

the case, the diagnosis can only be made from certain characteristic signs observed in the morning—from the pain of the bitten tongue, the dull headache, the slight extravasation of blood into the conjunctivæ, or the unequal pupils (*vide supra*). In one of my cases of nocturnal epilepsy there occurs after each attack a deep-red spot, the size of the palm of the hand, on the forehead, which does not begin to fade until one or two days have passed. For years the attacks may be confined to the night, and may go on without interfering to any extent with the patient's business and social life. Above all, he is not exposed to the usual injuries caused by the falls, but he never can feel absolutely certain that some time or other an attack may not occur during the day. These nocturnal fits are heralded by an irregular respiration, snoring, grunting, or moaning. Convulsions may not occur at all, but the whole body gets into a condition of tetanic rigidity which is followed by a relaxation of the muscles; during the whole time the patient does not awake, and has no consciousness of what has been going on.

There are certain things which seem to exert an unfavorable influence upon the severity and the frequency of the fits, and against which the patient must be strictly and repeatedly cautioned. These have been mentioned on page 573. It need only be added here that coitus does not always have a bad influence, and that there is no reason, from the physician's point of view, for forbidding it altogether. Whether the climate has anything to do with the fits we are not sure, and the idea of the supposed influence of the moon must be relegated to the domain of the unknown. It is interesting to note, however, that when an epileptic is taken ill with typhoid fever, pneumonia, facial neuralgia, etc., he may hope to enjoy immunity from the attacks as long as these diseases last. This, however, does not hold good for pregnancy; according to Nerlinger, to whom we owe an interesting monograph on the relation between child-bearing and epilepsy (Heidelberg, Winter, 1889), a diminution of the attacks during gestation is observed only in rare instances.

On the other hand, there are certain things which exert a favorable influence, either by aborting or preventing for certain periods the occurrence of the attacks. How these factors work is quite inexplicable. Among the former may be mentioned the application of a tight bandage or strap to the part

of the body—e. g., the finger or hand—in which the motor aura occurs; to the latter belongs frequent epistaxis, as I have repeatedly had occasion to observe; if it was profuse it seemed to produce an intermission in the occurrence of the attacks which lasted for a relatively long time.

Besides the classical attack which we have just described, and which is known as "*grand mal*," there occurs the rudimentary abortive attack, as it were, which has received the name "*petit mal*." Of this latter kind there exist countless varieties. There may be nothing more than a momentary vertigo, without any loss of consciousness; this is termed epileptic vertigo; or in place of or following this there may be a brief loss of consciousness, lasting but a few seconds, the "*absence*" of the French writers, of the onset and the duration of which the patient is unable to give any account. An individual may in the middle of any kind of occupation—speaking, eating, reading, and so forth—suddenly stop what he is doing; for an instant he stares vacantly before him, remains as he is, standing or sitting, and immediately after the "attack" resumes his occupation as if nothing had happened; the unfinished sentence is after a short pause completed, the spoon which was ready to bring the food to the mouth, after a short stop reaches its goal. If an "*absence*" occurs to the patient on the street when he is out walking, he keeps on mechanically, loses his way perhaps, and only finds it again when consciousness returns. The instances in which such periods take in a much longer time, during which the patients undertake voyages, spend money, transact business of which they are not conscious later, or do things which are against their intention and entail disagreeable consequences, must also be looked upon as coming under the head of epilepsy. They are undoubtedly rare, and up to this time have been carefully observed only by French physicians, more especially by Charcot ("*automatisme ambulatoire*"). Insignificant as *petit mal* may seem, it often has a very deleterious effect upon the general condition of the patient, especially upon the mind; we should be cautious, therefore, with our prognosis.

There are still other seizures in which typical convulsions do not occur, but in which the patient suddenly begins to walk first forward, then backward, to run around in a circle ("*mouvements de manège*"), or spin round and round; or he may rush out of his house and run for long distances without knowing why or whither. This form, which has been de-

scribed by Bourneville, Ladame, Weinstock (Inaugur.-Dissert., Berlin, 1889), and others, is called "running epilepsy," *epilepsia procursiva*. It often appears in childhood, and later gives place to the usual classical attacks. Its frequent combination with moral insanity is interesting. Anatomical changes have not been found in the cases which came to autopsy up to the present (cf. Büttner, Allg. Zeitschr. f. Psychiatrie, 1891, xlvii, Heft 5).

Again, instead of the convulsive attacks, we may have from time to time transient psychical disturbances, which consist of states of excitement or depression; in such instances we speak of "epileptic equivalents" (Samt). We must leave to the psychiatrists the task of investigating their cause and their significance. From a medico-legal point of view these puzzling conditions possess great interest.

About the frequency of the paroxysms no definite statement is possible. There are people who during their whole life have not more than one, two, three, six, or ten attacks, and again there are others in whom they recur once a week or still more frequently. Sometimes there are certain periods in which they increase in frequency, and others of months or years during which only an occasional attack occurs. In rare instances, in periods of the former kind, the fits may succeed each other so closely that there may be one or even many every day. Before the patient has had time to regain his full consciousness another attack looms up. This is what we call the status epilepticus, *état de mal*. The temperature may rise steadily for from three to eight days as much as 5° to 7° F., so that it may reach 104° or 106° F. If, then, in the intervals consciousness does not become fully restored, but the patient remains dull and bewildered, there is very great danger that death may occur during the status epilepticus, and the friends should be made acquainted with the seriousness of the situation. Only in exceptional cases does recovery take place and the temperature fall to normal again (Witkowski, Ueber epileptisches Fieber u. s. w., Berliner klin. Wochenschr., 1886, xxxiii, 43, 44).

Course.—The course of the disease, the general condition of the patient in the intervals between the attacks, the influence of the attacks upon the mind and body—all these may present great variations.

The course is very chronic and the disease lasts in most

cases years and tens of years. Frequently the patient is subject to the affection during his whole life. The earlier the first attacks make their appearance the less chance is there of their complete disappearance. In some cases of "late epilepsy," "*épilepsie tardive*," in which the affection does not begin until late in life, it may happen that the attacks completely cease as unexpectedly as they came on. Still, a course so favorable as this is rare and can never be predicted with certainty. Mendel has pointed out that this late form runs in general a milder course, and that the mind is less likely to become affected in these cases. If the disease has set in in early childhood, the influence of the period of puberty is generally very marked. The attacks become more frequent, and in women the increase in number is observed every month at the time of the menses until the time of the menopause. Pregnancy has little influence on the attacks, according to my own experience; sometimes it appeared as if shortly after conception the number of fits was considerably lessened, while in other women there seemed to be no change.

The general condition in the intervals between the attacks is by no means the same in all cases. In some, fortunately not rare cases, the paroxysms do not cause any bad effects for years and nothing morbid can be discovered. The mental faculties develop normally or, if already developed, remain good. The disposition is cheerful, social intercourse is enjoyed, as there is nothing in the bodily condition to interfere with such pleasures. The presence of epilepsy does not necessarily prevent the full development of a genius, as is proved by the universally quoted historical examples of Cæsar, Alexander the Great, Rousseau, Napoleon I, and others.

In other instances the general condition in the intervals leaves much to be desired, and as a rule it is the psychical part of the man which suffers most unpleasantly. Either the disposition of the patient is changed for the worse, so that he is easily excited, irascible, suspicious, peevish, unsociable, and disagreeable to those around him, or the mental faculties suffer, he becomes dull, slow in grasping ideas, indifferent, anxious, abstracted, and so unreliable in his work that he is no longer able to fulfill his duties as a man of business and as a good citizen.

In such cases we are sometimes able to note bodily defects, as, for example, abnormalities in the formation of the skull, in

the form of the auricle, in the condition and arrangement of the teeth, and quite frequently flat-foot (Féré et Demantká, *Journal de l'Anat. et de la Physiol.*, 1891, 5). Such "signs of degeneration," however, are often absent.

The final issue of the disease is almost always the same. The patient remains an epileptic all his life, from time to time having attacks, and finally dies from some intercurrent malady. The mental faculties may remain throughout, on the whole, good and the capacity of the patient for following his calling be retained. In other instances the mind becomes gradually impaired, so as to necessitate the transference of the patient to an institution, or again, in very exceptional cases, there may be complete recovery or, at any rate, so marked a decrease in the frequency of the attacks that the patient may well regard himself as cured. This cure may come about spontaneously or may be caused by some unexpected psychological emotion, particularly a fright. However, we should beware of being too precipitate in calling a patient "well," because now and then even after intermissions of years an attack may again make its appearance.

Death rarely ever occurs during an attack, but indirectly the paroxysms may cause a fatal issue. The patient during a fit may receive serious injuries; he may fall upon his face and be suffocated, or fall into the water and be drowned. The average life of epileptics is considerably shorter than that of other persons.

Pathogenesis.—The pathogenesis of the epileptic attack is totally obscure; although we know from the experiments of Kussmaul and Tenner that the source of the attacks must be sought for in the brain, the exact seat of the disease is not known. Since the work of Schröder van der Kolk special attention has been given to the medulla oblongata, and the discovery by Nothnagel of a "spasm centre" in the pons seemed to afford much support to the "bulbar theory," but of late years this has fallen more and more into discredit, and it is now the brain cortex which is regarded as the starting point of the convulsions (Hitzig, Albertoni, Franck et Pitres, P. Rosenbach). For a long time the motor area was thought to be the only region concerned, but recently Unverricht, who, with his convincing experiments on animals, has proved himself the most successful defender of the cortical theory (after extirpation of an area in

the cortex he found that he could not obtain spasms in the muscle groups corresponding to it) has shown that excitation of the posterior cortical regions is also capable of producing an attack, hence that these too possess epileptogenic properties, and that irritation of the same may by extension of the stimulus to the motor area give rise to general convulsions (*Deutsch. Archiv f. klin. Med.*, 1888, 44, 1).

Binswanger agrees that in the lateral portions of the floor of the fourth ventricle there are points the stimulation of which gives rise to spasms, which, however, he considers to be of a reflex nature, and assumes the reflex centres to be situated in the dorsal half of the pons. According to his opinion, these represent, as it were, a collecting station for the centres of the spinal cord, and can not, in the physiological sense, be termed "spasm centres." He maintains that we never can succeed by electrical or mechanical stimulation of the pons in producing real epileptic attacks (*Arch. f. Psych. u. Nervenkh.*, 1888, xix, 3).

However probable an association of the cortex with the appearance of symptoms of motor irritation may seem, such an association is far from explaining the increased salivary secretion, the involuntary evacuation of the bladder, the increase in the frequency of the respirations, etc., and we must for the present leave the question open whether or not such phenomena depend upon some influence acting on certain centres in the brain and spinal cord, the situation and function of which we do not as yet know. The question raised by Ziehen as to the significance of the subcortical ganglia in the causation of an epileptic attack deserves to be looked into more closely; for the present only this seems certain, viz., that (in dogs) the clonic part of the convulsive movements produced by stimulation of the cortex is connected with the cortex itself, while the tonic and the running movements seem to be of subcortical origin (XIII. *Wanderversammlung süddeutscher Neurologen. Archiv f. Psych.*, 1889, xx, 3, p. 584). The possibility can not be excluded that in man, as in animals, both regions, the cortex as well as the bulb, may be responsible for the attack.

In the second place we are entirely ignorant of the cause of the attack; it is unlikely that a palpable anatomical alteration exists, and the claim of Chaslin (*Note sur l'anatomie pathologique de l'épilepsie, dite essentielle, Journal des Connaiss. méd.*,

1889, 5 s. x, 12), that a gliosis, which he designates a "sclérose névroglie," is to be regarded as the cause of epilepsy, is by no means proved. Much more plausible is the theory that the amount of blood in the brain is of importance in this connection, but the different writers have never been able to agree whether an increase or a diminution in the amount of blood is the cause. Many clinical observations speak in favor of anæmia: thus Leyden has seen epileptic attacks in cases of aortic stenosis undoubtedly as the result of a temporarily insufficient blood supply; Sommer noted their occurrence in a case of ankylosis of the atlas which had produced narrowing of the vertebral canal in its upper portion (Virchow's Arch., 1890, cxix, Heft 2, p. 362). Results pointing in the same direction have been obtained by Sutnikow in his experimental studies on hyperæmia and anæmia of the brain and its relation to epilepsy (Pflüger's Arch., 1892, xc, p. 609). On the other hand, Bechterew, whose opinion is based on experiments of Todorsky, holds that during the attack there occurs an increased blood-flow to the brain and a dilatation of the capillaries, and that this condition is the cause of the attack. We see, therefore, that the question is by no means decided; we should also think of the possibility that vaso-motor changes, or a rapidly or gradually developing auto-intoxication, perhaps by ptomaines (Benedikt) may produce the attack. Since epileptic attacks are also sure to occur after acute infectious diseases (influenza, typhoid fever), also after vaccination (Althaus), an infectious origin can not be excluded. But whatever may eventually be shown to be the cause, a hereditary abnormal excitability of the psychomotor centres has to be regarded as a *conditio sine qua non*.

A peculiar kind of epilepsy, which is said only to occur in heart disease, has been described by Lemoine (De l'épilepsie d'origine cardiaque, Revue de méd., vii, May 5, 1877); yet since the connection is not absolutely proved, and since, moreover, the attacks themselves presented no peculiarities of their own, we shall limit ourselves to saying that they disappeared under the administration of digitalis.

Von Jaksch (Zeitschr. f. klin. Med., 1885, x, 4) has shown that epileptic attacks may be produced by auto-intoxication, not only by urea, but in a similar way also by acetone. In cases of "epilepsia acetonica" large amounts of acetone were found in the urine, which besides contained neither sugar nor albumen. The physiological connection between the occur-

rence of acetone in large quantities in the urine and epileptiform attacks is not as yet fully established, nor do we know how poisons—for instance, lead—introduced into the organism from outside are able to produce such attacks; as a matter of fact, however, lead workers suffer so frequently from epilepsy that we are justified in assuming the existence of a definite "epilepsia saturnina" (Hirt, Krankheiten der Arbeiter, iii, 49).

Briefly, epileptic attacks may occur as a symptom also in meningitis, dementia paralytica, during delirium tremens, in sclerotic processes, more especially in sclerosis of the cornu Ammonis. They may be associated with tumors, hydrocephalus, or abscess of the brain, in which cases they are the result of the increased intracranial pressure, as we have pointed out above. From what has been said in this and in previous chapters it will be understood that these and the so-called epileptiform attacks above mentioned have in all probability nothing to do with the genuine classical epilepsy.

Diagnosis.—We can well understand, then, how cautious we must be in our diagnosis. Only after repeated and careful examinations, after which we are able to exclude organic brain diseases, abnormalities in metabolism, in consequence of which abnormal or poisonous substances occur in the urine (urea, sugar, acetone), are we justified in making the diagnosis of genuine epilepsy. The skin and tendon reflexes should always be carefully examined. Sometimes, from the absence of the abdominal or cremasteric reflex, or from a unilateral increase of the patellar reflex, we may be able to diagnosticate an organic brain trouble when we otherwise, without any inquiry into the condition of the reflexes, might have regarded the case as one of genuine epilepsy.

Quite frequently we meet with malingerers who, for some reason or other, feign epilepsy. The situations in which the simulation of this disease would be likely to be advantageous to the deceiver are quite numerous, and it would be impossible to enter into the consideration of them here; we will only mention that epileptics are exempted from military service, good grounds enough for many to sham this disease. The more cunning the malingerer the more perfect will be the attack, not excluding the foaming at the mouth (made by soap) and the (not very deep) wounds of the tongue; there will be con-

vulsions, and the (feigned) loss of consciousness is possibly prolonged more than is necessary; if the rogue has courage enough he will not betray himself either by a reflex motion of defense, or even by the slightest twitching, if hot sealing wax is, as a test, dropped on his chest. Under certain circumstances it may be extremely difficult to unmask the fraud; it might, indeed, be impossible, did we not know one reflex over which the will has no power, namely, the pupillary reaction to light, which in the epileptic is lost, in the malingerer naturally is retained. In doubtful cases, therefore, this reflex has to be carefully observed, and the further measures should depend upon its condition.

Treatment.—The treatment of epilepsy confirms the old experience that the greater the number of remedies which become known and are recommended for a disease, the more difficult and uncertain becomes the cure. In the course of centuries such an array of medicaments have been recommended to combat this disease that there is hardly a drug in the shops which has not at one time or another been regarded and praised as an infallible "specific." Unfortunately, all these claims have been proved to be false. We are to-day as little in a position to cure epilepsy as we were one or five centuries ago. Only by the discovery of some causes which may produce epilepsy, the removal of which lies in our power, has any progress been made in the treatment of the disease. This more particularly applies to the above-mentioned reflex epilepsies, and the Jacksonian variety, which, it is true, is not a genuine epilepsy. Here a cure is possible—nay, we may say even certain—if we are able to remove the cause. To discover it must be the physician's aim. Sometimes it consists of a bone splinter which has been left after an injury to irritate the cortex, in which case a cure will invariably be effected by the operation of trephining for the removal of the splinter. The principles which should guide us in such an operation, the foremost of which is to make as large an opening as possible, have been formulated, among others, by V. Horsley at the French Congress for Surgery (Wien Med. Presse, 1891, 16). In other instances painful cicatrices have to be excised or affections of the intestinal tract or the sexual apparatus treated. In children the natural openings of the body have to be examined for the possible presence of a foreign substance, the removal of which would then be absolutely necessary.

Such are the favorable cases in which it is in the power of the physician to bring about a cure. Unfortunately, their number is not great. In the largest majority of instances we are not able to find any cause, the removal of which would remove also the disease; but to-day, as centuries ago, we are reduced to the sad necessity of trying all sorts of remedies, trusting to good luck that at some time we may hit upon one which is truly efficacious. Before relying upon the action of any drug, or together with the administration of the remedy chosen, strict attention should be paid to the condition of the stomach; indigestion should be prevented, or if it exists should at once be treated, if necessary by emptying the stomach with the tube (Alt, Münch. med. Wochenschr., 1894, 14). The fact that I have observed the occurrence of attacks to be more frequent when much food was given which was rich in nitrogen, has prompted me to limit the use of nitrogenous articles of food and to advise total abstinence from meat at least three days in the week. Some epileptics have improved their condition considerably by becoming vegetarians; whether they ever recover absolutely under that regimen I am unable as yet to decide. To counteract any intestinal sepsis Féré recommends naphthol and salicylate of bismuth.

Among the internal medicines the so-called specifics possess an interest purely historical; from artemisia (in hot beer, 10 to 20 grm. at a dose—grs. 150 to 300) and valeriana down to squilla, gratiola, sedum, cardamine, and hellebore, many herbs have been lauded as effectual. Asafoetida, castoreum, and camphor have been recommended, although no better results have been obtained from them than from silver nitrate, ammonio-sulphate of copper, and arsenic. A great sensation was created by Meglin's pills, which, in addition to zincum album contained hyoscyamus. Some have sworn by oxide of zinc, and Herpin, for instance, claimed that out of forty-two cases he cured twenty-eight with it. To unprejudiced judges who continued their observations for a sufficiently long time these "cures" could not hold their ground. They proved to be deceptive, and we were as helpless as before. Recourse was had also to narcotics, and much was hoped from the action first of opium and later of ether and chloroform. It is true that here and there an attack has been cut short by inhalations of the latter, but that is all. It is not to be wondered at that under such circumstances secret remedies were used to a tremendous extent;