks of pain. Either then it is the combination which works the mischief, or there is, in times of storms, some as yet unknown agency productive of evil. Such an agent may be either electricity or magnetism. These were not studied for lack of instruments, but when the aurora was brilliant, in '67-'68, neuralgia was prevalent. The pain belt may surround the storm belt and extend beyond the storm.

Prof. *Verneuil* recognizes and describes a neuralgia secondary to traumatism, which is intermittent in type, resists antiphlogistics and narcotics, but yields without difficulty to sulphate of quinine. After cessation of the pain immediately consequent upon the injury, at a variable length of time, the secondary pain sets in; it may be local, or felt at a distance from the wound, even in regions innervated by branches anatomically distinct. This secondary pain is less acute than the primary and more varied in character; it is neuralgic in character, has remissions, sometimes extends over a large surface, sometimes is circumscribed, pressure does not increase it, movements of the parts awake it or increase it; it begins suddenly, generally in the night, rarely in the morning; the duration of the attack is limited to four or five minutes. This pain appears usually towards the middle of the second week, rarely later than thirteen or fourteen days, often earlier.

Among the causes of neuralgia which are rarely met may be mentioned the new formation of dentine at the roots of teeth pressing upon the nerves (*Julius Schiff, Jr.*). *Balfour* looks upon obstinate trigeminal neuralgia

as a symptom of syphilitic cerebral disease; he says if the disease can be localized about the sella turcica, the probability is great that it is syphilitic in character, so great, that we are justified in treating the patient accordingly. *Taylor* finds that sciatica, depending upon syphilis, may appear as soon as six months after the primary lesion. *Stevens* thinks that, among the centripetal influences which give rise to neuralgia, the irritation arising from a perplexity or exhaustion of nerves engaged in the function of accommodation of the eye must be regarded as by far the most frequent and important; and when the eye is relieved the neuralgia ceases.

Fernet refers all cases of sciatica to a neuritis; he gives the account of one case, with autopsy, which confirms this view. His directions for examining the nerve in the living patient are, to have the patient on his back, with thighs slightly flexed, and the legs flexed on the thighs, so that the feet will rest comfortably on the bed. All the muscles of the legs are to be relaxed. The sciatic nerves are then examined with the fingers, which are pressed deeply into the popliteal space, and run along in the interstices of the muscles to the sciatic notch, the palmar surface of the fingers turned toward the external part of the thigh, and their ends moved backwards and forwards from within outwards; the sciatic nerve is very clearly felt as a large cord. On the diseased side, the nerve is larger, harder, and more cylindrical than on the healthy side, and is not changed by pressure. This change in the form and consistency of the nerve is sometimes uniform throughout its whole tract, sometimes is more or less limited.

H. C. Wood, for convenience, divides trigeminal neuralgias into two classes: I., where the paroxysms come on regularly, but at distant intervals. These are mostly symptomatic of several varieties of cachexia: Malarial—regularity of the intervals and the history of the case aid in the diagnosis; this is mostly supra-orbital. Megrin—connected with disturbed menstruation, gastric, anæmic, chlorotic, or syphilitic. Rheumatic neuritis—toxic, lead, arsenic, etc. II., coming on in sharp paroxysms at short intervals, and generally a reflex indication of peripheral irritation or centric pressure; three varieties: *a*, tic douloureux; *b*, anæsthesia dolorosa, and *c*, tic. In *a*, there is generally both pain and spasm; cause, usually peripheral, as a decayed tooth, pressure of cicatrix; *b*, caused by central tumor or clot pressing on the sensory fibres, causing pain and anæsthesia, with sensation of pain referred to the periphery.

Schreiber mentions a case of occipital neuralgia, complicated with vaso-motor affection, which is rare in neuralgia of that region. There was redness of the conjunctiva, increased secretion of tears and of nasal mucus. He explains these phenomena by the relations between the occipital nerve and the superior cervical ganglion.

Seeligmüller reports a rare case of neuralgia in which the *nervus cutaneus brachii internus* (*nervus cutaneus medialis*, *Wrisberg's nerve*) alone was affected. The pain began in the axilla, was of a burning character, lasted half an hour to an hour, recurring every two to four

weeks. After a year, the pain was also felt in the left arm and shoulder, beginning just above the olecranon, running up the posterior part of the arm to the axilla, and thence across the lower angle of the scapula. Also the pain at times shot from the shoulder into the left breast. There were no painful points.

TREATMENT.

Prof. *v. Pitha* gives a detailed account of his own suffering from neuralgia, and the benefit he obtained from the hypodermic use of morphia. The precautions which he urges in regard to this use of morphia are excellent, the chief of which is to use small doses in the beginning; he advises as small as one-tenth to one-twentieth of a grain, or even less.

Herman Schulz injects under the skin a solution of carbolic acid, two parts of the pure acid to one hundred of distilled water, using from one-half to two syringefuls, the syringe holding about one gramme (about π 15) distilled water. He repeats this in six to eight hours if the pain renders it necessary, without regard to the feverishness which may result. Urine was never colored green. He has had only one abscess in two hundred cases, and that was probably caused by an accidental motion of the patient, causing the syringe to tear the tissues. He thinks this will often take the place of morphia injections.

Of internal remedies, *croton-chloral* has been somewhat prominently brought forward. *Skerritt* used it in one hundred and twenty patients, found it of the greatest benefit in facial neuralgia. He obtained the most marked benefit in young patients, especially in the headache of anæmic women and girls. In these he obtained either relief or cure in eighty-six per cent; about the climacteric, the success was about fifty per cent, while later the ratio rose again to sixty per cent. At the climacteric, bromide of potassium seemed more reliable. Where there were marked hysterical symptoms he had less success. It is necessary to continue the use of the drug for some time to obtain permanent relief. In cases of pain in other regions than the head, he has not had success in the use of *croton-chloral*.

Gelsemium has been used with success by Prof. *Massini* in eighty cases of trigeminal neuralgia. The drug, when its physiological action is obtained, causes redness of the conjunctiva, pain in the eyelids, contraction of the pupil, double vision, giddiness. When the dose is increased there may be slight ptosis, dilatation of the pupil, gaping, langor, pain in the limbs. The respiration is not affected. He gave of the tincture twenty minims every half hour, till three doses were taken; he never had occasion to use more than sixty minims. *Gelsemium* may be used thus several days in succession.

Jurasz has found this drug of use in other than trifacial neuralgia, having employed it with wonderful effect in cases of brachial and sciatic neuralgia, and in muscular rheumatism. He used doses of from five to twenty drops three times a day.

The *ammoniacal sulphate of copper* has been used by *Féréal*. In one

case of epileptic tic douloureux, the attacks recurring almost without interruption 60 to 100 daily, the above drug was used in dose of .05 the first day, .10 the second day, causing nausea without vomiting. This was continued three days with the effect of stopping the attacks. He has also used it in six other cases, four of which were cured as if instantaneously. He used .10 to .15 a day, increasing even to .30, or even .50. The formula used is:

R Aqu. dist. 100.
 Syr. aurantii flor. 30.
 Cupri ammoniati.10 to .15

Take a tablespoonful at meals.

It is important to continue the medicine for ten to fifteen days.

Prof. *Gubler* says he has never met a case of neuralgia of the fifth nerve, even tic douloureux, which did not yield to *aconitia*. A case where resection gave only temporary improvement was cured by .005 aconitine ($\frac{1}{4}$ grain). *Hottot's* preparation of nitrate of aconitine is the best to use, $\frac{1}{4}$ grain which contains $\frac{1}{8}$ grain of aconitine is the proper dose to begin with; this may be increased to $\frac{1}{2}$ grain. Heart disease absolutely counterindicates its use.

E. C. Seguin uses *Duquesnel's* crystallized aconitia. He found the susceptibility of individuals varied enormously, one patient having been severely affected by $\frac{1}{8}$ grain, while another tolerated $\frac{1}{4}$ grain every three hours with no special symptom. On the average distinct physiological and therapeutic effects were obtained by giving $\frac{1}{10}$ grain three times a day. Of six cases of severe trigeminal neuralgia one, which was probably reflex from a decayed tooth, was not benefited; three cases, epileptic in form, were slightly or only temporarily relieved; two cases were cured, in one of these the neuralgia had existed for seven years with an interruption of ten months after resection of the affected nerve. The form of trigeminal neuralgia which can be most certainly benefited by aconitia is not yet sufficiently defined. The formula used is:

R Aconitiæ (*Duquesnel's*) gr. $\frac{1}{10}$
 Glycerinæ,
 Alcohol. ãã 3 i.
 Aq. menth. pip. q. s. ut fl. 3 ij.

M. One teaspoonful = about $\frac{1}{4}$ grain.

Sig. One teaspoonful two or three times a day on an empty stomach.

In some cases he used $\frac{1}{8}$ or even $\frac{1}{4}$ grain aconitia in this formula.

The effects obtained from a decided impression made by the drug are, paralysis of heart, directly and by way of the vagus, pulse reduced, arterial tension lowered; subjective sensations are numbness and tingling of skin and mucous membrane, especially in the hands and tongue, chilliness and faintness, and indefinable nervousness.

Nitrite of Amyl has been used by *Urbantschitsch* in thirty cases, twenty-one or twenty-two cured. Some of these were followed for two or three months, others were lost sight of; sometimes the pain returned

after three months or more, sometimes it did not relieve after a relapse. Its effects were very uncertain.

Evans used the amyl in three cases with relief or cure; large doses were necessary.

Dr. *Abbot* used *salicylic acid* with success in a case of sciatica.

Of operative measures *Weinlechner* tied the carotid after resection had failed in a case of inframaxillary neuralgia. *Patruban* had one death from pyæmia in eight or nine cases. The operation was successful where resection had failed, but was not invariably so.

S. W. Mitchell has collated one hundred and twenty cases of neurotomy. The immediate result in ninety-six cases was total relief. In eight more or less pain was felt again within three weeks; this is probably too soon for regeneration of the nerve to have taken place. Twenty-five were still well at the close of the first year; but five of these relapsed within two years. Twenty-seven had neuralgia again within periods varying from one to eighteen months. In four there was permanent relief from secondary operations.

Dr. *Mitchell* reports a case with repair of the nerve in six months after excision of two and one-half inches. In a second case one inch was removed and repair was observed in less than a year.

NERVE STRETCHING.

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Nerve stretching has only recently come into prominence as an operation for the relief of neuralgia and other nervous affections. As it has been used chiefly for neuralgia, it seems fitting to consider its use here separately for all nervous affections for which it has as yet been resorted to.

In 1869, *Billroth* exposed the sciatic in a young man who had epilepsy as the result of an injury. The object was to break up the adhesions of diseased nerves. The nerve was found healthy at the point exposed and was dissected out for some distance. It was necessarily stretched to some extent and the patient was benefited (see *A. H. Marchand*).

In 1872, *Nussbaum* performed a similar operation upon the nerves of the arm to relieve contraction with benefit to the patient. This operation by *Nussbaum* first led to similar operations for relief of spasm or pain, only instead of releasing the nerve from adhesions it is now forcibly stretched. *Gärtner* and *Patruban* were the next to perform this operation.

Any nerve which can be reached surgically may be stretched. As a fact the operation has been performed upon the facial, supra-orbital, infra-orbital, alveolar, mental, spinal accessory, the nerves of the brachial plexus, the musculo-cutaneous, median, ulnar, digital, intercostal, sciatic, crural, tibial. As has been mentioned, this operation has been resorted to most frequently to relieve pain, but it has also been tried as a remedy in tetanus, in other varieties of spasm as torticollis, blepharospasm, and in contractions, also in two cases of epilepsy apparently depending upon implication of a nerve in a cicatrix. *Blum* advises that the operation should be performed antiseptically, an incision being made parallel to the direction of the nerves, varying in length according to the distance of the nerve from the surface, generally 5 or 6 cm. is sufficient. If it is suspected that a foreign body is pressing upon the nerve, or if there is limited abnormal sensibility, the incision should be made at that point. The fingers or a grooved sound should be used to separate the nerve from

surrounding parts. The nerve after being separated is to be raised upon the fingers, sound, or forceps, pulled strongly, according to the size of the nerve, in both directions. *Verneuil* advises to press the nerve between the fingers or thumb and the edge of the grooved director, so as to rupture the nerve-fibres, but *Blum* and others think this ought not to be done, as that is not simple stretching, but is equivalent also to division of the nerve and is unnecessary. After the stretching the nerve is laid back in its place, and the wound closed and dressed. The nerve may be so much longer than previously that it will necessarily take a curved or wavy position.

Callender states that nerves bear rough handling without injury if freed from their connections at the point where the traction is made; two or three inches of a large nerve may be exposed without injury to its nutrition. *Bell* mentions that on pulling the nerve a sensation was felt as if he was pulling a vegetable with long fibrous roots from the ground.

As to the amount of force which may be used, *Symington*, in a paper read before the Edinburgh Med. Chir. Soc. reports experiments made by himself upon the sciatic nerve of a dead subject, by attaching weights rapidly to it immediately below the gluteus muscle until the nerve broke. He found that 130 lbs. was the average weight required, the maximum being 176 lbs., the minimum 86 lbs. in a young woman who died of phthisis. *Tillaux* very nearly agrees with this. He found 54 to 58 kilogrammes (119 to 127.9 lbs.) necessary to rupture the sciatic; and 20 to 25 kilogrammes (44.1 to 55.1 lbs.) to rupture the median and ulnar.

The immediate effect of stretching nerves varies much, perhaps depending partly upon the force used, partly upon the amount of crushing at the point where the force is employed. Thus the crushing recommended by *Verneuil* would cause paralysis. *Blum* says that simple stretching is not followed by motor or sensory paralysis. In some cases, however, those results have been seen, also there has been severe pain as the immediate result of the stretching, but in no case heretofore reported has there been mention made of permanent paralysis either of motion or sensation. There have been two deaths recorded after stretching a nerve for neuralgia, one by *Verneuil* from erysipelas; one by *Gärtner* from hemorrhage from the jugular vein, which had not been injured at the time of the operation.

In most cases of neuralgia the relief from pain was immediate. Of 29 cases of neuralgia thus treated, only two were not relieved; 3 were temporarily or only partially relieved. The remaining 24 were entirely relieved for longer and shorter periods, most up to the time the account was written. The longest date mentioned is 14 months, the shortest 1 month, and at those dates there had been no return of pain. These periods are not sufficient to establish definitively that there will be no return of pain, but the results do encourage the performance of the operation wherever neuralgia is peculiarly rebellious.

Blum thus sums up the value of the operation and indications for it: In cases of traumatic neuralgia success is complete, in non-traumatic

the pain disappears, but success is less complete. Stretching is indicated in neuralgias which are rebellious to therapeutic agents, and clearly limited to one nervous department. It ought to be performed immediately when the neighboring nerves show a tendency to be invaded. In neuralgias of stumps, stretching should always be tried a short distance from the cicatrix.

In contraction and spasm the operation has been performed 8 times; in 6 there was recovery; in 1 no effect; in 1 the patient was only temporarily benefited. Three of these cases were cases of torticollis (two recoveries, one failure, which was subsequently benefited by resection). *Tage Hansen* reports two of these cases, both recovered; in one the head was turned to the left one hundred times in a minute, and this had continued four years. An incision was made at the posterior edge of the sternomastoid, the accessorius was exposed and stretched in both directions. When the effects of the anæsthetic had partially disappeared, the contraction recurred with moderate intensity; but ceased after about a quarter of an hour, and did not return. Active voluntary motion of the head was not interfered with. His second case was equally successful. *Hansen* remarks that, as the cause of the spasm is not known in every case, it may be central, and then a cure would not be certain.

In two cases of epilepsy, where the attacks were evidently due to irritation of the nerves in the leg or foot, stretching the sciatic gave relief.

Nerve stretching has also been used in seven cases of traumatic tetanus. Only two of these recovered; one only had partial relief, but died; four died without relief.

Blum thinks that the stretching acts by releasing the nerve from neighboring tissues which compress it, but its value is chiefly due to changes in structure and circulation; not only at the point where the operation is performed, but also at points more or less distant.

Vogt found that the centrifugal stretching had no effect upon the central organ, but the centripetal stretching was communicated to the peripheral distribution and acted on the terminal apparatus of the nerve. The anatomical changes consist in displacing and loosening the nerve in its sheath, combined with a greater tortuousness and enlargement of the vessels running to the nerves. Changes in the pressure and metamorphosis of tissue (dependent upon slowing of the circulation in the dilated vessels) are important factors in the change of function caused by stretching.

Davault says there have been found in animals twenty-five days after stretching a nerve a few degenerated fibres. In another case, thirty days after, no such degenerated fibres were found.

SPASM AND TETANY.

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S. W. Mitchell gives the details of several unusual cases of functional spasm, the spasms being excited by voluntary motion of one set of muscles either in neighboring or distant muscles. The seat of the morbid process giving rise to these acts is uncertain. He concludes: "Voluntary acts give rise to spasms in the muscles willed to move, or in remote groups of muscles. There is at times an unusual discharge of nerve force in some of these cases, or else the muscle itself has become the means by its over-use of hypersensitizing the sensory centre, which takes record of its activities, so that from this centre at times excito-motor impressions are radiated on to near or remote centres and result thus in spasms. It will be found in all these cases that, when an ordinary functional motor act gives rise to spasms elsewhere, these occur in muscles which have physiological and therefore anatomical relations to the muscles which, by their normal use, gave rise to the morbid activities."

TETANY.

T. Buzzard reports a case in a child ten years old.

Chvostek has reported very many cases of tetany. His observations have confirmed the statements made by *Erb* in regard to the electro-contractility of the muscles in such cases, and completes them in regard to the facial.

Weiss reports a fatal case occurring after extirpation of the thyroid gland. At the autopsy the recurrent nerve was found implicated in the wound. There were a few small hæmorrhages around vessels in the cord, else nothing.

WRITER'S CRAMP AND ALLIED AFFECTIONS.

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G. V. Poore has carefully analyzed seventy-five cases of impaired writing power, including cases of paralysis, of writer's cramp and of cramp or spasm from other causes. Twenty cases he classes together as neuritic or neuralgic; in each case the cause for seeking advice was loss of writing power or of some allied function, such as sewing, painting, or organ-playing. A strain or injury, over-work, mental worry and general fatigue added to local fatigue were the causes. The symptoms in these cases he thinks were dependent upon a mild form of neuritis. They closely resembled those of true writer's cramp, and were separated from the latter only because: 1. The symptoms involved a wider area. 2. They have been in some cases produced without excessive exercise of any function. 3. Nerve tenderness or neuralgia was a prominent symptom.

Of true writer's cramp *Dr. Poore* gives abstracts of thirty-two cases, with report of the muscles most affected and their reaction to electricity. He says that in every case of impaired writing-power there was evidence, more or less marked, of derangement of one or more of the muscles used for writing. One of the earlier symptoms of muscular derangement is that the patient has altered his method of holding the pen. Inquiry as to the ability to perform other acts besides writing will also show the presence of muscular derangement; but in this great caution is necessary, as a muscle may be incapable of prolonged action, yet be able to perform a rapid act with great force. The occurrence of associated or consentaneous movements, such as movements of the left fingers while the right hand is writing, may always be taken as evidence of muscular weakness. They only occur during the performance of that act which the patient

finds difficult. Depressed or exalted irritability is certainly a sign of muscular derangement. Indirect evidence of muscular derangement may be afforded by derangement of the sensory branches of mixed nerves which supply the muscles implicated.

Dr. Poore considers that writer's cramp is a peripheral disease, not a disease of the co-ordinating centres. 1. Because he has never seen a case without evidence of peripheral change, and in most cases no evidence exists of any other change. 2. He considers writing is acquired by education and is not an essential attribute of man and he does not believe co-ordinating centres can be created by education. 3. The fact that the affection is of gradual growth and is never suddenly established militates against the idea of a controlling centre. He would couple writer's cramp with neuralgia, a disease all of whose phenomena are local, due to conditions which may affect nerve-tracts before or after junction with their nerve-centres.

In treatment of true writer's cramp rest must be obtained for the hand and also for the patient's mind and body. Many times the patient is relieved by having the nature of his malady explained to him, understanding that it is purely local. He thinks there is no harm in permitting a moderate use of the left hand to relieve the right. One of the most useful aids to recovery in advanced cases is rhythmical exercise of the affected muscles, but not to fatigue; friction with slightly stimulating liniment. The passage of the galvanic current through the muscles during rhythmical exercise is strongly advised. A warning is given against the continuous use of mechanical contrivances.

Dr. Beard concludes from his analysis of one hundred and twenty-five cases occurring in his own practice and in that of correspondents: 1. What is called the cramp is but one of a large number of the symptoms of this disease, and no two cases are precisely alike.

2. Also in other forms of professional cramp, as that of telegraphers, musicians, sewing women, painters, etc., the cramp is but one of a number of symptoms, and by no means always the most important symptom; and as in writer's cramp, there is frequently no cramp at all from the beginning to the end of the disease.

3. This disease is primarily a peripheral and local disease of the nerves and muscles; secondarily and rarely it becomes central and general, or it may result from various central lesions; and it may affect any point between the extreme periphery and the centre.

4. This disease occurs mostly in those who are of a strong, frequently of very strong constitutions, and is quite rare in the nervous and delicate; and when it does occur in those who are nervous, is easier relieved and cured than when it occurs in the strong.

5. This disease is far less likely to occur in those who do original work, as authors, journalists, composers, than in those who do routine work, as clerks, bookkeepers, copyists, agents, and so forth.

6. This disease, like all nervous diseases in this country, diminishes in frequency as we go south.

7. Writer's cramp is no longer an incurable disease.

8. The treatment of writer's cramp and affections allied to it consists: 1. In the use of electricity locally applied. Both galvanic and faradic currents may be used—preferably the former. 2. Hypodermic injections of atropine, strychnine, duboisia, Fowler's solution and other tonics, narcotics and sedatives. 3. The internal use of calabar bean, ergotine, iodoform, and in some cases of nerve-food, as oil and fats. 4. Massage. 5. Dry heat and dry cold. 6. Actual cautery and very small blisters to the upper portion of the spine or along the course of the affected nerves and muscles.

He then mentions various "hygienic devices" as holders, type-writers, writing with the left hand, etc.

Gowers, differing with *Poore* and *Beard*, thinks the disease is central; he believes the danger from using the left hand is exaggerated; reports a case where the patient, after using the left hand a year and resting right hand, was able gradually to return to the use of the right hand.

Carl Hertzka found gelsemium sempervirens useful in one case of piano-player's cramp, in which there were vague pains and weakness in both arms, which had prevented playing for two years. The patient for three weeks took tincture of gelsemium, eight drops three times a day. The symptoms disappeared without any unpleasant results.

Bianchi used hypodermic injections of nitrate of strychnia, using a solution such that one gramme contained five milligrammes of the nitrate of strychnia. He began by using one milligramme and increased the dose to three and one-half milligrammes every other day. The injections were made in the forearm. He concludes that: 1. The morbid condition or process differs as to its seat in different cases. 2. The difference in the disturbing process of the disease, in its seat, and in the mechanism by which the malady is determined, is perfectly in harmony with the difference of the clinical form. 3. The prognosis may be considered less grave than most pathologists believe. 4. The treatment, electric or internal, in order that it may obtain a greater average of recoveries must be conformable to the clinical character of the disease which differs in various cases, and which must indicate whether the ascending or the descending current may have a better effect on the spinal cord and on the nerves; when simultaneous faradizations of the muscles and of the skin may be applied with success; when galvanization of the brain or of the sympathetic nerves in the neck is useful and when the hypodermic injection of strychnia, exclusively or associated with established methods of electrization, may be of more utility.

PARALYSIS.

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Robert M. Smith has experimented upon the effect of pressure upon nerves in producing paralysis, somewhat as *Mitchell* has done formerly. *Smith* experimented upon frogs, using a column of mercury to obtain the pressure; when the column is from thirty-five to four hundred and fifty millimetres in height there is an increase of irritability of the muscular or peripheral end of the nerve, while the irritability of the spinal or central end as constantly decreases. Though these modifications bear a certain relation to the degree and duration of pressure, the variation is much less marked in the peripheral than in the central end of the nerve.

On removing the pressure, there is generally a diminution of irritability of the peripheral end and increase of irritability of the central end.

The reflex irritability of a nerve subjected to pressure, in the periph-

ral end, is diminished during pressure and tends to regain the normal on its removal, while the irritability of the central end in some instances, when subjected to comparatively light pressure, is at first increased and then diminished with a tendency to rise upon removal of the pressure if its irritability has been reduced below the normal, while in other cases of more severe pressure the preliminary rise is wanting; also, if pressure has been continued too long, the rise subsequent to its removal may be wanting.

S. thinks an explanation of these phenomena may be found in a reversal of the natural electric current in the nerve.

Bernhardt gives statistics of the frequency with which various peripheral paralyses occurred in his experience during two and three-fourths years. He had 28 cases of lead paralysis, all males; 14 of these being painters, 4 file makers, 3 varnishers, some of these without colic, some had had colic two to four times. Generally the extensor muscles of the hand or fingers were affected alone, when others were affected the deltoid was most frequently the muscle attacked, next those of the thenar eminence. The left hand was affected alone in the case of a left-handed person. There were 19 cases of radial paralysis; 14 where the ulnar nerve was affected, nearly all traumatic, 13 of the median nerve, 5 of the axillary, of the musculo-cutaneous alone none, in 2 cases all the nerves of the arm were affected, and in 3 the serratus magnus; 1 of these was from a chill, 1 from pressure, 1 from tearing. In 2 cases the nerves of the lower extremities were paralyzed, both were cases of neuritis.

W. Korybatt-Daszkiewicz has studied anew the degeneration and regeneration of the medullary nerve-fibres after injuries. There is little that is new in his dissertation.

Cosse and Dejerine, from their investigations in regard to the degeneration of nerves separated from their trophic centres, conclude that the loss of motricity in the peripheral end of a divided nerve, which is seen on the third day, results from an alteration in the molecular condition of the axis cylinder—an alteration which renders it more fragile and perhaps ends in producing a solution of continuity, but which in every case renders it incapable of transmitting excitations, whatever may be their nature. II. This alteration is primitive; the changes of the nuclei and protoplasm are secondary. III. There is a rather striking analogy between the loss of the properties of the axis the third day and the marked diminution of contractility seen at the same period in the muscles whose nerves have been cut; these muscles then present no appreciable change in their primitive fibres. IV. The central nervous system may be considered as exercising an exciting influence on the nutrition of the nerve-tubes; removed from the influence of these centres the nerve-tubes rapidly lose their structure and their physiological properties. V. All the medullary tubes are subject to the influence of these trophic centres. This influence is not as well demonstrated for the fibres without myelin or Remak's fibres.

In the treatment of paralyses, *John E. Morgan* advises the application

of electricity directly to the nerves and muscles by means of acupuncture. Finding electricity as ordinarily used of no avail, he passed needles into the limbs in two cases of total paralysis with wasting, and then found that the muscles responded feebly to the galvanic current. Forty or fifty cells were used without trouble two or three times a week for months. (He does not mention the battery used.) The result was very great improvement. This treatment is adapted to cases where there is motor and sensory paralysis with changes of electrical irritability of muscles or nerves, whether quantitative or qualitative.

Senffleben experimented upon the *trigeminal* in regard to the occurrence of keratitis. His conclusions are :

1. The affection of the cornea is independent of the influence of trophic nerve-fibres; there are probably none of these in the *trigeminus*.

2. The primary affection of the cornea after division of the *trigeminus* is probably a necrosis, caused by repeated coarse injuries which the eye receives in consequence of its anæsthesia.

3. The circumscribed necrosis of the cornea acts as an inflammatory irritation and calls forth a secondary inflammation of the cornea which advances towards the periphery.

4. The simultaneous extirpation of the upper sympathetic ganglion is of no influence upon the origin and course of the affection of the cornea occurring after division of the *trigeminus*.

Again in 1878 he repeats this opinion that the keratitis is of traumatic origin.

Feuer concludes from his experiments that :

1. Division of the *trigeminus* does not interfere directly with the nutrition of the cornea, nor does it cause immediate inflammation of the same, but it puts the eye in a condition of diminished resistance to external influences.

2. The keratitis has its ground exclusively in the cessation of winking, the uncovered cornea dries, necrosis of tissue follows, this necrotic part acts as an irritation, therefore a reactive inflammation causes necrosis of neighboring parts.

3. Diminished secretion of tears hastens this process.

R. S. Archer reports a rare case in which both divisions, sensory and motor, of the fifth were paralyzed together; vision, hearing, taste, smell, were all affected. Taste was blunted if not lost in the corresponding side of the tongue anteriorly. There was a profuse discharge of mucus from the nostril on the paralyzed side.

Onimus (Practitioner, Jun., 1875, p. 413) thinks that *facial* paralysis due to cold depends upon an affection of the terminal branches of the nerve rather than upon an affection of its trunk.

Bärwinkel, in a case of severe facial paralysis, differently from *Erb*, found the posterior auricular nerve was not entirely paralyzed. He concludes from this that the pressure was not equal on all the fibres, and hence it may be wrong to conclude that in light cases the nerve is affected externally to the canal. The amount of compression may vary within

the canal; a plastic exudation giving rise to a severe form of paralysis, a serous exudation to a light form.

In regard to the chorda tympani, he reports a case of lesion of the facial within the meatus auditorius, the auditory and all the branches of the facial being affected, the fifth and the chorda escaping. Hence the chorda could not have followed the facial to the brain. He thinks it runs in the facial only as far as the ganglion geniculatum, and then passes into the fifth by the smaller superior petrosal nerve. He mentions cases in support of this view.

In regard to the secondary contraction after facial paralysis, *Onimus* states that it appears at the time of commencing improvement, while the muscles are still in a state of paresis and the nervous influence is still imperfect. The muscles are in a state of inflammation caused by the paralysis. He does not allow that there is increased irritability of the centre. As yet experiments have not proved any centripetal influence of a clearly motor centre.

Webber suggests that the pain which frequently attends facial paralysis or even precedes it is due to an affection of the auricular branch of the vagus which crosses the seventh within the petrous bone, gives branches to the seventh and is a nerve of sensation.

VAGUS.—Several papers have been published in regard to experimental physiology of the vagus. The titles only of the most important of these are given.

Löwit reports a case with enormous increase of the heart's action which he refers to a unilateral paralysis of the vagus; he further considers the subject of paralysis of this nerve in its effects upon the lungs and heart.

In regard to paralysis of other nerves there is comparatively little that is new, though much has been written.

Poore, in discussing a case of paralysis of the serratus magnus, differs with *Duchenne*, who states that when the arm is held in front if this muscle is paralyzed, there is rotation of the scapula, also that the arm cannot be raised above the horizontal. In *Poore's* patient this was the only muscle paralyzed, and the arm could be raised higher.

Panas reports four interesting cases of paralysis of the ulnar nerve from unusual causes. In the first there was development of an abnormal sesamoid bone in the internal lateral ligament of the elbow. Chronic neuritis of the ulnar was seemingly caused by repeated bruising of the nerve against this body. In the second, twelve and a half years after fracture of elbow, the groove in which it runs was filled up, the nerve became subcutaneous, and so more exposed. In the third case, three years' continued pressure on the elbow was found to have caused enlargement of the nerve. The fourth case was one of deformity by arthritis of the humeral trochlea.

In paralysis after diphtheria there have been several autopsies. *Dejerine* in five cases found constant changes in the cord and anterior roots, there being parenchymatous and interstitial inflammation of the gray substance in the cord. The lesion of the roots he thinks is secondary.

Pierret found the dura mater thickened, adherent, rough with a deposit of neo-membrane similar to that on the mucous surfaces.

NEURITIS.

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Neuritis was distinguished from neuralgia by *Bärwinkel* by the direction in which pain radiates. Where the pain radiates centripetally, he says there is a slight inflammation of the neurilemma, a neuritis. Where this centripetal irradiation is wanting, it is a case of neuralgia. In a case of traumatic ascending neuritis, *Boeck* found that pressure over the nerve caused pain shooting towards the centre, according to *Bärwinkel's* statement. The spontaneous pain which *Nothnagel* claims as present was not felt.

An interesting case of *perforating ulcer* of the foot is recorded by *Savory*. The nerves were found diseased, the epineurium thickened, perineurium very little changed, the endoneurium thickened, the nerve-fibres were much atrophied and diminished in number.

Fernet claims that acute pneumonia, called fibrinous, is a herpes of the lung depending upon a neuritis of the pneumogastric nerve.

Neuritis migrans, or *progressiva*, has attracted considerable attention, and several new experiments have been recorded. *Treub* found that in six cases where he had been able to excite interstitial neuritis,

it was transmitted by continuity, the infiltration never jumped over one part of the nerve to attack it anew; but the inflammation may attain a higher degree in certain points of predilection, where blood-vessels are more numerous. He thinks many cases of so-called reflex paralysis are really cases of neuritis extending by continuity.

Rosenbach found considerable difficulty in exciting neuritis, irritating injections producing only perineuritis, limited to the vicinity of the injection; threads drawn through the nerve excited neuritis, but there was no transplanting of the inflammation to neighboring parts of the nerve, nor to the spinal cord, nor its meninges in twenty-one cases. This does not prove, he adds, that clinically there may not be a neuritis migrans, though he considers "neuritis disseminata" as a better name. He operated on rabbits.

Klemm, who also operated on rabbits, came to a different conclusion. He injected a few drops of a solution of arseniate of potash. The resulting inflammation always jumped to spots where many arterial vessels branched. Even the dura mater spinalis was affected. Once the disease passed from the sciatic to the plexus brachialis. The cerebral dura mater was twice affected. The nerve of the opposite side was also affected, though the dura mater of the cord was not.

Niedick experimented upon rabbits, and found that the neuritis did not extend continuously, but by spots jumping over a stretch of healthy tissue. He found also centres of softening in the cord.

Eichorst reports a case in which there was slight affection of the perineurium, blood-vessels dilated and filled with blood, lymphoid cells next the vessels, blood extravasation in the endoneurium, nerve-fibres degenerated. One nerve after another was affected, an attack of fever attending the attack of each nerve; the superficial perineal nerve was first attacked, next the deep perineal, three days later the posterior tibial; later other nerves were affected. Sensibility was first lost, then the motility. The electrical reaction was lost soon after the paralysis appeared.

NEUROMATA AND NEUROPLASTIC FORMATIONS.

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Takacs reports a case of multiple neuromata; the tumors were filled with round cavities or canals crossed by fibres and filled with blood-clots; one, the size of a hazel-nut, was within the vertebral canal, inside the sac of the dura mater. The nerves were in part lost in the tumors. As the nerve-fibres approached the tumor they spread out, the nuclei became more numerous around them; the medullary sheath could not be recognized; the axis cylinders could be followed into the tumor, but were lost there, and within the tumor only a row of long nuclei suggested the nerve-structure.

It was evident that the new growth sprang from the interior of one or more of the primitive bundles of a nerve-trunk, from the interstitial tissue of the nerve-fibres, the endoneurium, and not from the perineurium, and the nerve-fibres of the primitive bundles were not simply pressed apart by the new growth and shoved to the periphery, but were frequently attacked concentrically.

To settle the diagnosis as to whether a tumor is a neuroma, *Gerhardt* recommends to introduce a needle into the tumor; if it involves a mixed or motor nerve, a weak current, which would not otherwise excite contraction, will cause the muscles to act. If the nerve is sensitive alone, only pain will be felt, perhaps with reflex contraction. In the case reported, when the needle entered the tumor, five cells produced contraction; if it only penetrated near the tumor five cells had no effect; while on the skin twenty-five cells were required to produce contraction.

Findley operated to remove a neuroma with as little injury as possible to the nerve: he passed a rubber ligature around the tumor, notching it first, so that the ligature might not slip; the nerve-fibres were left as intact as possible. The pain was relieved, and there was only a slight loss of motion.

