

The cranial nerves also exhibited well-marked signs of degeneration, specially well seen in the oculo-motor, abducens, and glossopharyngeal.

In the large nerve-trunks the degeneration was not so pronounced as in the nerves of the face and neck. The degeneration appeared to be inversely proportional to the calibre of the nerve. Degeneration was also visible in the anterior and posterior spinal roots, more particularly in the cervical and lumbar region than in the dorsal. The anterior roots were relatively more affected than the posterior.

Degeneration was also to some extent evident in the multipolar cells of the cervical and lumbar region of the cord. The cells of the posterior cornua were also affected to some extent.

The author concludes that the diphtheritic infection attacks the nervous system in general, both spinal and peripheral, and that there is no reason to regard the one as secondary to the other.

DAVID FERRIER.

Leegard on the Degeneration of Nerves and their Electrical Reactions.—(*Arch. Klin. Med.* 1880.)—It is notorious that writers differ greatly in their accounts of nerve degeneration and regeneration. This may partly depend upon the nature of the primitive lesion. Our author employed only the ligature, which he carefully applied to the nerve without disturbing its natural relations. The thread is tied, and immediately removed, so as simply to produce a solution of continuity in the axis and myelin, the empty sheaths remaining intact. The microscopical examination of the nerves was made on specimens macerated for twenty-four hours in osmic acid, and then stained in picrocarmine and other agents. In three or four days the myelin begins to run together into cylindrical masses. The axis breaks at places; hence the loss of electrical excitability. *Secondary* to these changes appears an enlargement of the nuclei in the sheath. The myelin gradually undergoes further segmentation, and ultimately (three weeks) granular degeneration. The axis breaks up also, and every trace of it is lost between the tenth and fifteenth day.

There is an increase in the number, as well as in the size, of the nuclei. At both extremities they present masses of protoplasm which tend to form a continuous streak along the sheath. This is the first step towards regeneration. Eichhorst and Neumann thought that the products of disintegration of the medulla and axis underwent a kind of chemical alteration, and that this new sub-

stance persisted in the sheath. But it is more probable that those products are altogether absorbed. It is very likely that some fibres are completely destroyed, sheath and all, and that this is the origin of the granular débris noticed among degenerating fibres.

The process of degeneration does not follow a centrifugal direction, but attacks the whole peripheral portion of the injured nerve at once. At the point of injury itself there may be some inflammatory changes, if the operation has not been conducted with due care; otherwise there occurs nothing but an increase of the nuclei. Immediately above this point the central end of the divided medulla and axis offer much the same alterations as the peripheral end on a length of 3-5 mm. or more. The first interannular segment is altered as above described; the next three or four are shorter, irregular, with their medulla broken up. The sheath is empty at places, and displays nuclear proliferation.

As mentioned above, the first steps of the process of regeneration are made before the degenerative process is complete, and starts in the protoplasm accumulated within the sheaths in the neighbourhood of the nuclei. Fine greyish threads become differentiated in the interannular segments, and run together into a continuous fibre. The new segments appear to be more numerous than in the healthy nerve. It is possible that wholly new fibres may be reproduced, but this is not certain. The supposition that several new fibres may originate in a single original one is baseless. The regeneration is the more rapid, the more peripheral the lesion has been.

The irritability of the *nerve* undergoes the following changes. There is frequently a slight increase of it during the first day after the operation. This, however, is not constant, and is followed by a diminution which becomes more marked until the nerve does no longer react to the most powerful stimuli. This occurs, on an average, on the third day. The period of unexcitability lasts a variable time, according to the depth of the lesion; and voluntary motion, as we know, returns before any electrical reactions can be obtained, especially below the point of lesion. Applied here, the galvanic current sometimes brings about muscular contractions before the faradic. It is to be noticed, also, that opening contractions are more difficult to obtain than in the normal state. The author confirms the few observations previously recorded, where an inversion of the polar effects on the nerve is noted; he has found that in certain cases A.C.C. > K.C.C., and K.O.C. > A.O.C. In these, he says, every experimental error has been carefully

eliminated, but he cannot give any explanation of the occurrence. The indirect stimulation was always characterised by a rapid, healthy contraction.

With reference to *muscle*, its loss of reaction to faradism is usually complete within four days. Vulpian has rightly insisted that this is not strictly true of muscles directly excited (not percutaneously), for here fibrillary contractions persist for a long time. Section of the antagonists may be necessary to demonstrate weak contractility. To galvanise muscles at first react less freely, soon after the injury to the nerve, but this applies less to the strength of the current to be used than to the amplitude of the contractions; in other words, it is the maximal, not the minimal, test which displays the alteration. At the same time A.C.C. approximates K.C.C. The author has not seen the same regularity in the development of the qualitative changes during the period of increased excitability, as is usually described; he has never seen A.C.C. > K.C.C. Both O.C. disappear at first; but when they return A.O.C. is always > K.O.C. They tend to overtake the C.C. during the period of increased excitability, and disappear again afterwards, sometimes permanently. During the same period the closure and opening tetanus appears only after the closure and opening contraction have been obtained. A singular fact is that the author has not been able to obtain signs of the increased mechanical excitability of muscles so generally found in the human subject, nor of Erb's "middle form" of the degenerative reactions. The course of the electrical phenomena connected with the processes of nerve and muscle degeneration may be divided into four stages, of which a tabular view (p. 565) is appended.

[The reader interested in the question will find an account of the similar process as observed in man in the reporter's "Introduction to Medical Electricity," Chapter III.; or better still in Erb's vol. on the Peripheral nerves, in Ziemssen's 'Cyclopedia.']

Langenbuch on Nerve Stretching in Ataxy and other Spinal Diseases. (*Berlin Klin. Woch.* 1881, 24-27.)—The author begins by expressing the view that locomotor ataxy is not primarily an affection of the posterior tracts, but has a peripheral origin in the sensory nerves. In all the cases in which he operated, the nerves showed, to the naked eye, signs of alteration; sometimes swelling and reddish discoloration, sometimes dryness, atrophy, and yellowish or violet discoloration. He thinks that the large number of cases of tabes, as well as the great importance

—	First Stage.	Second Stage.	Third Stage.	Fourth Stage.
<i>Nerve.</i>				
Motility	Absent	Absent	Returning	Good.
Reaction to galv. and far.	Increase at first, then disappears.	Absent	Returning	Further improvement. Normal formula restored.
<i>Muscle.</i>				
Farado-contraction	Disappears; only fibrillary contraction.	Fibrillary only . . .	Reappears at some period .	Rises, but not to normal.
Galvano-contraction	Diminution of C.O. Disappearance or inconstancy of O.C. Tetanus diminishes.	Increase of all C. to maximum of hyperexcitability. O.C. constant. Tetanus evident, but appears last of formula.	At first increase, then decrease of O.C. below normal. O.C. decrease and disappear. Tetanus diminishes.	Diminished irritability. O.C. recover. O.C. absent or inconstant. Eventually rise of irritability and return of normal formula. Irritability may remain permanently deficient.
Character of contracting	Rapid. Maximal often very weak.	Slow, vigorous . . .	Strength falls off. To indirect stim. rapid, to direct slow. Gradual improvement of latter.	Strength restored; sluggishness disappears.
Mechanical irritability	Diminished	Exalted (?)	Exalted (?); later diminished	Usually diminished.

of cold in the causation of disease, is rather in favour of the peripheral origin. Another consideration is the fact that in the early stage the morbid changes in the cord are limited to the part of the posterior tracts which Flechsigs has shown to be the direct continuation of the peripheral nerves. The pathological process invades Goll's columns at a later period: these we know are not in direct connection with the peripheral fibres. Further extension occurs later, by contiguity, into the neighbouring lateral tracts.

According to Langenbuch, then, we have to do in ataxy with an ascending inflammatory alteration in the nutrition of nerves, roots, and columns. How is it then that the overgrowth of connective tissue (sclerosis) is proportionally much larger in the cord than in the nerves? He thinks that the answer to this question lies in the fact that the morphological character of the connective tissue is different in the two cases. The result of connective overgrowth is much more important in the cord where the nerve elements are thickly crowded together among the thin meshes of the tissue. The author is, besides, far from saying that the morbid process always invades the cord. This is well illustrated in the temporary ataxies after acute disorders. With reference to the lightning pains, their peripheral origin seems to be shown by the happy results of compression or friction along the course of nerves.

The action of nerve-stretching is twofold: it stimulates the conductivity of partially disabled nerve-fibres, and promotes resorption of morbid products. It seems to influence the whole nervous system; the pulse and respiration-rate is quickened.

The first symptom to give way is the sensation of chilliness. After a few hours, sensibility returns in the limbs, and may even reach hyperæsthesia. After a certain diminution, muscular power increases, and the ataxic symptoms disappear. During the first few days peripheral pain is present, perhaps as the result of the operation; but within the second week the patient usually becomes entirely free from pain. The symptoms connected with the rectum and genito-urinary organs are also usually much relieved. A curious phenomenon sometimes observed is profuse perspiration after the operation. The general vigour, physical and mental, of the patient is increased, but the gait remains abnormal for a certain time. The knee-phenomenon remained absent in the twenty-two cases in which the author operated.

He has performed nerve-stretching in various other cases of spinal disease—in one (lateral sclerosis) the result was very favour-

able. Two cases of general chronic pemphigus and obstinate senile pruritus were cured by the stretching of one sciatic nerve.

On the retardation of Sensory Impulses in Locomotor Ataxy. FISCHER (*Berlin Klin. Woch.* 1881, 83) examined five cases of tabes with a view of determining the relative rate of sensations of touch and pain. For such experiments it is advantageous to deal with patients intelligent enough to give an accurate description of their feelings. The retardation for impressions of pain may be considerable. He found it once to extend to fifteen seconds, but states that sensations of touch may be delayed longer than those of pain. The delay may vary during the experiment; it may become less on repeating the stimulus; or, contrariwise, the stimulus may cease to be perceived at all. Retardation of the other kinds of sensations (temperature, pressure, &c.) was not clearly demonstrated. The author does not offer any theory in explanation of the retardation.

Unilateral Perspiration and Hemiatrophy, with their relation to the Nervous System. TAKÁOS (*Ciriblatt. f. Nervhkt.* 1881, 13) has observed a case in which the patient (a man, aged 32, left-handed) was seized with pains, weakness and stiffness in the right extremities. At the same time he ceased to perspire on the right side of the body. Pilocarpin injections produced some sweating on that side, especially on the back of the hand, where perspiration appeared more abundant than on the left hand. The whole right side of the body was, when patient came under observation, viz. two years after the beginning of the disease, much thinner than the left. There was distinct atrophy of all the right hand-muscles, which showed deficient reaction to electricity.

The author remarks that most cases of a similar nature hitherto described have been referred to hyper- or hypokinetic conditions of the sympathetic. He thinks, however, that the combination of pupillary vasomotor and trophic symptoms has its origin in the cord itself. The cilio-spinal centre accounts for the pupillary symptoms. And, according to the late researches of Adamkiewicz, perspiration is governed by the anterior grey matter of the cord. The suspension of perspiration does not depend upon mere vaso-constriction, but upon paresis of special nerve action, and pilocarpin is a stimulant of such an action.

Cherchevsky on the Laryngeal Crises of Locomotor Ataxia (*Revue de Médecine*, July 1881). The author describes eighteen

cases of tabes, in which laryngeal crises occurred. He classifies the latter in three groups, according to the intensity of the symptoms :

1. In the milder form there occur fits of coughing very like those of whooping-cough, consisting in a series of rapid short expiratory efforts, followed by a deep whistling inspiration. The duration varies from a few to ninety seconds. The expectoration is very scanty.

2. In the second group the cough is much more violent, and the external manifestations (congestion of the face and eyes) much more marked. The crowing inspiration louder and more difficult. Other symptoms, such as headache, nausea, vomiting, &c., accompany the fit. The duration is longer ; five to ten minutes.

3. In the severest form there is complete apnoea, with symptoms of asphyxia, unconsciousness, epileptiform convulsions. There may be local prodromal symptoms before the fit. Its duration may extend to half an hour, or even several hours.

The laryngoscope reveals no local change ; and the time and number of fits varies much in different cases. Post-mortem appearances in two cases pointed to atrophy of the vagus and accessorius roots, and of the posterior pyramids, besides the usual tabetic alterations in the cord.

In the majority of instances the laryngeal crises appeared along with the early symptoms of tabes ; and occasionally formed the only prominent symptom for a considerable time.

A. DE WATTEVILLE.

A Microcephale of Simian character.—Professor Tamburini showed to a Medical Congress at Reggio Emilia a microcephalic boy, named Battista, now twelve years of age. He was a foundling. When three and a half years old he had been described by Professor Lombroso (see my report on some cases of microcephaly and cretinism in the *Edinburgh Medical Journal*, August, 1875, and my book on *Idiocy*, p. 87). Dr. Tamburini's paper is a reprint from the *Archivio Italiano per le Malattie Nervose*, Fasc. I., Anno 18, 1881.

Lombroso described Battista as having a tender and delicate skin, covered with fine hair on the forehead, limbs, cheek and neck. The head was small and peaked, with a retreating forehead, and the external orbital process protuberant. The face was prominent ; the incisors distant from one another, and the canines twice as big as usual. The palate was longer, and the genital organs more developed than usual. The hallux more distant and longer than the other toes.