different in kind, and not merely in degree, from our conception of a material aggregate, it is clear that in tracing back life to primitive forms we are getting no nearer to what is called abiogenesis. The result of investigation in this direction can only be to extend further the domain of biology and widen biological ideas. Our aim must be, in short, not to reduce organic to inorganic phenomena, but to bring inorganic phenomena into the domain of biology.

I am well aware that it will be strongly maintained that the change of front which I have urged as necessary involves the giving up of all real attempt at scientific explanation in biology. As already explained, this is a philosophical question, and I shall not attempt to deal further with it here. What immediately concerns us as biologists is whether the change of front will further or hinder biological advance, particularly in physiology. Now the first requisite of a working hypothesis is that it should work, and I have tried to point out that as a matter of fact the physico-chemical theory of life has not worked in the past and can never work. As soon as we pass beyond the most superficial details of physiological activity it becomes unsatisfactory; and it breaks down completely when applied to fundamental physiological problems, such as that of reproduction. Those who aim at physico-chemical explanations of life are simply running their heads at a stone wall, and can only expect sore heads as a consequence. It seems to me that the proposed change of front is only the conscious adoption of a common-sense idea which is somewhat vaguely, perhaps, present in the minds of all men, and which has in reality guided biological advance in the past. This idea, as I have tried to show, is a working hypothesis which actually works, and affords clear guidance for future advance.

I would fain add a few words as to the relation of physiology to psychology and ethics, for this is a subject of deep human interest. We know that at any rate the higher organisms are conscious and intelligent. This fact brings physiology into touch with a new element in the behaviour of organisms. The subject is far too great a one for me to attempt to discuss here, but I should like to say that it appears to me very clear that just as biology is something more than physics and chemistry, so psychology is something more than physiology, with the added assumption that consciousness is tacked on to certain physiological processes, if such a crude conception has any definite meaning. We can, it is true, by a process of abstraction treat sensation from the purely physiological side, as in investigating the physiology of the sense organs; but this is physiology and nothing else, for we are leaving out of account the distinctive elements of consciousness. At our present stage of knowledge life is not intelligence, and men or animals as intelligent individuals involve a deeper aspect of reality than biology deals with. Our fundamental physiological working hypothesis cannot be successfully applied to the phenomena of intelligence, and the sooner and more definitely this is realized the better for physiology.

In conclusion, let me endeavour to state shortly the main contention which I have endeavoured to place before you. It is that in physiology, and biology generally, we are dealing with phenomena which, so far as our present knowledge goes, not only differ in complexity but differ in kind from physical and chemical phenomena; and that the fundamental working hypothesis of physiology must differ correspondingly from those of physics and chemistry.

That a meeting-point between biology and physical science may at some time be found, there is no reason for doubting. But we may confidently predict that if that meeting point is found, and one of the two sciences is swallowed up, that one will not be biology.

REFERENCE.

1 *Treatise concerning the Principles of Human Knowledge*, 1710.

THE Department of State Medicine and Public Health of Western Australia has commenced the publication of a monthly bulletin. It is intended for the information of local health authorities and others interested in public health work, and to keep them in touch with what is going on at head quarters, and in Western Australia as a whole. The body immediately responsible for its publication is the Central Board of Health; it meets weekly, and consists of five members. Its president is Dr. T. D. Lovegrove.

A Clinical Lecture

ON

CHOREA.

DELIVERED AT THE LONDON SCHOOL OF CLINICAL
MEDICINE.

By GUTHRIE RANKIN, M.D., F.R.C.P.,

PHYSICIAN TO THE DREADNOUGHT AND ROYAL WATERLOO HOSPITALS.

CHOREA was first described by Sydenham in 1686. It is a prevalent affection among children, especially girls. It also occurs occasionally in adults, and in them is almost invariably met with in women during pregnancy. Irregular muscular movements, closely resembling but totally distinct from true chorea, sometimes result from emotional causes, and the popular name of St. Vitus's dance is properly applied to this hysterical and often epidemic disorder, which generally occurs under the influence of religious excitement, and which in the Middle Ages was cured by a pilgrimage to the shrine of St. Vitus at Zabern. This form of dancing mania was for long confused, and regarded as identical, with Sydenham's chorea; and one reason for this confusion existed in the belief—which is still entertained by some observers—that imitation may act as an existing factor of Sydenham's disease even among children. And the possibility of a mimetic variety of chorea must not be too lightly set aside, as the following experience will show. Many years ago, when driving one summer afternoon through a small outlying village in Scotland, my progress was arrested in the main street by a crowd of children surrounding a girl of about 12 years of age, who was obviously the victim of an acute attack of chorea. The movements of the unfortunate child were extravagant, and were evidently a source of intense interest and merriment to her youthful onlookers, and of cruel imitation by some of the more precocious of them. Within a week or ten days the local doctor had no fewer than fourteen cases of chorea on his attendance list. It may be presumed that probably the worst cases only came under his observation, and that many others of a milder type also resulted from the street exhibition of which I had been an accidental observer. Hysteria could hardly be accepted as an explanation applicable to a number of children in a country village, and such epidemicity seemed more readily to be explained by a theory of mimicry than by any other. The village doctor himself had no doubt on the matter, especially as, in his previous experience, chorea was not an ailment which figured largely in his daily work.

In true chorea the muscular movements are involuntary, purposeless, and liable to intensification under the influence of mental perturbation or emotional excitement. They cease during sleep. The demands made by education upon the nervous reserve of quickly-growing children, particularly such as are of an anxious temperament and ambitious of attaining a high degree of excellence in their school-work, are responsible, in no small measure, for the onset of the disease. The peculiar and intimate association which exists between chorea, cardiac disease, and rheumatic affections is well recognized, but the nature of the relationship has not, so far, been ascertained. Morley Fletcher concludes, from a careful examination of 580 cases, that "chorea is a manifestation of rheumatic fever, but that many other causes may co-operate in the production of the disease." Legay, of Paris, published statistics in 1897 which went to show that the disease occurs, for the most part, in children with a neurotic heredity who have recently suffered from an infectious disorder. In the majority of instances the infection was rheumatic, but he quoted many cases in which chorea was apparently directly due to the poison of measles, scarlet fever, varicella, influenza, and tuberculosis. Sturges has pointed out that it is a not uncommon sequela of whooping-cough. When rheumatism attacks children, it tends to exert its influence more on the heart and pericardium than on the joints, so that, if care be not taken to seek for evidences of endocarditis or pericarditis, the true association of chorea with the rheumatic poison may be overlooked. In most fatal cases one or more of the cardiac valves are found diseased, and the interdependence of chorea with rheumatism, in the

vast majority of cases, is now generally admitted. Either disorder may precede the other, or the two may be associated, and manifest themselves simultaneously. There seems little doubt that both depend upon the same, or closely allied, micro-organisms.

Chorea rarely occurs under 5 years of age; about 50 per cent. of all cases are met with between 5 and 10 years, and another 30 per cent. between 10 and 15 years. It attacks girls three times more frequently than boys, and after the second decade the percentage in females increases. It is most prevalent during the cold and damp months of the year. Certain families are specially predisposed, mostly those in which a rheumatic and neurotic inheritance are combined. By some writers reflex irritation, such as that produced by dentition, intestinal worms, errors of refraction, etc., is held responsible for choreic manifestations. Children who have suffered from one attack of the disease seem liable to recurrence.

As has already been stated, the proximate cause is probably a micro-organism similar to that of rheumatism, the toxins of which are responsible for the nervous manifestations with which we are familiar. But even if this hypothesis be ultimately confirmed, it must be admitted that the direct excitant of an attack is, in many instances, some form of emotional disturbance. In children fright is the most acute of all emotional states, but it is conceivable that excessive joy or sorrow may act in a similar detrimental way on those who are suitably predisposed. It is not impossible that the emotional excitant may be responsible for two varieties of the disease, according as the child harbours the rheumatic micro-organism or not; that, in one instance—and that the most frequent—it may be a rheumatic manifestation, and in another neurotic. Gowers states that 25 per cent. of all cases are induced by fright, and that, in his experience, the interval between the fright and the development of muscular movements rarely exceeds a week.

The onset of an attack of chorea is usually gradual, and may be preceded by premonitory evidences of failing health, such as lassitude, irritability, emotional excitability, broken sleep, and impaired appetite. By-and-by, the child is observed to exhibit clumsiness in movement and to have a difficulty in sitting still long. Erratic contractions of individual muscles, or of groups of muscles, then ensue: these are at first one-sided, and may show themselves in the face or arm, or less frequently in one leg, but the opposite side of the body soon participates in the jerky movements. The face may be twisted into all sorts of grotesque grimaces, and one or more limbs become subject to violent spasmodic and inco-ordinate movements. Sir Thomas Watson thus graphically described this condition as it may affect the lower extremities:

When the patient intends to stand or sit still, her feet scrape or shuffle on the floor, or one of them is suddenly everted and then twisted inwards, or perhaps is thrown across the other: and if she endeavours to walk, her progress is indirect and uncertain. She halts and drags her leg rather than lifts it up, and advances with a rushing or jumping motion by fits and starts.

Weir Mitchell has pointed out that sometimes a purposive movement of the affected limbs has the effect of partially inhibiting the choreiform movements, so that severe jerkings may be present during repose and yet become controlled on the performance of some voluntary muscular act. The characteristic movements are, as a rule, most marked in the small muscles of the hands and face; they are irregular, intermittent, and though described as "purposeless," are really exaggerated reproductions of voluntary movements, which would be "purposive" if they were sufficiently under the control of the will. Bouillard has aptly described the disorderly character of the muscular contractions as a *folie musculaire*. According to Sturges, "the parts selected by chorea are not those which depend upon a common motor centre, but those which habitually combine in purposeful and emotional movements," and it has been shown by Hughlings Jackson that when the muscles of the face or trunk are involved, they are always affected bilaterally; whereas when the spasms are confined to the limbs, the disease is often unilateral in its distribution, and is then known as "hemichorea." In severe cases, however, the whole muscular system may participate to such an extent that, except when asleep, the patient is never at

rest. The limbs are unceasingly twisted about as if they wished to part company with the trunk. The head is twitched from side to side; the features are never still, and present a succession of the most contradictory expressions which, were they not the outcome of serious disease, would be ludicrous from their incongruity. The tongue is rolled about in the mouth, thrust out spasmodically every now and again, and suddenly retracted, the jaws closing like a rat-trap with a snap, which is occasionally violent enough to break one or more of the teeth. The shoulders execute shrugging movements, and the pelvic muscles may contract so as to jump the patient off her seat. The eyes are seldom still, and their irregular movements often give rise to diplopia; the pupils are usually dilated, and are not infrequently unequal. It has been recently pointed out by Langmead that the movements of the iris are extraordinarily wide and rapid; that the reaction of the pupils is often asynchronous, one pupil contracting, while the other remains dilated; that contraction of the pupils both to light and accommodation is badly sustained; that one pupil frequently remains persistently smaller than the other; and that the pupils are in some cases eccentric. Though the discs are generally normal, they occasionally present evidences of slight neuritis. Swallowing may be difficult from inco-ordination of the muscles of deglutition, and the movements of the arms and hands make it often impossible for the patient herself to convey food to her mouth. Articulation is more or less impaired, and may be so jerky and explosive as to render speech altogether unintelligible. All this *folie musculaire* ceases during sleep, or under the influence of an anaesthetic, but it is intensified by emotion or voluntary effort. Rigidities do not occur, but there is invariably some loss of muscular power, and this paresis may precede, or even replace, convulsive movements, because it is important to remember that the picture is not always one of disorderly muscular action, but may be rather one of paralysis, with nothing more than an occasional and limited muscular movement to afford an inkling to the direction which investigation ought to follow. When this happens in cases of hemichorea, the condition may readily enough be mistaken for a cerebral hemiplegia. Monoplegias may also be of choreic origin, the most frequent being of one arm; such a monoplegia, coming on gradually and without any initial convulsion, in a child of from 7 to 15 years of age, is, almost without exception, due to chorea. When choreic movements are incessant and long-continued, the patient's clothes become worn out by constant friction, and even the skin over the prominences may become abraded or ulcerated. After the disease is fully established, the facial expression of the patient often becomes vacant and fatuous, and the mental faculties are apt to be blunted, causing loss of memory, obtuseness, and hallucinations of sight and hearing. In extreme cases occurring in adults, this intellectual impairment may gravitate into actual mania and produce a rare variety of the disease which is frequently fatal, and which is known under the name of "chorea insaniens." There is a mental element attaching to all cases of chorea, and the waywardness of children who are the subjects of its milder manifestations must always be regarded as resulting from conditions of morbid change, and not from ordinary faults of temper demanding punitive correction.

The disease presents no marked sensory disturbances, but aching pains in the limbs and back, and a sensation of numbness, pins-and-needles, or even a mild form of anaesthesia, may be complained of. Headache is frequently present. The reflexes either remain normal or may be moderately increased; not infrequently there is a "sustained" knee-jerk, the leg being maintained in a position of extension for a second or two after the patellar tendon has been tapped. There is often considerable impairment of the general health, and, as was first pointed out by Trousseau, anaemia is a concomitant of many cases. The appetite is always capricious and the bowels are generally constipated. Except in the maniacal form of the disease, or under the influence of complications, there is no pyrexial disturbance.

The heart requires to be closely watched, because endocarditis and pericarditis are in evidence in the majority of cases. Osler relates that in 73 patients under his observation 62 suffered from one or other variety of valvular lesion and 19 from pericardial inflammation. Almost invariably

the action of the heart is abnormally rapid, but this rapidity is not necessarily accompanied by endocardial or exocardial murmurs. Two varieties of endocardial murmurs are met with—those which are haemic, and due to the anaemic state of the blood, and those which are organic, and result from vegetative deposits on the valves, together with subsequent fibroid changes. Any valve may become involved, but the majority of cardiac lesions associated with chorea are met with at the mitral orifice. A mitral systolic bruit indicative of regurgitation is the most common murmur, but the double murmur of stenosis and regurgitation is frequently met with, and the one murmur may develop some time subsequently to the other. Failure of compensation is attended by the usual sequence of symptoms dependent upon the development of back pressure.

The disease usually runs a chronic course and lasts, on an average, for from eight to twelve weeks, but remissions and exacerbations may prolong its continuance over three, four, or even six months. Relapses are met with in about one-third of all cases, and may declare themselves at any time between six months and two years after the primary attack. Weir Mitchell has noted that the tendency to recurrence is greatest in spring and autumn. Ultimate recovery is the rule in children, and though mental dullness may persist for a time after a severe attack, there is seldom any permanent intellectual impairment. As regards the cardiac lesions, these, when once established, remain as a permanent legacy from the illness; even a very mild attack of chorea being, at times, responsible for a lasting and serious derangement of the mitral valve.

The symptoms which have been related occur in all varieties of combination; one case is mostly convulsive in its manifestations, and in another the paretic element is the pronounced feature, but true chorea corresponds more or less closely to the picture which it has been attempted to portray. Other conditions in which convulsive muscular movements play a prominent part are sometimes confounded with it and are even described under its name; they depend upon a variety of causes, and should be described as choreiform rather than choreic. Among such choreiform ailments may be mentioned senile chorea, Huntingdon's hereditary chorea, post-hemiplegic chorea, hysterical chorea, Dubini's electrical chorea, etc.

The most frequent complications of the disease are those with which we are familiar as occurring in association with rheumatism. Acute rheumatism itself may either precede the choreic attack or come on during its progress; rheumatic nodules are common; hyperpyrexia, such as occurs in rheumatic fever, is occasionally met with; and hemiplegia may arise from cerebral embolism secondary to mitral disease. Erythema nodosum and peliosis rheumatica are the most common skin complications. A temporary form of imbecility is not very unusual in severe cases; the child loses her bright, happy expression of face, and becomes wayward, destructive, and often dirty in her habits. In adult cases there is always a risk of violent delirium, which is apt to run on to acute and fatal mania. Phthisis ensues upon chorea in a fair number of cases, and though the relationship is probably coincidental only, the one serves to prepare the way for the other in some such way as to bring them frequently into immediate sequence.

As regards pathology, no constant lesions are found in the nervous system which can be regarded as the anatomical basis of the disease, but various changes have been noted by different authorities. Dickinson has described a form of dilatation of the small arteries and veins throughout the substance of the brain and cord—more especially in the central ganglia—accompanied by exudations, small haemorrhages, and even minute foci of necrotic softening. Ross, Hughlings Jackson, and others have found minute fibrinous embolisms, presumably conveyed from the vegetations on the cardiac valves, in the brain and spinal cord with accompanying minute haemorrhages and small areas of softening. This would appear to confirm the embolic theory of causation originally propounded by Kirkes. Ord, while admitting the existence of hyperaemia and extravasation, endeavoured to explain the disorderly movements and their spontaneous cure by a hypothesis of rupture and subsequent healing of motor nerve-cell processes. Sturges—and many observers agree with him—regards the disease as a functional expression of nerve instability induced by various extraneous causes,

and urges in favour of this view the remarkable limitation of the disease to the period of childhood, its preference for females, and its onset at a time when the requirements of growth and education are exciting a strong demand upon the resisting power of the sensori-motor ganglia. Finally, there are not wanting advocates of a microbic origin of the disease, and it has been found that the diplococcus isolated by Poynton and Payne from the joints of acute rheumatism is capable of producing, when injected into rabbits, not only arteritis and endarteritis, but in some instances also a form of chorea. Sections of the cerebral cortex of an animal thus rendered choreic have revealed masses of diplococci in connexion with the small arterioles. The probable entrance of micro-organisms through the delicate mucous membrane of the naso-pharynx has been suggested as a possible explanation of how infection may occur, and there can be no doubt that the disease occurs in association with several types of sore throat. Whatever the minute pathology of chorea is ultimately proved to be, the one prominent fact in our present knowledge is that the evidence so far forthcoming points to localization in the brain primarily, and not in the cord except as a secondary and inconsiderable incident. There are also many reasons for believing that the precise seat of disturbance is the cortex, and possibly the basal ganglia.

In the large proportion of fatal cases which have been examined *post mortem*, a fringe of fibrinous nodules has been found occupying the free edge of the mitral valve. Similar nodules are also met with, but not so frequently, on the segments of the aortic valve. Many cases present the usual evidence of pericarditis.

The prognosis in children is favourable as regards recovery from the choreic attack, but there is always the ulterior risk to be borne in mind of permanent cardiac mischief. According to the report of the Collective Investigation Committee of the British Medical Association, the mortality does not amount to more than 2 per cent. The outlook is much less favourable in adults, and in the maniacal form of the disease is always associated with grave danger to life.

In well marked cases there can be no difficulty about the diagnosis. The age and sex of the patient, the typical character of the movements, and their cessation during sleep; the frequent association with mitral disease; the shuffling gait and loss of muscular tone; the alteration in speech and the vacant expression, together with the absence of pyrexia, combine to produce a picture which can hardly be mistaken. There are other disorders in which muscular contractions play a prominent part, but in none of them do the movements present the jerky, uncontrollable purposeless features of true chorea. The cases liable to cause most error are those in which the paretic phenomena of the disease are unusually well marked, the muscular movements being so inconsiderable that they escape notice. Error will, however, be avoided if it is remembered that a recent localized paresis in a child is more frequently due to chorea than to spinal or cerebral disease. By keeping the patient under observation the development of further symptoms and the general progress of the illness will speedily enable a differential diagnosis to be arrived at. Disseminated sclerosis, paralysis agitans, Friedreich's ataxia, paramyoclonus multiplex, and habit spasm are all associated with disturbance of the muscular system, but the tremors of these disorders are quite different from the muscular jactitations of chorea, and the other leading points in their descriptive history make it inconceivable that they could be mistaken for St. Vitus's dance. To anterior poliomyelitis there may be a superficial resemblance in cases of the paretic type, but the onset of infantile paralysis is much more sudden than that of chorea, and is accompanied by pyrexia; the loss of power is prominent from the beginning, and there is subsequent muscular atrophy and arrest of development in the parts involved.

In the treatment of the disease, rest, both mental and physical, is of special importance, and is indicated in every case, no matter how mild. In many instances the child will recover under the influence of rest alone without any medicine whatever, but many cases will get steadily worse if not treated by drugs. The child ought to be put to bed and kept there until all movements have ceased, so as to minimize the risk of cardiac complications and at the same time expedite the natural tendency to recovery. Any

discoverable source of reflex irritation—such as errors of refraction, phimosis, intestinal worms, nasal troubles, dentition, etc.—should be removed or corrected. The bowels must be kept gently open by occasional doses of mild alteratives. There is no specific for the disease, but better results are got from arsenic than from any other drug. It ought to be administered from the earliest development of symptoms, in moderate doses at first, but judiciously increased and pushed up to the limit of toleration. For a child of 8 years old, Fowler's solution may be commenced in 3-minim doses, and gradually increased until within a week 10 minims are given three times a day. Children bear arsenic well, and can frequently stand large doses without inconvenience. Brilliant results have been claimed for heroic doses of from 15 to 25 minims, given from the onset of symptoms, three times a day after meals, in a large tumblerful of alkaline water. It is doubtful whether the ordinary and safer dosage of from 3 minims gradually increased to 10 is not attended, in most instances, with perfectly satisfactory results, without the disadvantages of the need for constant medical supervision. When the stomach is intolerant of the drug, Eulenberg has advocated its administration hypodermically, but in children the emotional upset which results from the prick of the needle constitutes a serious drawback. Cacodylate of soda is extensively used in France instead of liquor arsenicalis in the treatment of chorea. It may be given either hypodermically or in the form of a pill in much larger doses than other preparations of arsenic, but the garlic odour it imparts to the patient's breath is a strong reason against its administration. Chapuis has shown experimentally that arsenic is less toxic when combined with butter than when given in solution. A known quantity of arsenious acid, according to the dose to be administered, is taken and added to chloride of sodium in the proportion of 0.1 gram of the sodium salt to 0.005 gram of arsenious acid. This mixture is triturated with 10 grams of fresh butter, and given, spread on bread, after a meal. In all cases where arsenic is being administered over a prolonged period in large doses, a keen eye should be kept open for the occurrence of pigmentation of the skin or of peripheral neuritis, either of which may be regarded as evidence of saturation.

In stray cases arsenic is not tolerated; under such circumstances sulphate of zinc is sometimes found a good substitute, and may be given in doses of two or three grains, gradually increased to 5 or 6 grains to a child of 8 or 10 years. Antipyrin is another drug which has been recommended as a substitute for arsenic, but, to be of service, it must be administered in bold doses. McCall Anderson was in the habit of prescribing from 10 to 20 grains every six or eight hours for a child of 8 or 10. Ergot of rye is also credited with good results, but, like antipyrin, must be administered freely—a drachm of the liquid extract may be given to a child of 8 three or four times a day. Trousseau set great store on strychnine as a curative drug in chorea, and ordered its administration in gradually increasing doses until its physiological effects were produced. In the later stages of the disease, there can be no doubt about its value.

Besides arsenic, other drugs may be called for, according to the indications in each case. Thus, anaemia is frequently an important accompaniment and demands the administration of iron for its relief; nutrition may be much impaired, and will be benefited by the addition to the daily dietary of maltine and cod liver oil; if rheumatic symptoms are pronounced, the salicylates must be given in suitable doses; excessive restlessness demands the exhibition of bromides; and so on. If restlessness is accompanied by a dry state of the skin, diaphoretics are often very soothing. It is under such circumstances that antimony is specially useful. When exhaustion threatens, stimulants are necessary, and should be given in quantities to suit the requirements and age of the patient.

In all severe cases something should be done to control the muscular movements until the more slowly acting drugs above referred to have time to exercise their power. The movements may be so incessant as to threaten the patient's life from exhaustion, and under these circumstances more good will be got from hydrate of chloral than from any other drug. Gairdner declared that, when pushed sufficiently far, it has an almost absolute power of sus-

pending or controlling the muscular disorder. It may be given either alone or combined with bromide of potassium. If, for any reason, chloral is inadmissible, sulphonal or trional may be tried. Ringer recommends conium juice in doses of from one to several drachms, but its effects are not permanent, and in such large quantities it is apt to upset the child's digestion. In desperate cases it may be necessary to resort to the careful administration of morphine hypodermically, or to the inhalation of chloroform at short intervals. Cold douches or icebags to the spine, or the application along the course of the vertebral column of the spray of ether or of chloride of methyl, are local measures which are sometimes worthy of trial in extreme cases. Where the movements are not too violent, a warm bath or hot-pack may be used with benefit. Mechanical restraint often affords the patient comfortable relief: it is best accomplished by bandaging with flannel the upper limbs to the trunk and the lower limbs to one another, subsequently fastening a blanket or sheet tightly to the sides of the cot over the child's chest and abdomen. The use of a water bed lessens the risk of skin abrasions and bed-sores. In the later stages of the paretic variety of the disease, massage and faradization are valuable additions to medicinal treatment.

During convalescence, tonics, a generous dietary, carefully graduated gymnastic exercises, and change of air are all serviceable. The child should not be allowed to undertake mental work until complete recovery is established.

In the maniacal form of the disease met with in adults, treatment must be conducted on general principles, always bearing in mind that the condition is one likely to become serious, and therefore demanding, from the beginning of the illness, skilful and energetic management.

In all choreic cases the parents or friends of the patient should be warned of the liability to recurrence, and instructed that it is essential to put the child to bed and seek advice on the first indication of a renewal of the symptoms. In order to minimize the risk of relapse the general health must be maintained at the highest possible standard. The child should be warmly clad; a dry sunny climate should be chosen when possible, so that rheumatic ailments may be escaped; and during the cold months of the year cod liver oil should be administered perseveringly. Education must be carefully adjusted to the capacity of the child, and all forms of competition for distinction stringently forbidden. The daily life should be so arranged that a certain proportion of every fine day is spent in the open air, and all forms of excessive fatigue or mental excitement must be guarded against. Healthy children should be protected against the risk of fright and not allowed to associate with any child suffering from chorea.

A Clinical Lecture

ON

THREE CASES OF PARAPLEGIA.

DUE TO ACUTE ANTERIOR POLIOMYELITIS, TOXIC POLY-NEURITIS, AND TRAUMATIC MYELITIS RESPECTIVELY.

BY

J. MICHELL CLARKE, M.A., M.D. CANTAB.,

F.R.C.P.,

PROFESSOR OF MEDICINE, UNIVERSITY COLLEGE, BRISTOL;
PHYSICIAN TO BRISTOL GENERAL HOSPITAL.

I WISH in this lecture to deal with cases which well illustrate the features of three important forms of paraplegia.

The first case which I shall take is one of acute anterior poliomyelitis in a young adult:

A. B., aged 20, a farm labourer, had always enjoyed good health, and came of a healthy family, with the exception that one sister had suffered from tuberculous glands. On September 25th he had a slight headache on going to bed, being in his usual good health all day, and on the 26th the headache was more severe, and he had constant "darting" pains in the calves of both legs. He went to work on the 26th and 27th, but on the latter day could only hobble along on account of pain. On the 28th he could just stand and walk across the room with great difficulty on account of pain and increasing weakness in the legs, and on the 30th he found he could not stand nor use his legs at all. There was also pain in the lumbar spine, but never very