has been improved sufficiently to make its assimilation likely. At first it ought to be given in one of the milder preparations, and if there is still restlessness to contend with, it may be advantageously combined with one of the bromides.

The following formula, which should be given after meals, three times a day, will meet the requirements of most cases: Ferri et ammoniae citratis, 7 gr.; liquor arsenicalis, 5 minims; potassium bromide, 10 gr.; liquor ammoniae acetatis, 1 drachm; chloroform water to 1 oz.

This should be replaced by a more potent form of iron as soon as possible. In the following combination, also to be taken after meals three times a day, the antiseptic influence and the steadying effect on the vaso-motor system of ichthyol is valuable, while the cannabis indica suitably replaces the bromide in the earlier mixture: Sulphate of iron, 2 gr.; ichthyol, 5 gr.; arsenious acid, $\frac{1}{10}$ gr.; extract of cannabis indica, $\frac{1}{4}$ gr. To be put into a capsule.

If iron in any form disagrees, as it does in some instances, it may be replaced by oxide of manganese in 5 to 10 gr. doses. Though this drug is not in general use, there is no doubt of its value.

When headaches occur with such severity as to demand special treatment the tonic remedies should be temporarily intermitted, and 5 gr. of antifebrin, or 10 of phenacetin, combined with 3 gr. of caffein given in their place.

Spinal tenderness is sometimes a prominent and rebellious symptom; it is most speedily relieved by the light application of a Paquelin cautery down the length of the spine.

When the illness is complicated by the existence of a loose kidney, the kidney ought to be supported by a suitable crutch or by a pad applied underneath a firm abdominal belt. As an accompaniment of a floating kidney there is frequently a certain amount of atonic dilatation of the stomach. When this condition exists it must be dealt with as an initial step in procedure by a short course of lavage.

By washing the stomach out every morning for a few days with a warm solution of bicarbonate of soda—1 drachm to the pint—the mucous lining is cleansed and its normal secretion stimulated to healthy activity. If lavage is resorted to the diet must be limited for the time being, and adjusted to meet the indications which present themselves.

Change of air and surroundings is always desirable for a few weeks, either at the seaside or in the country, before a return to the ordinary duties of life is sanctioned.

In the matter of prophylaxis much can be done to lessen the risk of a recurrent attack by a careful regulation of habits. The patient should continue to arrange his work so as to avoid undue fatigue; he must have long nights in bed, practise regularity in regard to meals and exercise, and make a point of having, at frequent intervals, a short but complete respite from the routine of his daily life. He should avoid responsibilities involving prolonged concentration of work or undue anxiety, and he will be wise if he cultivates a hobby, more especially if it be one the exercise of which compels a certain amount of time to be passed in the open air. Every slight ailment demands prompt and active treatment, so that the risk of incurring nervous exhaustion may be reduced to a minimum.

Children born of neuropathic parents should be safeguarded from the risks of their heredity by strengthening the energy and resistive powers of their nervous centres. To this end the child should be brought up amidst healthful surroundings, and the education arranged with a view to the substitution of an acquired stable, individual habit of body for an inborn unstable ancestral tendency, due care being taken that the school work is so well balanced and so accurately adjusted to the mental capacity of the child that all danger of overpressure is avoided.

PROPOSED CHAIRS OF SOCIAL MEDICINE.—The Medical Chamber of Upper Bavaria has decided to urge upon the proper authorities the need for the provision of adequate teaching on social legislation, workmen's compensation for accidents, the framing of reports, etc. The opinion is expressed that chairs of such subjects should be established in the Bavarian Universities, and that the University of Munich should lead the way in the reform.

NEURASTHENIA, DEGENERACY, AND MOBILE ORGANS.

By P. C. SMITH, L.R.C.P. AND S. EDIN., L.F.P.S.G.

TUNBRIDGE WELLS.

FLOATING kidney, as is now generally recognized, occurs usually in the neurotic. Other conditions that resemble it in being characterized by laxity of attachments, and in being found in nervous subjects, are gastric, hepatic, and general enteroptosis (in men and nulliparae at all events); mobile heart (a condition in which the situation of the apex beat varies considerably with the patient's posture), uterine displacements (in nulliparae), spinal curvature, genu valgum, and flat-foot; varicocele is to some extent a parallel condition. What is the connexion between the neurotism and the laxity of attachments?

The unit of degeneracy is the family. A degenerate family is one in which there is imperfect heredity, showing itself by a loss that tends to be progressive of racial characteristics,¹ anatomical, physiological, and psychical. The losses in the anatomical sphere are manifested as malformations, usually of a minor order, affecting mostly the head, face, and hands. Of the physiological defects, the commonest are disorders of metabolism and vaso-motor instability; the most important is diminution of sexual or generative power, which leads to the extinction of the family. The psychical abnormalities are impulsiveness, irritability, instability, suggestibility, and a tendency to obsessions, tics, and phobias. Degeneracy is the soil on which are developed the neuroses (as a rule), some of the psychoses, and some organic diseases of the nervous system, and it even predisposes to some maladies of other systems and to general diseases.

The term "neurasthenia" is applied to two conditions, as I have already pointed out in the *BRITISH MEDICAL JOURNAL*.² One of these (neurasthenia major) is a complaint of adult life, characterized principally by pain or discomfort in the head or spine, by debility, insomnia, constipation, and mental depression. The other (neurasthenia minor) may be described briefly as a state of chronic fatigue; in the article referred to, an endeavour was made to show that it is congenital—it is, in fact, the condition which has been described as being "born tired"—and its symptoms were traced from infancy to adolescence. It was further maintained that the major complaint in the great majority of instances occurs in those already suffering from the minor affection, of which, indeed, it is little more than an exacerbation.

It remains now to point out that the particular neurosis that accompanies floating kidney and the other conditions referred to is neurasthenia minor, and to try to show that the latter is a syndrome of degeneracy. The very frequent occurrence of slight congenital malformations in a state which is itself congenital is almost enough to prove the point. But, in addition to this, neurasthenics usually exhibit some of the functional stigmata of degeneracy, vaso-motor instability and disorders of metabolism being almost, if not quite, invariably present. Again, the feebleness of nervous action and the slowness of repair after fatigue that are the essential features of neurasthenia minor, have obviously the appearance of losses of racial characteristics such as constitute degeneracy. Finally, in Dr. Ch. Féré's experiments on eggs, he found that the same injurious influences that produced malformations in the chicks, if applied to the eggs at an early stage of the incubation, caused simply congenital debility if applied at a later period. It is possible that normal persons may be subjected to such prolonged fatigue, anxiety, intoxications, or disordered metabolism as to bring on neurasthenic symptoms that remain after the withdrawal of the exciting cause; but for the most part those who are subjected to such a degree of these influences are already touched with the disorder.

The neuroses, other than neurasthenia, are usually developed on a soil of degeneracy; neurasthenia minor is degeneracy, or rather is a group of symptoms common to most forms thereof; neurasthenia major may be regarded as developed on a soil of degeneracy, like the other neuroses, but is really little more than an exacerbation of neurasthenia minor.

The immediate cause of floating kidney and enteroptosis is commonly held to be lessening of the intra-

abdominal pressure from want of tone in the muscles of the abdominal wall. It seems evident that this is, at any rate, one—and a very important—cause, and that it also brings about uterine displacements in nulliparae. It is highly probable, too, that scoliosis, flat foot, and genu valgum are in many cases due to hypotony of various muscles. With regard to mobility of the heart, Dr. C. Addison has pointed out to me that it may be produced in either or both of two ways. If the liver be prolapsed the diaphragm and heart will follow it, the latter organ descending into a wider part of the thorax, where it has more room for movement; secondly, want of tone in the elevator muscles of the thorax will cause the first ribs and the cervical fascia to sink, so that the attachment of the pericardium to the cervical fascia will be brought nearer to its diaphragmatic attachment, and thus the normally taut organ will become lax, and allow greater play of movement to the heart. Varicocele is chiefly due in all likelihood to a malformation of the spermatic veins themselves; but it is probably caused in part by laxity of the spermatic cord and scrotum, due to want of tone in the cremaster and the unstriped muscular fibres of the dartos respectively.

Thus muscular hypotony is a cause of all the conditions under consideration, and this muscular hypotony is a common symptom of degeneracy, being especially frequent in neurasthenia minor. But with the want of tone is probably associated another cause, otherwise it is difficult to understand why enteroptosis is not always general. Cazalis and Hanot³ hold that arthritics are predisposed to their complaint by a congenital tendency to the proliferation of connective tissue, and in view of the frequent association between the arthritic diathesis and neurasthenia, it is probable that this condition, like most congenital abnormalities, is one of the mal-developments of degeneracy. It is obvious that such proliferation, if present, will help to produce mobility of viscera and laxity of joints; and its presence in some regions only will explain how a universal hypotony may produce only a limited enteroptosis. The connexion, then, between laxity of attachments and neurotism is that both are symptoms of degeneracy.

If the view here adopted as to the etiology of neurasthenia be correct, then the current belief that the increase of the complaint is due to increased over-pressure can hold good only of the exacerbation of the minor disorder into the major, and even there it is far from the whole truth.

The recognition of neurasthenia minor as a form of degeneracy necessitates the addition to my former article of degenerative symptoms which were then known to be of common occurrence in neurasthenia minor, but were thought to belong to a concomitant disorder; to these may be added one or two that were omitted through inadvertence. All the symptoms detailed in that article and in this are symptoms of degeneracy, but they constitute a distinct and very common group that deserves a name to itself. This syndrome is usually present in cases of insanity, hysteria, and other complaints when they have developed on a basis of degeneracy. The additional symptoms are anatomical, physiological, and psychological.

Anatomical.—These are usually slight. The most frequent are flattening of the hind head; a markedly lateral position of the whorl of hair commonly called the "crown" of the head; epicanthus; slight malformations of the ears, especially of the margin of the helix; narrow jaws, irregular teeth, and a highly-vaulted palate; funnel, or gutter-shaped depression of the sternum; increased deviation of the forearm from the line of the upper arm; lateral deviations of the phalanges; perhaps marked deviation of the septum of the nose; hyperplasia of lymphoid tissue (enlarged tonsils and post-nasal adenoids); hernia. The "tuberculous" and "scrofulous" types of conformation are probably among these anatomical stigmata; the former seems to depend on hypoplasia of bones, muscles, and connective tissue with vasomotor instability; in the latter there is hyperplasia of skin, connective tissue, and bones, and the muscles, though large enough, are wanting in tone.

Physiological.—The body readily assumes a position of general flexion, and in especial there is shown what Dr. Warner calls "the weak hand."⁴ The child reacts strongly to vaccination and teething; marked disturbance

on these occasions should be regarded as a warning. He frequently suffers from catarrh of the respiratory and alimentary tracts; attacks of diarrhoea and abdominal pain are common. It is in these subjects that mucous and membranous colitis occur. Among the infantile complaints to which the child is predisposed are not only zymotic diseases, but also rickets and infantile scurvy. These last are not purely food disorders; improper food is no doubt the exciting cause, but very slight deviations from an ideal artificial diet may bring them on in a degenerate infant, while healthy babies tolerate gross improprieties of feeding with impunity. Dr. Cheadle points out that in rickets "reflex excitability is exaggerated, and probably the cerebral control of the imperfectly developed higher centres is also defective." Cough frequently assumes a paroxysmal character, suggesting whooping-cough. Want of muscular tone may lead to spinal curvature, genu valgum, or flat foot. Vasomotor instability and defective metabolism should have been described not merely as common, but, if their slighter degrees be included, as almost invariable. Among vasomotor symptoms are rapid pulse, propensity to blush, coldness of the extremities, giddiness, frequency of micturition, polyuria. Owing to the want of sensory acuteness and the imperfect co-ordination, it often happens that sensations are not followed by prompt and appropriate action, but find vent in diffused and useless movements, the "extra movements" of Dr. Warner.⁶ Other occasional symptoms are frequent hiccup, vomiting from excitement or without obvious cause, incontinence of urine, night terrors, stammering, tics, and more complex bad habits (eating soil, etc., during the first childhood, biting the nails, or masturbation later).

Psychical.—The boy or girl is impulsive, restless, excitable, sensitive, and usually incapable of sustained effort. A few, however, are unduly laborious. A good many make occasional spurts of excessive exertion; this over-exertion increases the chronic fatigue, and should be prevented. There is a certain degree of the *folie du doute*. Over-conscientiousness in trifles is not rare. There is a tendency to emotionalism which should be checked; religion should not be allowed to become too emotional. There are sometimes morbid fears. The memory is often remarkably good at first, but as the stress of life increases, as it does even in childhood, the power of attention and the force of sense-impressions diminish, and the memory lessens with them. As to intellect, there is often a sufficiency of intellectual acuteness, but nearly always a want of intellectual vigour. These subjects are often unable to form habits of conduct, at least to a natural and desirable extent.

As neurasthenia minor is a form of degeneracy, the heredity claimed for it in the former article does not, strictly speaking, exist. Indeed, in most cases transmuted or dissimilar "heredity" is not heredity at all. It is difficult to see, for example, that a son can inherit epilepsy from a father with hysteria any more than he can inherit black hair from a father with brown. It may be held that what is inherited is an unstable nervous system; but this does not explain the frequent presence in both parent and child of anatomical malformations that differ in the two individuals. The probable explanation is that advanced by Dr. Féré: that in degenerate families there is not heredity, but a dissolution of heredity, so that parent and offspring alike inherit the qualities of the race imperfectly.

I may perhaps take the opportunity of calling attention to an anatomical stigma of degeneracy that I have not seen described, though it is very common. It is the rotation of the last phalanx, or less often of the last two phalanges, of one or more fingers round their long axes, so that the dorsal surface is turned slightly towards or away from the neighbouring fingers. In my cases the index and ring fingers have most often been turned towards the middle line of the hand, and the little finger away from it; but the contrary direction, in any or all of these fingers, is not rare. Rotation of the middle finger is less frequent than that of the others; it may occur in either direction. Since writing the above I have found that, though rotation of the fingers is not described in *La Famille Névropathique*, it is shown in some of the illustrations to that work; moreover, Fig. 34 shows rotation of the first phalanx of the middle finger, and Fig. 36 appears to show rotation of a toe. I have also

heard from Dr. Féré that he wrote a paper on the subject some time ago, and that it will appear shortly.

REFERENCES.

¹ Ch. Féré, *La Famille Névropathique*, 2nd ed., pp. 236, 253. ² 1903, vol. i, p. 781. ³ Féré, op. cit., p. 221. ⁴ *The Study of Children*, pp. 84 and 109, and fig. 17. ⁵ *Alburt's System of Medicine*, vol. ii, p. 110. ⁶ Op. cit., pp. 10, 206. See also *Mental Faculty*, p. 114.

THE PATHOLOGY OF EPILEPSY.*

[WITH SPECIAL PLATE.]

By JOHN TURNER, M.B.,

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It is not my intention to attempt an account of all the pathological features that have been observed in the brains of epileptics. I shall confine my remarks to a brief consideration of some which seem to me to have a very intimate connexion with the causation of the fits.

The view which I shall endeavour to support from my microscopical examinations and the results of experiments (by others) is that epilepsy is a disease occurring in persons with a defectively-developed nervous system associated with a morbid condition of the blood, whereby it shows a special tendency to intravascular clotting, and that the immediate cause of the fits is sudden stasis of the blood stream resulting from the blocking of cerebral vessels by these intravascular clots.

I take it that the fits are merely one of the symptoms of epilepsy, and may even be entirely wanting throughout the whole course of a case. Following the classification adopted by J. Van der Kolk¹ and others, I would divide the symptoms of epilepsy into two groups:

1. Those which represent the sequelae of chronic diseased conditions in the brain. These are permanent and form the epileptic character. (Attacks of intense disturbance of consciousness and complete or partial amnesia, with restitution of integrity between attacks, religiosity, aimless wanderings, etc.)
2. Those which occur only temporarily, and represent the reaction of the diseased brain to stimuli (the fits, *grand* or *petit mal*).

Probably the mechanism of all fits of a similar character, whether we term them epileptic or epileptiform, is the same. Dr. Hughlings Jackson draws a very sharp distinction between some fits which are clinically like epileptic and true epileptic fits. The former he looks upon as "middle-level" the latter as "highest-level" fits. Whether epilepsy is a disease of those parts of the nervous system which fall into his highest-level region or not, I would suggest that the convulsive fits at all events, regarded merely as one of the symptoms of the disease, are due to a disarrangement of middle-level elements in the so-called motor region.

NERVE-CELL LESIONS.

So long ago as 1864 Dr. Hughlings Jackson² advanced the hypothesis that the pathology of epilepsy was vascular, and suggested that the fits were caused by the plugging of small cerebral vessels. My observations bear out this view, but they also seem to show that the vascular changes alone are not sufficient to account fully for all the clinical phenomena. It seems necessary to assume that a morbid condition of the nervous cells is also present, and the study of the central nervous system in epileptics shows that changes in the nerve cells are generally to be found; and, although doubtless some of these are merely the results of the disease, others are probably antecedent to it, and among these latter I would direct attention to two very common features, both of which appertain to stigmata of degeneration; these are:

- (1) A variety of nerve cell, which, as Lugaro and others have pointed out, represents an embryonic form, and which I³ have shown to be common in imbeciles.
- (2) The persistence in the brain of subcortical nerve cells, a character first noted by Roncoroni.

As regards the first of these changes, it is shown most clearly in the Betz cells of the ascending frontal convolution, although the smaller pyramidal cells may also be, and frequently are, affected. This change was met with in 27 out of 35 cases examined (77 per cent.). In some of

these cases all, or a great majority, of the Betz cells were affected, in others only a few. The change resembles an early stage of *réaction à distance*, and may, indeed, owe to some extent its character to a cause which has been found sufficient to produce the axonal reaction in the cells of the spinal cord. I refer to a diminution in the normal stimuli, for more than half of the spinal cord of epileptics which I have examined (7 out of 13) show either defective development or degeneration of the posterior columns, especially the columns of Goll. Briefly stated, the changes seen are as follows:

The Nissl bodies in the central parts of the affected cells are in the form of fine granules, whilst those at the periphery and in the protoplasmic processes still retain their normal form. The cell is somewhat swollen, and its nucleus, instead of being centrally situated, is at the side or quite up in the apex. In many cases, to all intents and purposes, the nucleus appears otherwise quite natural (Fig. 1).

Amongst the earliest to point out and emphasize the importance of defectively-developed nerve cells in the cortex of epileptics was Bevan Lewis⁴—that great pioneer in the pathological anatomy of insanity. He describes an inflated spheroidal form of nerve cell with few branches, which he looks upon as "the expression of a reversion to a more primitive type," for similar cells are normal in the pig, and he remarks that "it is in the structural peculiarity of the cell that we must learn to recognize the origin of the convulsion."

This form has been met with by many more recent observers, and does not require any further corroboration at my hands. I have singled out for more minute description another form of cell change, indicating also a primitive or defectively developed type of cell. Probably, also, Lewis has recognized this change as common in epileptics, but his method of staining does not permit him to see the finer details of the change affecting the chromatoplasm. Although it is not peculiar to epileptics, occurring as I have already mentioned in imbeciles not subject to fits, it is probably an important adjunct in the causation of the fits, for it is conceivable that stimuli which would fail to produce convulsive phenomena in persons whose nerve cells were well developed and stable, might be able to do so in those with defectively developed and probably unstable nerve cells. And, further, these affected cells may play an important part in determining the character of the fits in individual cases.

It is a recognized fact that very often a great uniformity obtains between the character of the different fits in an epileptic, one being, as it were, a replica of another, and it may be asked how a block which is liable to occur in a vessel in any part of the brain can be the stimulus which will produce such a uniform discharge. In most cases it is only some of the cells in epileptics' brains which show appearances of defective development, and I would suggest that the pattern, so to speak, of the fits of each epileptic is predetermined by the position and number of these affected cells, so that when the stimulus is present in any part of the brain which is connected by conduction paths with the areas in which these defective cells lie the resulting discharge will be of a similar character. This form of cell change seems to have no special relationship to defect of intellect, for, although most of my epileptic cases were idiots or imbeciles, a few were of quite average intellect, and in them the change was present; and, further, a large acquaintance of its occurrence in the brains of the sane and non-epileptic insane shows that it may occur in a very marked degree in cases much above the average of intelligence found in those from whom this asylum population is recruited.

With reference to the persistence of subcortical nerve cells, they exist in fairly large numbers in the lower animals throughout life, but, although found in infants, they soon, with the growth of the child, become less, and at adult age few remain. With imbeciles, whether epileptic or not, they tend to persist, so that at all ages they are met with in large numbers. All the epileptics' brains which I have examined show, some in a more marked degree than others, this characteristic.

There is still another change in the nerve cells frequently met with which, as it has not attracted much attention, and as it appears to me to have a very important bearing on the theory I am advocating, I shall

* A paper read at the Pathological Meeting of the Neurological Society, December 7th, 1905.