or in places absence of pigment in the hair or the skin, were noted (Möbius, Schmidt's Jahrb. d. gerichtl. Med., 1886, vol. ccix, p. 251). How these are brought about we are utterly unable to explain.

Diagnosis.—It is usually not difficult to recognize chorea if we remember that young patients of the female sex, who are often also anæmic, form the largest contingent of the cases, that the twitchings chiefly affect the upper extremities and the face, and that they are entirely independent of the will of the patient. Their disappearance also during sleep is an important point, and this fact by itself would distinguish them from the athetoid movements. These latter, possibly the twitchings of the tic convulsif, the tremor of paralysis agitans, the shaking movements of the intention tremor of multiple sclerosis, finally, certain muscular spasms, which Leclerc and Royer (cf. lit.) have designated as pseudo-choreas, must more especially be taken into consideration, but they ought never to render the diagnosis really difficult.

Pathology.—Our knowledge of the pathology of idiopathic, uncomplicated chorea is very imperfect. The changes which have been found thus far do not seem to be essential. Repeatedly capillary emboli have been found at the autopsy in the thalamus and the corpus striatum, often they could not be demonstrated (Dana, Brain, 1890, xlix). The experiments of Money on guinea-pigs and dogs (Lancet, 1885, 1, p. 985) would indicate very decidedly that chorea can be caused by capillary emboli. Their mode of action, however, remains unexplained. The objections which Litten has raised against the embolic theory, that the demonstration of embolic processes in ordinary cases of chorea is not proved, and that in spite of the diversity of the localization of the foci of softening in the brain the clinical picture is always the same, can not be regarded as convincing.

The communication of Flechsig, who in the two inner anterior segments of the lenticular nucleus, but nowhere else, found small bodies in the lymph sheaths of the vessels, some of which were larger, some smaller than blood-corpuscles, has as yet been neither confirmed nor overthrown. "Their arrangement resembled that of glandular structures; they were strongly refractive, very firm, and almost like chalk, although they contained no lime. In alkalies they slowly swelled." Though their chemical nature is unknown, they resemble in the main

that material which von Recklinghausen has termed "hyaline." This observation has not as yet been interpreted, and Flechsig himself declines to give a decided opinion as to whether the bodies have been formed in the blood or lymph vessels or whether they have to be regarded as products of degeneration from ganglionic cells and nerve fibres. Although we have to admit that lesions in the lenticular nucleus may cause choreic movements, we can as yet make little use of these bodies as an anatomical cause for the disease. Wollenberg regards them as non-essential (Arch. f. Psych., 1891, xxiii, 1, p. 197). Earlier observations of conditions which were considered as significant for chorea—that is, hyperæmia of the brain and the spinal cord, lesions of the corpora quadrigemina, tubercles in the cerebellar peduncles, inflammatory conditions in the vertebræ, and spinal irritation resulting therefrom—possess only historical interest.

Although we are then still unable to say anything definite about the nature of the disease, the assumption that we have before us an affection of the entire nervous system, in which, to be sure, the brain takes the most prominent part, seems the most probable. Whether certain portions of the brain are particularly qualified to produce choreic movements—whether, besides being produced by irritation of the cortical motor centres, they may also be brought about by lesions of the basal ganglia; further, whether this irritation can ever be attributed to infectious material, microbes, or the like, whether it can ever be connected with fungous growths, such as, for example, Naunyn has found in the pia belonging to the species of the cladothrix or leptothrix, or whether we have to assume an autointoxication, as in epilepsy, uræmia, etc. (Duchateau, Thèse de Paris, 1893)—all these remain open questions, and we must also leave undecided whether or not the alteration of the blood depending upon the so-called rheumatic diathesis is sufficient for the development of the disease.

Ætiology.—Among the causes of chorea heredity plays an important *rôle*, as it does in all diseases of the general nervous system. This factor is more important, since heredity can here not only be called an indirect predisposing circumstance, owing to which an individual is more prone to one or the other nervous disease, but because there exists actually a hereditary form of chorea which is handed down from generation to generation and which for a great many years may remain in the

family. This chorea hereditaria, or, as it is also called, Huntington's chorea, has nothing in common with chorea but the name; it is produced by anatomical changes which have been characterized by Oppenheim and Hoppe as a miliary disseminated cortical and subcortical encephalitis (Arch. f. Psych., 1893, xxv, 3). It does not come on in childhood, and hardly ever appears before the age of thirty or forty. It is characterized by peculiar motor disturbances resembling those of athetosis (p. 284), and not rarely leads to pronounced mental deterioration. It is incurable. The conception that it is a progressive double athetosis seems to me worthy of consideration (cf. Remak, Neurol. Centralbl., 1891, 11, 12; Krohnthal und Kalischer, ibid., 1892, 19; Greppin, Arch. f. Psych., 1892, xxiv, 1; and others). There are "chorea families" in which a whole generation never remains free from the disease, and only certain members are exempt. On the other hand, there exists also a chorea congenita (Rau, Inaug.-Dissert., Berlin, 1887), which has to be attributed to an affection of the mother caused by fright, etc., during pregnancy (Fox, Richter, Möbius, Oppenheim). It has long been known that pregnancy itself may to a certain extent predispose to chorea, as is shown by the so-called chorea gravidarum. Age and sex play a certain *rôle* among predisposing causes, inasmuch as the young and the female sex are especially prone to it. Among 439 cases, 322 (that is, seventy-three per cent) were girls, and 340 (that is, seventy-four per cent) were between the ages of five and fifteen; 411 (that is, ninety-one per cent) were between the ages of five and twenty (Mackenzie). In rare cases old people become subject to chorea (chorea senilis), The oldest of my patients was eighty-one, the oldest of Mackenzie's patients even eighty-six.

Among the exciting causes there are two kinds which are particularly important—the one, psychical excitement, particularly fright and anxiety; the second, frequent contact with individuals suffering from chorea, which awakens an impulse to imitate the pathological movements and gives rise to what we then call chorea imitatoria. The latter is far less important than the former. Epidemics of chorea have often been described; Wichmann has observed one in Wildbad (Deutsche med. Wochenschr., 1890, 30). The time which elapses between the reception of the noxious influence and the development of the disease usually comprises from five to seven days, sometimes only one day. Sometimes, again, the effect follows the cause immediately, this being so in ten per cent of all cases caused by fright. Besides fright, bodily or mental overexertion, particularly the latter, may provoke the disease. According to Mackenzie's report, sixteen per cent of all cases observed are attributable to this cause.

Treatment.—Cases of uncomplicated chorea get well without any interference on the part of the physician, but the results of wide and varied experience have taught us that with certain measures we are able to cut short the duration of the disease to a no inconsiderable extent. With reference to the internal treatment it is interesting to follow up the different phases and changes through which this has passed in the last half century. When the spinal cord was supposed to be the seat of the disease much was thought of strychnine, which had been recommended by Trousseau and which was administered in the form of a sirup. Later, when to the rheumatic basis of chorea a prominent place was given, colchicum and quinine were preferred. Again, camphor, potassium iodide, and hydrocyanic-acid preparations were prescribed when irritation of the sexual organs was held to be the starting point of the disease. Venesection, leeches, cups to the head and along the vertebral column, were employed for a time on the authority of Sydenham. All these measures have now more or less fallen into oblivion, and even the zincum oxidum album, once so warmly recommended by Hufeland, has had to give way to other remedies. Among those still valued, arsenic, which was introduced by Romberg, stands first. It is best given in the form of Fowler's solution, in doses of from three to five drops three times a day, the dose being gradually increased to twenty or thirty drops a day. The medicine ought to be well diluted with water. Instead of Fowler's solution we might prescribe the waters of the Roncegno or Levico springs in doses of a teaspoonful to a tablespoonful three times a day. At the same time we must be on the lookout for intoxication, which has been known to be produced even by small quantities of the drug, as was proved by a case of my own. The arsenic treatment is to be continued until either the symptoms abate or digestive disturbances make their appearance, which would contra-indicate its continuance. We usually attain our end in from fifty to sixty days.

Next to arsenic we prefer the salicylate of physostigmine (eserine), which, in the form recommended by Riess (Berliner

klinischer Wochenschrift, 1887, 22), may be injected hypodermically twice a day in the dose of one milligramme (1/50 gr.). Excellent results may be obtained with this mode of treatment, and the duration of the disease may be reduced to thirty or forty days. We need hardly insist that this drug must be administered most cautiously, because eserine poisoning has been observed (Lodderstädt, Berliner klin. Wochenschr., 1888, 17). As soon as any bad effects begin to show themselves, such as nausea, vomiting, etc., it is advisable to discontinue the medicine at once for a considerable time. With regard to exalgin, so highly spoken of by Dana (Journal of Nervous and Mental Diseases, 1892, July), at present I must suspend judgment; from small doses I have observed but little effect, while large doses did not seem to be always well borne (cf. also Joris, Wiener med. Presse, 1892, 44). Antipyrin, which has been recommended by Legroux and others, I have completely abandoned. The results obtained with this drug are uncertain and transient. We were never able to note cures within from six to twenty-seven days with this remedy, such as Legroux has reported. If these medicines leave us in the lurch we may with caution prescribe chloral, morphine, opium, under the influence of which the movements may temporarily abate.

Among other measures we may mention the use of cold water and electricity, which, although only of secondary importance, may not be without good effects. We have in different places spoken of the cold-water treatment, and wish again to repeat here that extremely low temperatures are unnecessary, but that hip baths of 84° F., with cold affusions to the back (81° to 75° F.) and wet packs seem sufficient. In the electrical treatment the constant current is chiefly to be used, which is made to act alternately upon the brain and the spinal cord (Hirt, *loc. cit.*, p. 181).

Sometimes all these means of treatment which we have just described are ineffectual. The patients take medicine, undergo the cold-water treatment, etc., and no improvement is noticeable. In such instances a change of climate is to be recommended; the patient may be advised to travel, and be kept away from his family for some time; excitable individuals especially, in whom psychical influences increase the motor irritation, are to be secluded as much as possible. Visits of friends or members of the family should be interdicted. Children should be kept away from school, and should be spared

any mental exertion. Even at home they should not be made to work; they should be encouraged to suppress the movements as much as possible, and a small reward should be promised if they succeed. In this manner often a good deal is attained. Only in exceptional cases need the patient be in bed for any length of time—namely, if the twitchings are very violent and likely to lead to bodily injury. In such instances the use of narcotics, as suggested above, becomes more especially warrantable. We shall later have occasion to speak of the treatment by suggestion; the results obtained with this method are sometimes quite satisfactory.

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CHAPTER II.

TETANY—TETANILLA—TETANUS INTERMITTENS.

THE name tetany (Corvisart) has been given to a neurosis which is characterized by paroxysmal tonic muscular spasms, during which consciousness remains undisturbed. The spasms are often confined to the flexors of the fingers and of the wrist joint, and only rarely attack the muscles of the lower extremities; they are always bilateral. The fingers are drawn together and the hand assumes, to use Trousseau's comparison, the shape which the obstetrician gives it when introducing it into the vagina. With these spasms, which are of great intensity, so that the affected muscles feel tense and hard as boards, are associated slight flexion at the elbow joint and a moderate adduction of the upper arm. Hérard claims that the pressure of the thumb upon the other fingers may be so strong as to lead to pressure gangrene, but this is unquestionably very rare. If the lower extremities are affected the feet assume a position of plantar flexion, and the big toe is drawn under the second or third. Sensory disturbances are usually entirely absent, except that the contracted muscles are painful on pressure and the skin over them is covered with a copious sweat.

These attacks, which vary a good deal in frequency as well as in duration, may be produced by pressure upon the larger nerve trunks or the larger arteries of the upper extremities, as Trousseau found accidentally, by applying a venesection bandage; thus, by pressure upon the median nerve or the brachial artery, a spasm may be produced of exactly the same nature as the spontaneous ones. This is called Trousseau's sign, and is considered to be of great diagnostic importance.

The attacks scarcely ever occur suddenly and unexpectedly. Generally they are preceded by prodromal symptoms, which last for a few minutes and consist in a painful drawing sensation of the hands and arms. Previous to the first attack such