

amenorrhoea. Menstruation is now rather too frequent. There has been a gain in weight of 14 lb. in four months. No tubercle bacilli have been found in the last six examinations.

CHART 5.—Woman, aged 20. Two years' history of illness; infiltration throughout right lung, and in apex of left lung. The temperature in this case was the same as, or higher than, in the first 12 days of the chart. The chart shows the effect of the oral administration of Burroughs, Wellcome, and Co.'s tuberculin W. The temperature continued to be satisfactory.

CHART 6.—Man, aged 26. First seen after a month's history. Acute caseous tuberculosis in upper lobes on both sides. Tubercle bacilli present. Absolute rest for a week produced little effect. The administration of tuberculin by the mouth was followed rapidly by a cessation of fever, and it is possible here to see the effect of each dose given. In a month's time the temperature became normal. The patient was subsequently sent to a sanatorium, and is now at work.

CHART 7.—Man, aged 32. Taken suddenly ill with high fever and rigors. Four days subsequently he was admitted to St. George's Hospital. He was emaciated, semi-comatose, and had occasional rigors. Absolute rest was tried for a week without effect. As the clinical symptoms suggested a diagnosis of acute tuberculosis, the opsonic index for this infection was taken on the seventh day. When the temperature was normal the index was 1.75 and when the temperature was 104° F. the index was 0.73. 1/20000 mg. of tuberculin was administered by the mouth in the early morning of the eighth day. The temperature fell and did not rise again for 36 hours. A further dose of tuberculin of the same size was given and a similar effect produced. It was argued that tuberculin had a definite effect, but that as the effect of the dose wore off quickly it would be advisable to give the dose at shorter intervals—viz., 24 instead of 48 hours. This was done and the temperature fell to normal. The doses of tuberculin were gradually increased and given at longer intervals. The patient recovered and gained 2 st. in the hospital. He was reported to be well and at work two years after treatment.

CHART 8.—Man, aged 19. Six months' history of tuberculous pleurisy. This chart shows the result of oral administration in a susceptible case. Tuberculin was continued in this case with good results.

CHART 9.—Woman, aged 22. Eighteen months' history. Infiltration throughout right lung, and to a slight extent in apex of left lung. Tubercle bacilli present. Under observation without improvement at Northwood Sanatorium for six months. The chart shows the apparent effect of the oral administration of a minute dose of B.E. Subsequently an artificial pneumothorax was induced, and the patient at the present time is having nitrogen injections and tuberculin.

CHART 10.—Man, aged 35. Two and a half years' history. Infiltration apex of right upper and lower lobes and in the left upper apex. Tubercle bacilli present. This chart shows (a) a dose of 1/30 mg. T.R. by hypodermic injection, after a dose of 1/10 mg. T.R. has been reached by oral administration, produces no reaction; (b) a dose of 1/4 mg. T.R. by injection, after a dose of 2 mg. T.R. by the mouth had been given without reaction, caused a severe but temporary general reaction with marked malaise.

CHART 11.—Man, aged 35. Nine months' history. Infiltration throughout left lung and in right upper lobe. Tubercle bacilli present. This chart shows that there was no reaction when a dose (1/10 mg. T.R.) was given for the first time by the hypodermic method after a dose of 1/5 mg. had been reached by the oral method.

PROGRESSIVE LENTICULAR DEGENERATION:

A FAMILIAL NERVOUS DISEASE ASSOCIATED WITH CIRRHOSIS OF THE LIVER.¹

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THE purpose of this brief communication is to direct attention to what is practically a new nervous disease, to which, for reasons which will hereinafter become evident, the name of "progressive lenticular degeneration" may be suitably applied. The disease is familial, in the sense that it frequently attacks more than one member of a family, but it is neither congenital nor hereditary. It occurs always in young people, either in an acute, subacute, or chronic form. As far as my present knowledge goes, it is invariably progressive and fatal, its duration ranging from four or six months in the acute cases to as long as three, four, or five years in the chronic. The clinical symptoms form a complex which, once the physician is familiar with it, can be readily recognised, and is of great interest and importance, constituting, as it does, what may be considered a syndrome of the corpus striatum—a syndrome which has not hitherto been differentiated in this way. The symptoms are: 1. Bilateral involuntary movements of the extremities, upper and lower, and sometimes also of the head and trunk; these movements are practically always of the nature of a rhythmical tremor, occasionally irregular, which increases with volitional

movement. 2. Pronounced spasticity, or rather hypertonicity, of the limbs and face and musculature generally, the face being usually set in a spastic smile, while the limbs are in contracture—attitudes resembling those of hemiplegia, with this important distinction, that by an effort of the will the patient can undo these attitudes, so to speak, and can extend and flex his limbs at all joints. 3. In the later stages of the disease true contracture sets in, and this forms a constant feature of the affection. 4. Dysphagia and dysarthria, the latter eventually degenerating into complete anarthria. The dysphagia and anarthria are, in the first instance, due to rigidity of the corresponding musculatures. 5. A degree of emotionalism is often present, the patient responding abnormally to slight stimuli, when his spastic smile may pass into a *rire spasmodique*. As a result of the extraordinary degree of stiffness of the muscles there is often difficulty in maintaining equilibrium, but it is of fundamental importance to note that (6) there is little or no true paresis or paralysis, inasmuch as the patient is able to perform all ordinary movements at all joints, though it may be slowly and rather feebly. In spite of the great degree of motor helplessness to which he is reduced, the result mainly of the hypertonicity and involuntary movements, the abdominal reflexes are conserved, and in a pure case a double flexor response is obtained from the sole of the foot. In other words, where this affection occurs in an uncomplicated form, it constitutes an extra-pyramidal motor disease, the importance of which is apparent not only because of its rarity, but also by reason of the light it sheds on such diseases as paralysis agitans. 7. In some cases certain mental symptoms of a transitory nature manifest themselves and will be referred to subsequently.

The pathology of the disease is as striking as the clinical syndrome. The lesion is a bilateral symmetrical softening of the lenticular nucleus, involving more particularly the putamen; the globus pallidus is implicated to a less extent. Sometimes the external capsule is partly included in the area of disease, whereas the caudate nucleus is scarcely touched directly, and the optic thalamus escapes. Most important of all, in a pure case, the internal capsule is absolutely intact. If the diseased areas are examined minutely it will be seen that a change commences apparently round the lenticulo-striate vessels, as a result of which the lenticular nucleus begins to shrink and atrophy, the laminae medullares and internuncial fibres become less and less recognisable, while the nerve-cells disappear and neuroglial overgrowth takes their place; but it, in its turn, begins to break down, so that in advanced cases a cavity formation is the result. There is no sign of syphilitic disease of the blood-vessels, all of which are patent; in fact, gross vascular disease is conspicuous by its absence. The lesion has nothing to do with thrombosis in the distribution of a particular artery or arterial branches; on the contrary, the curiously selective action of the morbid agent will be readily appreciated when it is remembered that the lenticular nucleus is supplied from three distinct sources. Yet in this disease one collection of grey matter is singled out, while others in its immediate neighbourhood are untouched. Compared with this bilateral symmetrical degeneration of the lenticular nucleus the other changes found in the central nervous system are slight and relatively unimportant.

What must be considered, however, the most curious and the most remarkable feature of this familial disease is the occurrence of advanced cirrhosis of the liver. This hepatic cirrhosis does not reveal itself by any symptoms during life, but it is constantly found post mortem. It is mixed in type. Syphilis and alcohol as causative factors in its production can be definitely excluded, as far as it is ever possible to exclude anything.

This association in young people of cirrhosis of the liver with bilateral symmetrical softening of the lenticular nucleus constitutes the disease from the pathological standpoint; clinically the symptoms are exclusively nervous.

Progressive lenticular degeneration, as I propose to call it, is to all intents and purposes a disease unknown to the profession. As far as I can discover no case has been recorded since 1890, with the very doubtful exception of one reported by Anton, of Halle, some three years ago, under the title of "Dementia Choreo-asthenica, with Juvenile Nodular Cirrhosis of the Liver." In all probability this is a case of congenital cerebral syphilis. The total number of cases of this disease that have been published amount to six only. Of these, two

¹ The material, of which the present communication is a brief abstract, formed part of a thesis for the degree of M.D. of the University of Edinburgh, for which a gold medal was awarded, July, 1911. A complete investigation of the subject, with a discussion of its problems, is in the press and will be published shortly, fully illustrated, in *Brain*.

(brother and sister) were reported by Sir William Gowers in 1888 under the name of "Tetanoid Chorea, associated with Cirrhosis of the Liver"; one was reported by Ormerod in 1890; three (two brothers and a sister) were reported by Homén, of Helsingfors, also in 1890. Ormerod called his paper "Case of Cirrhosis of the Liver in a Boy, with Obscure and Fatal Nervous Symptoms." Homén described the condition as "a Peculiar Disease occurring in Three Members of a Family in the form of a Progressive Dementia, probably lues hereditaria tarda." All these six cases were fatal. In Gowers's cases (acute) no very definite lesion of the central nervous system was found. In Ormerod's case there was bilateral symmetrical softening in the putamen. In Homén's three cases identical lesions were found. All six cases had marked cirrhosis of the liver. Since 1890 there has been no further light thrown on the mystery of the disease, nor has there been any adequate pathological investigation, so that the subject has remained a *terra incognita*.

During the last six years I have had the opportunity of observing personally four cases of this disease, in three of which I have made a post-mortem examination. The first of these cases came under observation in 1905, and the patient died on July 28th, 1908. At the necropsy the diagnosis which I had made during the patient's lifetime was confirmed; bilateral degeneration of the lenticular nucleus was found, coupled with cirrhosis of the liver. The latter had given rise to no symptoms during life. The second case came under my notice in 1906, the patient dying on March 3rd, 1907. In this case cirrhosis of the liver and a slighter degree of lenticular change were discovered. The third case, that of a patient who was the brother of Case 2, came under my observation in 1907. He died on Sept. 20th, 1910, and in his case identical pathological findings were obtained. The fourth case is that of a patient who came under my notice in October, 1911, and at the time of writing is still living. In addition, the records of two hitherto unpublished cases have been obtained from other sources, so that I am in a position to add no fewer than six cases to those recorded 22 years ago, and as a result of the application of modern methods of investigation, both clinical and pathological, it may be hoped that increase in our knowledge will direct further attention to the elucidation of a disease which from its remarkable nature opens up a wide field for clinical and pathological research.

In this communication I do not propose to do more than sketch the more important clinical and pathological features of the disease, based on a study of my own cases and of the old ones, 12 in all. For a complete description of the disease and discussion of its problems the reader is referred to an article which is in the press and will appear very shortly in the next number of *Brain*.

1. DEFINITION.

Progressive lenticular degeneration may be defined as a disease which occurs apparently only in young people, which is often familial, but not congenital or hereditary; it is essentially and chiefly a disease of the extra-pyramidal motor system, and is characterised by involuntary movements, usually of the nature of tremor, dysarthria or anarthria, dysphagia, muscular weakness, spasticity or hypertonicity, and contractures, with progressive emaciation; with these may be associated emotionalism and certain symptoms of a mental nature. It is progressive and, after a longer or shorter period, fatal. Pathologically it is characterised predominantly by bilateral degeneration of the lenticular nucleus, and in addition cirrhosis of the liver is constantly found, the latter morbid condition not giving rise to symptoms during the lifetime of the patient.

2. ETIOLOGY.

Of the 12 cases, the age of the youngest patient at the onset of the disease was 10 years; of the oldest, 26. The average age at onset, calculated from the series of 12 cases, is 15. Seven were males and five females. In four of the latter, menstruation, after the commencement of the disease, became irregular or ceased—an interesting fact, the significance of which is at present obscure. Similar and dissimilar heredity can be excluded in the case of progressive lenticular degeneration. Eight of the 12 cases were familial cases. In my own series of cases there is neither subjective record nor objective evidence of syphilis as an etiological factor, and this is true also of the other reported cases. Homén made a most exhaustive examination of the members of his K— family, but was unable to obtain any definite

or unequivocal data in favour of the syphilitic hypothesis. It is true that with the Wassermann reaction to aid us opportunity should be taken to apply it in any future instances of the disease. Personally I was not in a position to take advantage of it in the only two of my cases which I had the chance to examine after the test was demonstrated to be of value. There is no evidence that alcohol has anything to do with the disease. Exciting causes are conspicuous by their absence. It is noted with almost complete unanimity that the disease comes on in an insidious manner.

3. SYMPTOMATOLOGY.

Two clinical types may be distinguished—one acute or subacute and the other chronic. Symptomatically there is little difference between the two; the former is associated with some, it may be considerable, febrile disturbance. Three of the 12 cases belong to this group; their duration was 4 months, 6 months, and 13 months respectively. In all three, more particularly in the first, a high irregular temperature was present for a more or less lengthy period; emaciation was unusually rapid; the symptoms were severe almost from the beginning; and the whole appearance of the patient suggested he was seriously ill, as with a fever or any toxic-infective condition.

The shortest of the more chronic cases lasted two and a half years; the longest case is one of Homén's, which went on for seven years. The average duration of the first three of my cases is three and a half years. The average of eight chronic cases is almost exactly four years.

(a) *Involuntary movements, tremor.*—Involuntary movements, in particular tremor, form one of the outstanding features of the affection. It is one of the earliest symptoms and one of the most marked. The tremor is a true tremor—i.e., it consists of a regular, rhythmical, alternating contraction of a given muscular group and its antagonists. The rate is increased as a rule by excitement or if attention is drawn to it, or by voluntary effort. In most cases the tremor is more marked peripherally than proximally. The range of the tremor is at first fine, but with volitional movement the excursions become wider, and as the disease progresses, according to the experience of all observers, it becomes worse in every way. In the later stages of the affection it is incessant. In one or two of the acute cases "tonic and clonic spasms" were noted, rather than tremor. In one of these both arms presented slowly changing tonic spasm, greater in the left. Sometimes the movements were quicker, and they were always increased by an attempt at volitional movement. In the legs there were similar involuntary spasmodic movements, and in the trunk. There were occasionally paroxysmal exacerbations of such spasms of a few minutes' duration. I have never seen any movements that could be described as athetotic, or athetoid, in this disease.

(b) *Muscular spasticity or hypertonicity.*—All of the 12 cases have been characterised by the presence of muscular spasticity or hypertonicity, which has often reached an extreme degree. It is steadily progressive, and results in the patient being reduced to a state of utter helplessness, unable to use his hands, unable to turn in bed, unable to recover his balance if that is disturbed. As a rule the rigidity is more noticeable at the larger joints. The muscles always feel firm on palpation, even when they are relaxed as far as possible. In the advanced cases there is an extraordinary degree of immobility; the face is fixed, expressionless, or smiling stiffly (Fig. 1). As one of my patients was sitting on the edge of his bed he slowly fell backwards in a helpless fashion, with his legs in the air, unable to relax his hypertonic muscles or to use them to recover his balance. The solitary muscles of the body that do not appear to be implicated in this condition are the extrinsic ocular muscles.

(c) *Contractures.*—It is but a step from rigidity to contracture. Contractures are as constant a feature of progressive lenticular degeneration as the involuntary movements, and they become extreme. It may be impossible to straighten the limbs out. Two stages in the process may be noted. The first is the fixation of a limb in a particular position from hypertonicity of the musculature. The patient looks as though he were suffering from a double hemiplegia (Fig. 2), but the condition is one of contracture-attitudes only, for both actively and passively the limbs can be completely extended at this stage. But, secondly, as the result in part of the prolonged maintenance of fixed attitudes, myogenic contracture sets in,

FIG. 1.



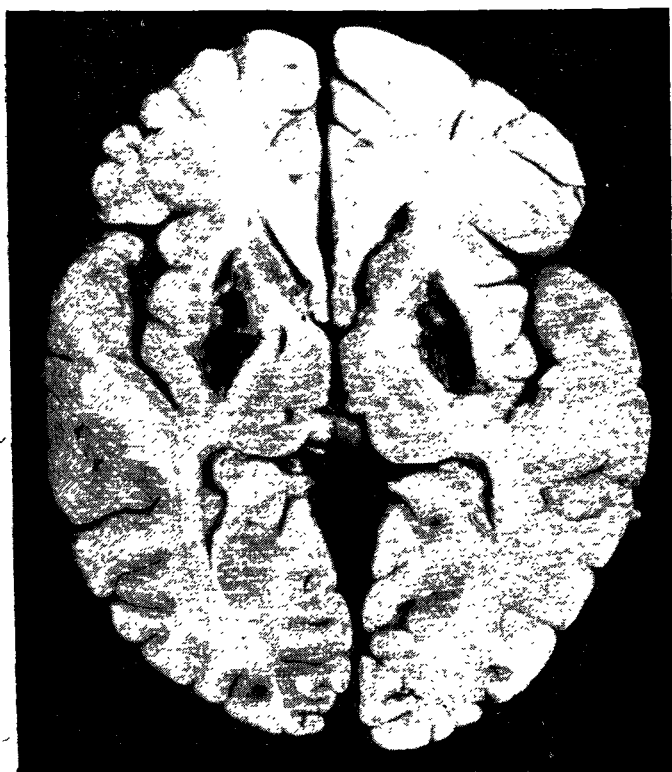
General appearance of a patient suffering from progressive lenticular degeneration. Note the fixed spastic smile; the patient is falling stiffly to the right.

FIG. 2.



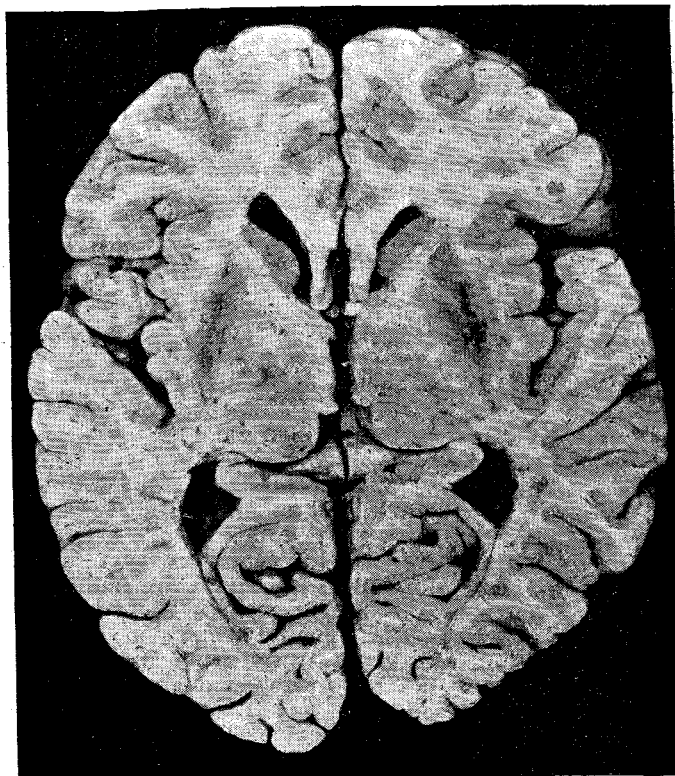
Brother of the patient represented in Fig. 1. The case is more advanced. Note the open mouth, fixed smile, sia'or-rhoea, contractures. (Exposure 1/250th sec., to counteract effect of never-ceasing tremor of the limbs.)

FIG 3



Horizontal section of the hemispheres in a case of progressive lenticular degeneration, showing bilateral symmetrical cavitation of the lenticular nucleus, with conservation of the optic thalami and of the caudate nuclei.

FIG. 4.



Horizontal section of the hemispheres in an earlier case, showing atrophy and commencing disintegration of the lenticular nucleus on each side. The caudate nuclei and the optic thalami are intact, and the internal capsules are entirely unaffected.

and this cannot be overcome. It is apparent that "tonic and clonic spasms," spasticity and hypertonicity, and contractures, are pathological conditions intimately allied to each other.

(d) *Dysarthria; dysphagia*.—Dysarthria has been present in every one of the series of 12 cases, and in all it has advanced until it has resulted in more or less complete anarthria, the patient being unable to articulate intelligibly a single word or syllable. Occasionally involuntary sounds or noises or moans escape from the patient. Dysphagia accompanies the anarthria. It is important to note that notwithstanding the anarthria the palate moves on the attempt to phonate, and the tongue is not paralysed. In a pure case these symptoms are, in my opinion, due to spasticity of the muscles necessary for the movements.

(e) *Muscular weakness and emaciation*.—While progressive emaciation has marked the course of the disease both in the acute and the chronic cases there is no record of local muscular atrophy. The wasting affects the musculature generally, and is associated, in part at least, with the contractures and the immobility of the limbs. At the same time, it may also in part be attributable to profound disturbance of metabolism, especially in the acute cases, where, although the duration was shorter, the degree of wasting was, if anything, more severe.

In spite of the tremors, rigidity, and contractures, in the majority of the cases a considerable degree of voluntary power remains. In each of my own four cases the patients were still able to walk at a time when their appearance suggested complete spastic paralysis. Muscular weakness, however, is undoubtedly to be observed. Volitional movements are usually resisted with comparative ease. But one ought not to use the term "paralysis" to express it. "Paralysis," where motion is concerned, ought to be confined to diseases of the pyramidal system. Except where contractures or rigidity forbid it, the patient is able to move his limbs. Although the lower facial musculature looks immobile, sometimes the patient can overcome the hypertonicity sufficiently, and he will then move his lips. He is not, therefore, "paralysed." It is unfortunate there is no special term to indicate this specific motor helplessness consequent on disease of the extra-pyramidal motor system.

(f) *Sensory system*.—Compared with the motor the sensory symptoms are minimal. Very occasionally there are pains in the body and limbs. Objectively no change in sensibility can be discovered. All of my four cases were carefully examined from the sensory standpoint, with a negative result. There are no sensory symptoms in pure lenticular disease.

(g) *Reflexes*.—In an uncomplicated case of progressive lenticular degeneration the tendon reflexes are active but not exaggerated. It not infrequently happens that owing to the contractures they are elicited with difficulty. The cutaneous reflexes are normal; in a pure case a double flexor plantar response is always obtained, and the abdominal reflexes are not abolished. These facts are of primary importance from the standpoint of pathological physiology. Towards the end the organic reflexes are impaired; in fact, most of the patients have become "wet and dirty." This is not to be taken as indicating local sphincter defect such as one meets with in disease of the lower part of the cord (the spinal cords were throughout normal).

(h) *Mental symptoms*.—It is a noteworthy fact that some form of mental change is specifically referred to in at least 8 of the 12 cases; its importance, therefore, must not be underestimated. On the other hand, it is highly variable both in degree and in kind. I do not think it forms an integral part of the clinical picture. The term "dementia" is not really appropriate. There is a certain narrowing of the mental horizon, but within its limits the powers of perception and recognition are unimpaired. There are no delusions or hallucinations. There is neither agnosia nor apraxia. The mental condition does not deteriorate or degenerate *pari passu* with the physical condition of the patient. There is often a degree of docility, facility, almost childishness. The patient, especially as the disease is advancing, often becomes easily tickled, pleased, amused. Increase of emotional reaction is not infrequently observed. It may, however, be remarked again that some cases do not show any definite mental impairment at all, while others present mental symptoms that are unique as far as each individual case is concerned.

(i) *Symptoms referable to other systems*.—The only system to which reference need be made is the alimentary. Eleven out

of the 12 cases showed no signs whatever of disease of the liver during life—i.e., while the lenticular symptoms were present, although in all severe cirrhosis was subsequently discovered. In two cases there was a history of an attack of jaundice some years before the onset of the symptoms of progressive lenticular degeneration, and though these cases are in a minority, the fact is nevertheless of some importance.

(k) *Negative symptoms*.—In progressive lenticular degeneration the optic discs are normal; the pupillary reactions are normal; there is no nystagmus; the palate moves on phonation, and reflexly; there are no cerebellar symptoms; there is no impairment of sensibility; the reflexes are not those of pyramidal disease.

4. PATHOLOGY.

In ten cases a necropsy was held. In three of these no definite findings were obtained in the central nervous system, but they were examined more than 20 years ago, and there is no record of a microscopical investigation of the basal ganglia having been made.

In the seven cases with positive findings the appearances are so similar that they afford striking proof of the selective action of some specific morbid agent. They consist of bilateral symmetrical degeneration of the putamen, and of the globus pallidus to a less extent. (Figs. 3 and 4.) Various degrees of this degeneration are found, from discolouration and sponginess of the nucleus, through shrinkage and atrophy to complete disintegration and excavation of the ganglion. The caudate is sometimes rather shrunken, but is never disintegrated; the optic thalamus is practically always normal, except in so far as loss of strio-thalamic fibres may affect its lateral part; the internal capsule in a pure case is intact from end to end. Sometimes the external capsule is degenerated, mainly in its middle or posterior third; the claustrum is usually normal, and the convolutions of the island of Reil are also normal, though sometimes the latter show a certain slight loss of substance. Apart from the lenticular degeneration, the changes in the brain are insignificant. There is no evidence of meningitis. The cerebral cortex offers little definite alteration; the Betz cells are well up to normal numbers and stain well. There is no sign in the modern cases of any small cell infiltration.

The microscopical changes in the lenticular nucleus consist of neuroglial overgrowth, which afterwards disintegrates and breaks down; there is often an immense increase in glial nuclei; the nerve cells and nerve fibres of the normal nucleus disappear. Even where the cavity formation is advanced there are no signs of obliterative endarteritis in the blood-vessels; on the contrary, they are sometimes thinned and sometimes fragile and hyaline-looking. The intima is never thickened. Round the lenticulo-striate vessels small but gaping spaces make their appearance, possibly from shrinkage of the nervous tissues; hence the nucleus presents a finely worm-eaten appearance; this is a stage previous to cavitation.

The pons, medulla, and cord are uniformly negative from the pathological point of view. In the modern cases, certain degenerations consecutive to the main lenticular disease can be traced. These are, in advanced cases, degeneration of the ansa lenticularis, relative atrophy of the corpus Luysii, partial degeneration of the lenticular bundle of Forel, and of the strio-Luysian and strio-thalamic fibres.

Two other organs are commonly affected in this disease—viz., the liver and the spleen. The liver is always cirrhotic, and I do not think that this can be regarded as other than an integral and primary feature of the disease. In several cases the spleen has been enlarged, but without other change. The exact significance of this is at present obscure.

The cirrhosis of the liver is always advanced, and is strikingly apparent. (Figs. 5, 6, and 7.) The organ is usually rather smaller than normal, but not constantly so. It is firm, hard, tends to preserve its shape, and presents the appearance of rounded nodules of liver tissue clustered together, of the size of hazel nuts or smaller, separated by depressed cirrhotic bands. The organ is never bile-stained, but is often rather lighter in colour than normal. Microscopically normal areas, necrosed areas, fattily degenerated areas, and actively regenerating areas are found to be scattered irregularly through the organ. The type of cirrhosis is mixed—i.e., it is mostly multilobular, in some places monolobular, and occasionally there are indications of intralobular cirrhosis. So-called hypertrophying bile-ducts are often seen in the new connective

tissue formation, which in some places is cellular, in others fibrous. In certain of my own cases the pituitary and suprarrenal were apparently normal; the thyroid showed certain proliferative and regressive changes.

5. NATURE AND PATHOGENESIS OF THE DISEASE.

Progressive lenticular degeneration is, I believe, the first definitely established morbid entity whose most striking characteristic is a specific association between disease of one of the viscera and disease of a particular part of the grey matter of the central nervous system—viz., the lenticular nucleus. It is so different, apparently, from most familiar

FIG. 5.



Upper surface of the liver in a case of progressive lenticular degeneration. During life no symptoms of hepatic disease were present.

morbid types as to constitute a class by itself, and there is no other affection with which to compare it. But certain symptoms of the disease furnish a clue to its nature, and there are certain analogies to be drawn from other diseases which may aid in its elucidation. Certain conclusions may be here indicated:—

1. It seems clear that the disease is not due to a congenital or abiotrophic defect; the presumption is strong that the disease is acquired.
2. There is evidence to show that the disease is toxic in origin, but none to suggest that this toxin is syphilitic.
3. It is possible this toxin may be elaborated in the liver.
4. The toxin has a specific action on the lenticular nucleus.
5. The nature of the toxin is speculative. It is almost certainly not microbial.

FIG. 6.



Transverse section of the cirrhotic liver represented in Fig. 5.

The important question of the pathological physiology of the more noteworthy clinical symptoms cannot be entered on satisfactorily in this brief communication. In the article to appear very shortly in *Brain* it will be shown that there is evidence to associate the tremor with defect of function of the lenticulo-rubro-spinal system, while the hypertonicity and contracture-attitudes may be coupled with defect of centripetal impulses on the sensory and motor cortex, arriving *via* the strio-thalamic fibres and the external part of the

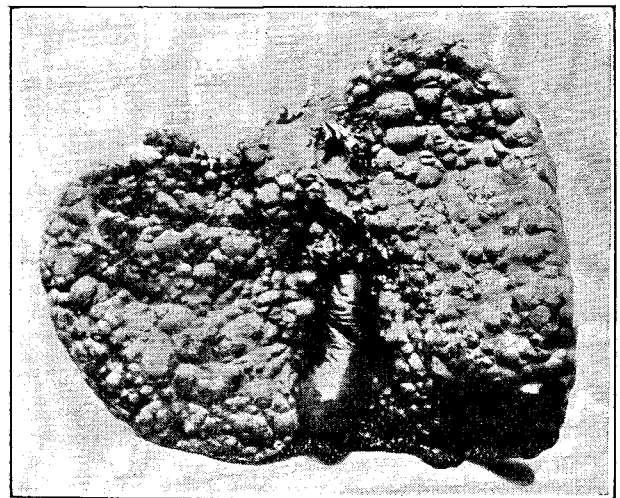
thalamus. In the same article the analogies between this disease and paralysis agitans will be found discussed, and the light which the former disease throws on the problem of the latter will be fully described.

In the disease which I propose to designate progressive lenticular degeneration three desiderata, on which the establishment of a syndrome of the corpus striatum would seem to depend, are fulfilled. The lesions are sufficiently large, in the first place; of sufficiently long duration, in the second; and thirdly, they are confined to the ganglion itself. One of my own cases offers a perfect opportunity of differentiating lenticular from cortico-spinal symptoms. With integrity of the internal capsule and pyramidal paths generally there is bilateral degeneration of the lenticular nucleus, which reveals itself by a train of clinical symptoms amply corroborated by the results of the investigation of a number of other cases, so that a *revue d'ensemble* provides a striking confirmation of the general statement.

The syndrome of the corpus striatum, therefore, here put forward for the first time from a study of this interesting disease, may be expressed as follows:—

In pure uncomplicated bilateral lesions of the lenticular nucleus, and more generally of the corpus striatum, provided they are of sufficient size and of adequate duration, the clinical symptoms are bilateral involuntary movements, practically always of the tremor variety; weakness, spasticity, or hypertonicity (sometimes spasmodic contractions), and eventually contracture of the skeletal musculature; dysarthria or anarthria and dysphagia, and a degree of emotionalism, but without any sensory disturbances; without any true paralysis, and without any alteration in the cutaneous reflexes. If the abdominal reflexes are absent (apart from muscular rigidity) or the plantars of extensor type, then the syndrome is no longer pure.

FIG. 7.



Under surface of the liver from another case of progressive lenticular degeneration. During life no symptoms of hepatic disease were present.

I am under deep obligation to Sir William Gowers, Sir David Ferrier, Dr. J. A. Ormerod, and Dr. H. H. Tooth, of the National Hospital, for permission to utilise their notes on certain cases which were at one time or another under their care in the National Hospital, and for generous assistance in other respects; and I wish also to express my great indebtedness to Dr. W. H. B. Stoddart, of Bethlem Royal Hospital, and Dr. G. W. Smith, of Virginia Water Sanatorium, for assistance in various ways, as well as to others whose help will be specifically referred to elsewhere.

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Wimpole-street, W.

PLYMOUTH PORT SANITARY AUTHORITY.—At the last meeting of the Plymouth port sanitary authority Mr. William Edward Manderson Corbett, L.R.C.P., L.R.O.S. Irel., was elected chairman for the ensuing year.