An Address

ON

THE CAUSES OF NERVOUS DISEASES.

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I WISH to thank you for the great honour you have done me in electing me to this chair, one that has been occupied by so many illustrious men. I have been much puzzled to know why I have been chosen, for I do not feel conscious of having done any special work which would warrant it, and I can only suppose that I am regarded as the representative of men in the Manchester area who have done so much for neurology, beginning with Braid, who was one of the first to investigate hypnotism, and followed by Ross, Dreschfeld, Judson Bury, Thorburn, Williamson, Orr, and Rows.

In dealing with nervous disease I often wonder whether we realise how few cases of any individual affection, the signs and pathological anatomy of which are thoroughly well known, any single observer sees in the course of, say, five years. How many cases in this period has any single person had under his care of myasthenia gravis, of amyotrophic lateral sclerosis, of progressive muscular atrophy, of syringomyelia, of alcoholic paralysis, of Erb's paralysis, or even of writer's cramp? No wonder that the exact causes of so many nervous affections are so little known.

CLASSIFICATION OF CAUSES OF NERVOUS DISEASE.

In the Bradshaw lecture¹ which I delivered in 1917 I made an attempt to classify the causes of disease into the following ten groups: 1. Injury. 2. Food and feeding. 3. Poisons. 4. Occupation. 5. Stress. 6. Abnormal metabolism. 7. Abnormal age-changes. 8. Neoplasms. 9. Parasites, including micro-organisms. 10. Heredity. I propose in this address to use this classification to study the causes of nervous diseases to estimate roughly their frequency in a busy industrial area, and to remark on special points as they arise.

Injury.

Besides the various injuries, such as meningeal hæmorrhage or obstetrical paralysis occurring during birth, injury may, of course, affect any nervous structure from the whole brain to an isolated peripheral nerve. However unfortunate for the recipient, these injuries from their effects have been the means of elucidating enormously the functions of the nervous system, and in no instance more prominently than by the work of physicians and surgeons during the late war. I include cold draughts or prolonged cold applications amongst injuries, for I am convinced that Bell's palsy, brachial neuritis, and sciatica can be so caused.

It is supposed by some that injuries of the head or spine may give rise to indefinite symptoms of a neurasthenic nature owing to multiple very minute hæmorrhages or to some more subtle molecular change. In my view very many such neurasthenias or hysterias are either feigned or are emotional in origin and are quickly recovered from when legal proceedings are over. But apart from these there are very genuine cases of traumatic neurasthenia, especially after head injuries, cases with persistent headaches, attacks of vertigo, insomnia, affections of memory, loss of power of mental concentration, mental depression or mental inertia almost amounting to a dementia. I have seen such cases where no question of compensation arose or where all legal proceedings were over. After tearing of minute muscular or tendinous attachments, even from trivial injuries as from the strain of lifting a

heavy weight, local pain may be very long lasting, possibly from the involvement in cicatricial tissue of nerve fibrils such as may occur in a painful stump.

Food and Feeding.

I know of no nervous disease which may be caused by food in this country, however much it may be possible to associate beri-beri, ergotism, pellagra, and lathyrism with the dietary of foreign countries. But if alcohol be included in this section, then we have the many effects of its abuse varying from delirium tremens to neuritis. Further observations since the arsenical-beer poisoning epidemic in the Manchester district in 1900 have only confirmed a statement made by me at that time that alcoholic beverages uncontaminated with arsenic very rarely indeed, considering the quantities taken, give rise to neuritis.

Poisons.

Poisons which may affect the nervous system are few in number. Of these lead, in my experience, is by far the commonest. Mercury poisoning with its tremors is very rare. In both these cases the risk of having to pay compensation to workmen has had an excellent effect in making employers employ rigorous safeguards. I have in the last few years seen several cases of widespread peripheral neuritis affecting sensation and motion in which the only antecedent I could trace was coal-gas either unburnt or burnt. In the former case I presume the poison has been carbon monoxide, but in the latter I am at a loss to know the actual poison. I wish to draw attention to the possible danger of working in these fumes, which may emanate merely from the unventilated domestic gas-stove.

Occupation.

Living as I do in the centre of what is probably one of the most industrial areas in the world, I have been struck with the few nervous diseases caused by occupation. The various "cramps"—writer's, telegraphist's, hammerman's or pianist's—are all, considering the numbers of people so engaged, very rare indeed, writer's cramp being, of course, the commonest. None of these occurs, in my opinion, unless there is a strong neurotic element already present in the sufferer. Many cases of progressive muscular atrophy, also a rare disease, are due, I am convinced, to the early death from over-use of late developed small central cells in the anterior horns, the cells which have specially developed to enable special skilled occupations to be performed. This was pointed out years ago by Ross, but does not seem to have been sufficiently recognised. In the busy needlewoman it commences in the small muscles of the hand, in the tramcar driver in the muscles of the right forearm which he uses to apply his brake, in the collier and in the puddler in the shoulder muscles. I have recently seen a case in which it commenced in the thigh and lumbar muscles in a man who spent his life lifting stones and carrying them up ladders. In all these cases there were the typical fibrillary twitchings, the loss of power, and the atrophy developing *pari passu* and not one before the other.

Stress or Strain.

Stress or strain, caused by overwork, hurry, and worry, is the origin of much nervous disease. It is the frequent cause of cerebral arterio-sclerosis, to which I will refer later. It is also the cause of neurasthenia of the purely acquired type, a type most important to recognise, as it is so eminently curable. A man gradually finds he is not able to fix his attention on his business; he dare not open his letters in the morning, he loses the power of routine work, cannot concentrate his mind, and so loses his memory for recent events; he has pressure pain on the top of the head and dragging sensations at the back of the neck; his appetite is not good and he may have insomnia. These cases have been very common since the Armistice of November, 1918. During the war men at home were enormously overworked and worried, but they struggled gamely on until the danger was over; they went through the terrible four years with no holiday. But when the war was won many of them simply crumpled up. Fortunately, the treatment for these

¹ THE LANCET, 1917, ii. 703.

cases is simple; a total rest in some quiet place, entirely free from business for one or two months; is a certain cure—a different prognosis from the hereditary neurasthenia of which I shall speak later. Personally, I have always looked upon Graves's disease as essentially nervous in origin, and I should class its cause as stress, whether due to the fright of a bursting shell, the excitement of battle, or the hurry and worry of life. I think it only occurs in certain types of people, for, as I wrote many years ago, it was almost unknown in my long experience as visiting physician in one of the largest workhouse hospitals in the country, whereas, of course, it is quite common in ordinary hospital and in private practice. The nervous constitution which may lead to pauperism does not seem to be of sufficient inherent energy to develop Graves's disease.

Abnormal Metabolism.

I know of but few nervous diseases which can be distinctly said to be due to abnormal metabolism. But then, to my mind, a good deal of what is written about metabolism is itself quite indefinite. I am, however, prepared to believe that certain nervous affections are due to abnormal chemical processes going on in the body. There is, of course, a diabetic neuritis associated with changes in the posterior columns, and quite possibly there may be a gouty neuritis. Is myasthenia gravis, with the fatty changes of the thymus gland and the lymphorrhages in the muscles, due to an altered metabolism? Probably the combined postero-lateral degeneration found in many anæmias and in certain exhaustive states, described by Putnam and Dana in 1891, is secondary to some chemical change. And cases of tetany secondary to obstruction near the pylorus, and sometimes seen in rickets, may be metabolic in origin. Has disseminated sclerosis any connexion with altered metabolism? Probably not, but we do not know.

Abnormal Age Changes.

One of the commonest nervous affections seen in a great industrial area is early senile cerebral softening due to early cerebral arterio-sclerosis, sometimes hereditary, more often due to stress. I have recently seen such a case commencing with a slight hemiplegic seizure at 42 years of age, and I have seen several men very senile as regards brain function below the age of 50. After 60 years of age it is quite common. To the general practitioner it causes much difficulty in diagnosis, for it appears in so many different forms. Not a few are very similar in many respects to general paralysis of the insane, and some of the cases in asylums which are described as chronic general paralysis going on for five or six years are, I think, of this nature, and not true general paralysis at all; they may have epileptic or apoplectic seizures, the speech is very similar to that of the G.P.I., and the mental condition not unlike, but it will be found that the tongue is protruded without hesitation, is not tremulous, and the pupils react to light. Other cases are merely hemiplegic, others paraplegic and with pseudo-bulbar paralysis. Some with marked physical signs are quite clear intellectually, others almost demented and with a hyper-emotionalism which is almost characteristic. Some because of the altered speech and the increased reflexes may be mistaken for disseminated sclerosis. Many have an increased blood pressure, but some have a low blood pressure and a somewhat feebly beating heart, and the radial artery may give no indication whatever of the extent of disease of the cerebral vessels.

Of a similar pathological origin but affecting the lumbo-sacral cord is senile paraplegia, so-called by Gowers, and caused by senile changes in the very long narrow arteries supplying that part; and just as one may have temporary hemiplegia from temporary thrombosis of the vessels of the internal capsule, so may the senile hemiplegia be temporary in character, improving as the circulation is improved.

Paralysis agitans is another typical abnormal old-age change, although it may commence before 30 years of age. It is often preceded by pain and stiffness of the limb first affected, generally the arm, thus resembling a brachial neuritis; and although at first

there may be no tremor, the mask-like face and slow movements are indications of what is approaching. It is noticeable for how long a time these cases will retain their intellect intact, and although some of them are morose and depressed, in others a keen sense of humour is quite astonishing.

Other local senile changes set up labyrinthine vertigo and others intermittent limp. I think it possible that the uncommon disease chronic anterior poliomyelitis may be due to early but progressive degeneration of the anterior horn cells, but opportunities for investigating this condition are rare.

Neoplasms.

In considering new growths of the brain and cord one would like to know, principally for medico-legal purposes, to what extent injury is a cause. It is a most difficult point to prove, for we all, I suppose, sooner or later, receive blows on the head more or less severe, and of course brain tumour is relatively rare. But are there some people with some predisposing condition in which an injury will be the exciting cause of a growth? Personally, from cases I have seen I am rather inclined to think so, and this is a point well worthy of further investigation and statistics. I have been struck with the number of cases of brain tumour occurring in men and women over 40 years of age who were otherwise of fine physique, the early symptoms being often most misleading and indefinite.

Parasites and Micro-organisms.

The gross parasites, hydatids or *Cysticercus cellulosæ*, very rarely affect the nervous system. I have personally never seen such cases. But the other parasites, the micro-organisms, are probably the cause of very many cases of nervous diseases, including, as they do, the tubercle bacillus and the *Spirochæta pallida*. Rheumatic fever, the acute infectious fevers, the septic and pyæmic organisms, tetanus, rabies, are also examples. And the further investigations are carried the more diseases are likely to be included in this group. It is quite a few years ago since acute anterior poliomyelitis was shown to be of germ origin; and in passing I should like to state my opinion that acute cerebellar ataxia is merely one variety of this disease, the area affected being localised to the cerebellum. Probably all forms of myelitis (apart from direct injury) are microbic in origin, and the "reflex paraplegias" have become more understandable since the researches of Orr and Rows. Acute ascending paralysis is almost certainly caused by germs or their toxins. So-called acute lethargic encephalitis (a very unsatisfactory name) has recently revisited mankind, and I agree with Dr. Farquhar Buzzard that it is a much more serious affection than the early cases led some of us to suspect, for not only may it be rapidly fatal, but its sequelæ may be most disabling and long lasting.

Of all nervous diseases disseminated sclerosis is far away the commonest that I meet with and the investigation of its cause is a matter of urgent necessity. I have, in the Bradshaw lecture, given my reasons for thinking that it is due to some special micro-organism, and its course and symptomatology are so similar to those of syphilitic nervous affections that I am quite prepared to believe that a special spirochæte differing from the *Spirochæta pallida* was found by Siemerling in 1918 in brains of disseminated sclerosis patients. Kuhn and Steiner, in 1917, inoculated intraperitoneally guinea-pigs with the blood and cerebro-spinal fluid of patients with disseminated sclerosis and were able to demonstrate the presence of a spirochæte in these animals, in several of which motor disturbances in the limbs developed after an interval of three days. Simon successfully repeated these experiments, using rabbits, injecting cerebro-spinal fluid subdurally, and in 1919 Marinesco injected the cerebro-spinal fluid of two patients into six guinea-pigs, using the intracerebral, intraspinal, and intraperitoneal routes in different animals. The two animals injected intracerebrally showed a few days later paresis of the hind limbs, and their cerebro-spinal fluid obtained from the fourth ventricle contained numerous spirochætes.

Heredity.

When one remembers that the nervous, muscular, and reproductive systems are the master tissues of the body it is obvious how nervous disease may so very frequently be inherited. The bulk of insanity (at least 75 per cent.) is handed down, including nearly all epilepsy, migraine, psychasthenia, much neurasthenia, habit spasm (including stammering), adult chorea, the tendency to early cerebral arteriosclerosis, Friedreich's ataxia, hereditary cerebellar ataxia, familial spastic paraplegia, peroneal atrophy, and the various types of myopathic paralysis. Personally I see no difficulty in understanding why this heredity should occur; structure and feature are handed down from parent to child, and this being so one naturally expects function to be similarly handed down. Indeed, the surprise would be if it were not. I will allude to one or two only of these hereditary affections.

Epilepsy I define as a disease characterised by a definite alteration of the brain cortex which renders it, as the result of some irritation, abnormally liable suddenly to liberate energy. Whether this alteration is a structural one not yet discovered or is due to an abnormal instability of the latent nerve energy I am not prepared to discuss; but the irritation may be anything from mental worry to intestinal worms. Putting aside those cases of convulsion due to definite coarse structural changes such as brain softening, general paralysis, brain tumour, the cortical sclerosis of infantile hemiplegia, toxic conditions such as lead, alcohol, chronic renal disease, and the puerperal state, I consider that all fits are due to essential epilepsy. The teething convulsion, the convulsion due to worms, the convulsion following fright or coming on some days after slight head injury, even if never followed by another fit, are in my view all true epilepsy.

Further, I consider that practically all true epilepsy is hereditary. A child after the irritation of teething or after a fright or after a slight blow on the head has no right, if of good heredity, to have a fit, and if it has there is almost certainly a neurotic heredity, and it may at some future time, long or short, have other fits. This is, I know, a rather alarming view to take of a simple infantile convulsion, but it is a very important one in view of prognosis, and I have been forced into this conclusion by minutely investigating large numbers of family and personal histories. The heredity may be alcoholism, or insanity, or epilepsy, but as a rule it is epilepsy itself. The more one cross-examines the friends the more one is confirmed in this idea. I am frequently told on inquiry that "there is no such thing as epilepsy in the family," but on pressing the question the parents say, "Oh, his brother had convulsions when teething, but has had none since." Or I find that a cousin had some kind of fits for a few years. Sometimes I hear that "the father or a brother had fits until they were 16, but none since," and so on. It is probably owing to the popular but quite erroneous idea that if essential epilepsy once occurs it continues until death that these family histories are difficult to obtain. I have been struck with the relative frequency with which epilepsy may cease as a person grows older; whether this is due or not to slight age-changes in the cortex, rendering it less explosive, I cannot say.

Migraine is another disease almost always hereditary, generally handed down from the mother. Just as epilepsy may be roughly described as a nerve-storm due to some irritation acting on the cerebral cortex and producing generally some motor disturbance, so I look upon migraine as a nerve-storm due to some irritation acting on some part of the brain and producing headache. And just as in epilepsy the symptoms may be sensory or psychical rather than motor, so in migraine one sometimes has motor phenomena either with hemiplegia (associated with aphasia if on the right side) or a temporary weakness of a limb. There are, of course, other similarities between epilepsy and migraine, the common commencement about puberty, the gradual diminution of the attacks as life advances, the visual or sensory auræ, the exhaustion following the attacks, the

similarities of the causes of the attack—as worry, anxiety, excitement, sudden awakening from deep sleep, crowded rooms, the menstrual period in women, &c. So that one is not surprised to find that the migrainous subject may have occasional attacks of epilepsy. Illustrations of such will be found in Sir William Gowers's most interesting little book on "The Borderland of Epilepsy." Another resemblance is the status migrainicus, in which a series of attacks occur, one overlapping another, just as do the fits in status epilepticus.

But I do not think the two diseases can be considered as different manifestations of one disease. Epilepsy in an ancestor does not seem to be a precursor of migraine, nor migraine of epilepsy. Another outstanding difference is that while as a rule the epileptic is more or less affected in his intellect the migrainous subject as a rule is more or less possessed of a higher intellect than the average. Any auræ which may occur in migraine are slow and comparatively long lasting, and the final manifestation of the attack—namely, the pain—lasts for many hours. The cerebral seat of the attack in epilepsy is, of course, in the cortex, but I should much like to know the exact seat of the temporary lesion of migraine.

I have no sympathy with those who say that migraine is always due to eye-strain, or to too much nitrogenous food, or to a high blood pressure, or an excess of uric acid in the system, or always to one type of irritation. The heredity must be present, and granting that almost any kind of irritation may act as an excitant of the attack.

I have already alluded to the acquired neurasthenia produced by stress and noted how curable it is. But there is another form of neurasthenia commencing in younger subjects in which the stress is very slight or almost absent, which is purely hereditary, and being a manifestation of some inherent abnormal constitution of nerve matter is often incurable, or at any rate very difficult to deal with; alleviation may happen, but relapses are common. Its symptoms, very similar to those of the acquired type, are entirely subjective and sensory (quite different from the objective signs of hysteria), and relate not only to peripheral somatic nerves, but to those of the viscera; these patients seem to feel the workings of their internal organs.

Another strongly hereditary affection is psychasthenia, in which the mind is involved to such an extent that, although not insane, some of them are borderland cases and in some their ideas finally so influence their conduct that insanity supervenes. Just as the neurasthenic seems to be disturbed by the working of his viscera, so the psychasthenic seems to be disturbed by the working of his brain.

HYSTERIA AND MALINGERING.

In spite of the very numerous definitions of hysteria since the time of what Dr. Walshe calls "that admirable psycho-analyst, King Solomon," I will attempt another, one which, at any rate, is sufficiently definite to include all cases of hysteria which I have seen. I define it as a mental condition in which a disease is imagined and assumed, but for which there is no known physical cause in the assumer, the basis of the condition being a morbid craving for sympathy or notoriety, or both. One is constantly puzzled in compensation work to know whether a person is hysterical or is malingering, a most important medico-legal distinction; for hysteria, being supposed to be an altered mental state, has to be paid for if caused by an accident; but malingering, being a deliberate fraud, has not to be paid for. The dividing line between the two conditions is sometimes so small as to be negligible. I would define malingering as a condition in which there is a deliberate assumption of a disease, the basis of the assumption not being a craving for sympathy or notoriety, but a desire for personal and material gain.

Allow me to give a few instances. In Bucknill and Take's "Psychological Medicine" (fourth edition, 1879, p. 472) you will find that John Jakes was sentenced to four years' penal servitude; he had a fit immediately afterwards while in the dock and became hemiplegic and speechless. He remained in this condition and was very helpless while in prison for

a period of 12 months, but he managed to make a key from a tin cup, escaped through a window, climbed a door 8 feet high, and then a wall 8 feet high, and cleared off, and was never afterwards traced. He was a malingerer.

Some years ago I was asked to see and to give evidence for a man who had been struck on the side of the head in a railway accident; he had on superficial examination a typical hemiplegia which had developed slowly and was supposed to be due to a brain tumour, the result of his injury. But he did not know the anatomy and physiology of the nervous system as well as I did, and although he was remarkably clever in his imitation he was not quite clever enough, and his manner suggested to me that he was a deliberate fraud and I declined to appear for him. But he was awarded £2500 damages. Within a fortnight he was seen dancing in a well-known ballroom at Blackpool. He was a malingerer.

A girl of 18, in good circumstances, fell off her bicycle, injured her left musculo-spiral nerve, and had a genuine dropped wrist. I think she was the only child of very fond parents who fussed unduly about this slight accident. Three days afterwards she suddenly developed a hemiplegia on the same side, thus causing intense alarm. Her doctor sent for me and I was able to satisfy him that the hemiplegia was not due to organic disease. The girl had a morbid craving for sympathy and notoriety and had hysteria.

Some years ago there was a woman in a hospital for women in Manchester who complained of some pelvic trouble, but nothing could ever be found except that she had alarming temperatures up to 103° or 105° F. very frequently; she was kept in hospital for about three months. Then I was asked to take her into one of my hospital beds. She appeared quite healthy and well nourished, but still had the extraordinary temperature. After a few days, using two thermometers simultaneously, one in each axilla, and holding her arms still I found the temperature normal, although the chart temperature just taken by the nurse was 103°. I said to the patient, "What have you been doing this for?" She looked at me a moment and then replied, "Well, as a matter of fact, I have no home and cannot easily get work and naturally I am more comfortable in hospital than anywhere else." She was a malingerer.

A few weeks ago I had a young woman in my wards who looked very ill and anæmic and had a temperature for some days up to 103°. She complained of pain in the epigastrium and right hypochondrium, made much worse by pressure; I found she had been an out-patient for many months with marked symptoms of gastric ulcer. I thought she had a subdiaphragmatic abscess, and asked a surgical colleague to see her; he agreed with me and operated at once and found nothing abnormal. Shortly afterwards she was sent back to my ward still looking anæmic and ill and still with the temperature. I then used two thermometers as before described; the temperature was normal, and remained so until her discharge. She had nothing material to gain by her assumption, but she had a craving for sympathy, and was a hysteric, not a malingerer.

I was asked to see a man who was claiming compensation for an alleged injury of the back. His gait was that of a typical case of spastic paraplegia; but I was rather suspicious about him, so I took his boots and stockings off and asked him to walk in his bare feet. He had evidently seen true spastic paraplegics walking in the street, but he had never seen them walk with bare feet. He stood up and then hesitated, as he did not know how his bare feet ought really to behave, so he deliberately threw himself down on the floor as if suddenly completely paralysed. He was a malingerer.

I saw a girl in a small village on the Yorkshire moors who had been bedridden for months with total paralysis of sensation and motion of both legs. She was the object of much solicitude and inquiry from all the neighbours, her room was laden with flowers, and she was evidently the centre round which the whole household revolved. I took her into a nursing home in Manchester absolutely isolated from all her friends, including her doctor, and although she was a difficult proposition she was well in a fortnight. She was a hysteric craving for attention and notoriety.

And so I could go on with case after case to illustrate my point.

In both hysteria and malingering any disease may be imitated which the person has seen or heard of or read about, but never one of which the person has no previous knowledge. Secondly, in both cases there must be an audience. No one isolated in the desert of Sahara would have a hysterical fit or would mangle. As a rule, the condition produced is one that can be examined by an observer, such as assumed blindness, deafness, mutism, loss of sensation, loss of power, vomiting, or raised temperature. But sometimes both

in hysteria and in malingering there is merely the complaint of some pain, for the existence of which one has no evidence except the statement of the person. And in my experience the cleverest malingerer is the man who says, "Since my accident I have had a pain in one spot in my back," and who always tells the same tale and refuses to elaborate his story in any way.

I remember many years ago hearing Hughlings Jackson in an address in Manchester refer to hysterical convulsions as "sham fits," and I also remember how shocked I was to hear them so described. But the more I have seen the more I feel, if it is not an imperative to say so, how correct his description was. In thus comparing hysteria and malingering I would not for one moment suggest that the treatment for hysteria is to be the same as that to be meted out to the malingerer. Babinski's definition of hysteria as a psychical state manifesting itself principally by symptoms which can be reproduced by suggestion and made to disappear by persuasion is, to my mind, more a description of hysteria than a help to its cause and nature. It is of the utmost importance in treatment to think of its cause as a craving for sympathy and notoriety. But the sympathy with which it is cured is the persuasive, encouraging, optimistic sympathy, not the coddling and pessimistic sympathy which makes it worse. Janet's definition of hysteria as a form of mental depression characterised by a retraction of the field of personal consciousness and a tendency to dissociation and emancipation of the systems of ideas and functions that constitute personality I certainly cannot subscribe to. So far from a retraction of the field of personal consciousness or of absent-mindedness, large numbers of hysterics, the great majority in my experience, are eminently alert. They may appear to be half asleep or absent minded, but they are really watching the physician as acutely as he is watching them. But I am prepared to admit that in some cases they may suffer from a self-induced hypnosis.

FREQUENCY OF GROUP INCIDENCE.

I find much difficulty in allotting to each causation group its proper value as a causative factor, partly owing to the fact that we have no tables of morbidity to refer to, and partly because my classification is not truly logical as the groups are not watertight compartments. For instance, cerebral arterio-sclerosis is partly due to abnormal old age and partly due to stress; some occupation diseases are due to stress and some to poisons and so on. But trying to look from a large view-point at such nervous diseases as I have seen, I should place heredity as the chief cause of nervous disease, including, of course, insanity, which to my mind is just as much a nervous disease as is epilepsy or locomotor ataxia. Then I should place micro-organisms as the next great cause. Then I think would come abnormal old-age changes and stress, and about this level, injuries, as I see many workmen's compensation cases. The remaining classes I cannot value accurately. Food would be low in the list, as would also be poisons, but either of these classes would be raised according to whether you include alcohol as a food or as a poison. Neoplasms are rare, especially tumours of the cord, but those of the brain commoner than I used to suppose. Metabolism and occupation pure and simple are probably lowest in the list.

But I expect each one of us, according to his experience, would arrange the list separately, and I leave it to those who are interested and who think it worth while to arrange their cards as they deem best.

WINSLEY SANATORIUM.—The proposed new further additions to this institution, which is near Bath, include a wing for 30 patients and an administration block, with quarters for assistant medical officer and 10 bedrooms for nurses. A separate house for the senior medical officer will also be erected. A lady resident of Clevedon, Somerset, who desires to make provision in her will for poor tuberculous patients of that town, made an application to the committee of the sanatorium in this matter, and it has been decided to erect a memorial wing if the balance of the trust should prove sufficient to maintain the beds.