THE EPILEPSIES AND LIFE ASSURANCE.*

BY

S. A. KINNIER WILSON, M.D., F.R.C.P.,

PHYSICIAN TO OUT-PATIENTS, NATIONAL HOSPITAL, QUEEN SQUARE;
NEUROLOGIST, KING'S COLLEGE HOSPITAL; CONSULTING
NEUROLOGIST, METROPOLITAN ASYLUMS BOARD.

OVER twenty years ago Professor Pierre Marie¹ of Paris, my old chief and teacher, wrote a paper with the arresting title, "At what age do tabetics die?" Those who know the work of this master of neurology will agree that on occasion it has been characterized by a somewhat iconoclastic rending of preconceptions or of established and conventional views from their pedestal; and the above-mentioned communication proved no exception. Marie was at pains to show that tabetics live as long as anyone else, in a general sense—that is to say, there is no clinical evidence that the disease hastens the end. This paper was written in the pre-Wassermann and pre-salvarsan era, so that if his conclusions were warranted by the facts twenty years ago it will, I think, be agreed that they should be even more justified to-day.

From the appearance of Professor Marie's communication I date my own scepticism as to not a few of the views that still are current in respect of the subjects of chronic nervous disease and their expectation of life, and under this category come some of those with whom we are at present concerned. Speaking as a neurologist, I ask myself how often have I seen an actual death from epilepsy; as far as my memory serves me, I have not personally observed any. With the help of the present registrar at the National Hospital, Queen Square (Dr. Arnold Carmichael), I have ascertained that for the years 1902 to 1925 inclusive 1,398 male and female patients were admitted there for treatment with a diagnosis of "idiopathic" epilepsy. Those who died in hospital number fifteen—that is, the death rate was 1.07 per cent. In spite of the fact that only those cases are recommended for admission which exhibit relatively serious symptoms (milder cases being treated always as out-patients) this percentage is insignificant, and far less than the hospital death rate from some other neurological diseases, such, for example, as cerebral tumour. I have not been able to define the immediate cause of death in all the fifteen fatal cases, since this would have entailed a prolonged search; but I can say that the majority died in status epilepticus, and that there were only one or two accidental deaths (for example, from asphyxia)—that is, less than half of 1 per cent. of the epileptic admissions.

Thus the impression is already left in the mind that when epilepsy as a whole is considered it cannot be regarded among the more common neurological causes of death. But this is only one aspect of the question. It may be taken that the neurologist is less likely than other practitioners to accept a diagnosis of "epilepsy," since he is fully aware of the variety of organic conditions which give rise to fits, and has probably had many opportunities of deciding whether a given "fit" should come into the "epileptic" category or not. Before any rational ideas can be obtained of the bearing of the problem of the epileptic on the question of life assurance it is imperative we should clear the ground by preliminary discussion of what is understood by epilepsy—a term that has been in vogue for generations, and enjoys the sanction of long usage.

The Nature of Epilepsy.

The first and the most important of the considerations is that "epilepsy" is a name for a symptom only; and while various "diseases" are still sometimes denominated by reference to a symptom (hemiplegia, spastic paraplegia, locomotor ataxia), the description is completely useless from the point of view of pathology. There are a dozen pathological conditions of which hemiplegia is the expression; similarly, a number of different morbid processes lead to disorder of function exteriorizing itself in the guise of

a "fit." We might as well speak of "a case of cough" as "a case of epilepsy." Doubtless the reply will be that there is, as a fact, a nervous malady characterized by recurrent fits, and since we do not know its pathology and cannot give it a pathologically descriptive title it might as fairly be called "epilepsy" as anything else. While this retaliatory comment is justifiable enough, it is precisely here that the danger lies, for routine habits of thought have fixed in many minds the idea that if on rough and perhaps hurried examination organic disease is excluded, the occurrence of an occasional fit is in itself sufficient to substantiate the diagnosis of "epilepsy"—a nervous disease of unknown causation and uncertain prognosis. It is against this mode and habit of transferring to a given case of "fits" our conceptions of the elusive affection called "epilepsy" that I strenuously protest. Over and over again we see cases in which the diagnosis of "epilepsy" has been made on the occurrence of occasional manifestations belonging to the category of "fits," yet the subsequent history of the case belies the diagnosis.

Difficulties at once arise if we essay a definition of "epilepsy," not merely in regard to cases which are shown to have an organic basis, but also in respect of the so-called "idiopathic" variety itself (which, of course, is in reality epilepsy of unknown origin). Taking the latter first, we ask, On what feature or features is the diagnosis established? The answer will doubtless be, The development of fits. We next ask, What constitutes a fit? This question has received many different and sometimes mutually contradictory answers, and no definition of a satisfactory character has yet been evolved. The term has been employed for clinical phenomena ranging from a gross convulsion of a generalized kind, with cyanosis, tongue-biting, and relaxation of sphincters, to twitching of a limb or segment of a limb, even to twitching of a finger or fingers, or of part of the face, without the slightest loss of consciousness. There need not even be manifestations of a hyperkinetic character, since some conditions in which restlessness is a feature occur in circumstances justifying their description as fits. Further, as is well recognized, recurrent phenomena of another order altogether, so-called psychical equivalents, have been included by many writers in the same category. I have several times seen uncontrollable attacks of "bad temper" both in epileptic subjects and in members of epileptic families not themselves subject to convulsions. Do we not speak of a "fit" of temper? Once more, every practitioner is conversant with the variety known as petit mal, and has also doubtless seen states characterized merely by a momentary "blank" in consciousness, without visible exteriorization of any kinetic kind—so-called *absences épileptiques*; and assuredly he has met with instances of loss of consciousness in which he has been unable to decide whether they were cases of "faint" or "fit."

In view of this disparity and diversity it is hopeless to look for a sufficiently comprehensive and at the same time precise definition of what the term "fit" is in practice used to connote. It is clearly not synonymous with convulsion, and as clearly does not of necessity imply a serious nervous condition. Thus, when we are told that a given individual is subject to fits, or has an occasional fit, we are far indeed from being authorized to assume that such a one is "epileptic" in any sinister sense.

Believing as we must, however, that an "idiopathic" clinical state of recurrent fits, seizures, attacks—what you will—is a common nervous ailment, for which as yet no constant cause has been unfolded, it is highly desirable we should recognize the existence of benign as well as of malignant varieties. In my recent Harveian Lecture² on "The Epilepsies" I referred to the case of a lady who had an epileptic fit at the age of 14, when her period of reproductive activity commenced, and another at 44, when it closed. Cases have come under my observation in which no more than half a dozen fits have occurred in a patient's lifetime; often enough the interval between attacks can be measured by years. And other cases are known where there has been one fit only. The truth is that by no means all "idiopathic" epilepsy is of bad prognostic significance, and it would be easy for me to cite personal experiences in regard to the relative harmlessness of many

* A paper read before the Assurance Medical Society, November, 1926.

such cases and to the satisfactory results of treatment. I am in the habit of stressing two points when called on to gauge the outlook in cases that apparently belong to the class we are for the moment considering: (1) Are there any physical or mental "stigmata" in the individual concerned? (2) Is the family history satisfactory? Speaking generally, if the patient is not weighed down by a bad heredity, and if no physical or psychical anomalies or abnormalities are conspicuous, the prognosis is good and the case will turn out to belong to the benign group. As a matter of observation I am inclined to believe that these considerably outnumber the others, and that the stress laid on neuropathic heredity has been overdone; I consider this variety of the "disease" is constitutional rather than hereditary. In this connexion the work of Douglas Thom³ is of no little interest. He has studied the records of 1,536 epileptic patients, of whom 1 in 6 was married; 80 per cent. of the marriages resulted in children (553 offspring traced and their history obtained). In only ten cases (1.8 per cent.) did epilepsy develop. Again, Myerson⁴ quotes the superintendent of the Massachusetts State Hospital for Epileptics to the following effect: "There are practically no families of epileptics in his institution, numbering 1,500 people, and a thorough search revealed four families of eleven people!" In face of these data we must revise our old conceptions of epilepsy of unknown origin; we are certainly not justified in perpetuating the view that it is commonly hereditary, and, like all hereditary conditions, incurable; or that if we cannot find the cause of the fits in a given case it is to be relegated to a mysterious "idiopathic" class and all hope of amelioration abandoned. Such ideas are utterly out of date.

Turning, in the next place, to cases in which "fits" are found to have an organic basis, there is patently no need to be concerned with any precise definition of the symptom. It is the physiological result of a pathological state, and the latter is the condition of which we have to evaluate the significance for good or ill. Fits are recognized to be, for example, a frequent concomitant of syphilitic disease of the brain and its coverings, of intracranial tumour, of cerebral vascular disease whatever its etiology, of intracranial infections, inflammations, and toxic haematogenous or lymphogenous processes. If a person is over the age of 40 or 45 it is my invariable practice to be on the look-out for an organic basis should his complaint be of occasional fits. The epilepsy of elderly patients has very frequently indeed a vascular origin. One or two fits at intervals, generalized in character and for the time monosymptomatic, may be found to precede the development of cerebral tumour, of general paralysis, or of vascular disease outside the cerebrum. Vascular changes in the brain are a much more common cause of Jacksonian epilepsy than is intracranial tumour.

Clinical and Experimental Evidence.

A little acquaintance with clinical data of this kind is doubly useful; we are able to adjudicate on such cases of "epilepsy" by reference to the morbid process causing the epileptic symptom without getting entangled in any maze of doubt as to what epilepsy is or is not; and at the same time we remove such cases from the vague category of "epilepsy" to the definite nosological group to which they respectively belong. Speaking for the moment from the life assurance standpoint, it is an unequivocal gain if we can assess a given case as one of cerebral vascular disease and not as one which happens, *inter alia*, to exhibit epileptic phenomena.

A second important consideration is of a somewhat different kind. The evidence of the experimentalist can be advanced to prove that epileptic convulsions can be produced in animals which show no signs of disease in any pathological sense. A healthy animal which is being bled to death may develop convulsions *sub finem*, while the respiratory centres are failing. Tetanization of the motor cortex will, under suitable conditions, result in convulsions. By the use of convulsants of the absinthine and thujone class fits can readily be caused in animals which are perfectly normal members of their respective species. According to Cobb and Macdonald,⁵ the march of events during a convulsion produced by thujone is very similar to that seen

during the epileptic fit. Elsberg and Stookey⁶ have proved that these experimental toxic fits can be prevented by the circulation of Ringer's fluid through the brain. The conclusion is obvious—that the phenomena of epilepsy can and do occur in appropriate circumstances in animals which are healthy and which exhibit no defect of neural structure.

It will, I think, be admitted that in man the greater part of the manifestations of a fit, Jacksonian or generalized, is the result of consecutive discharges of normal, stable nerve cells. I have indicated in the Harveian Lecture² (already referred to) the line of argument supporting this contention, and have there drawn the conclusion that "healthy neural mechanisms may become epileptogenous, without being in the remotest degree diseased."

If we follow this line of reasoning it may be fairly taken as indicating an epileptic potentiality in any mechanism of any neural level in man provided the appropriate factors come into being. In human cases of apoplexy (thrombotic, embolic, haemorrhagic, traumatic) how frequently do we not observe a fit or fits in the course of the illness, yet we never dream of regarding these patients as being the subjects of epilepsy. Their fits are the expression of a disorder of function which a number of factors have combined to produce; if the factors are removed the fits cease and leave no trace behind them. When a general paralytic or a uraemic patient has a convulsive attack we never dub him an epileptic, although we say his attack has been epileptic in character; knowing to some extent the causation in these particular instances we feel that if it can be controlled the attacks will stop. If we can operate successfully on a case of Jacksonian epilepsy from cerebral tumour we have good reason for holding that the fits will in consequence disappear. In other words, only one conclusion can be drawn—namely, that any constellation of motor nerve cells may on occasion become unstable; that the cause of this instability is no innate or inherent defect of the nerve cells as such, for we have good reason to believe they are normal; that it is constituted rather by some agent (toxaemia, pressure, etc.) which it is our business to detect and counteract; if we can do so, the neural mechanisms will recover their normal functions. This consideration should in its turn lead us to avoid confirming in our patients' minds the impression that a diagnosis of "epilepsy" has somehow a sinister significance; this is at present certainly the view of "the man in the street," and it must have been to some extent derived from medical opinion.

Lest these views should be thought to be of merely theoretical interest I may refer to experiences in regard to what has been called "war epilepsy." However much one is disinclined to accept in full the arguments and inferences of Pierce Clark,⁷ the late Dr. R. G. Rows,⁸ and others who believe that "epilepsy" is a "functional mental illness," curable by "mental methods," there can be little doubt that during the war, and since, most of us have met with cases in which the apparent cause (predisposing? exciting?) of full-blown epileptic fits has been a stimulus belonging to the mental (as opposed to the physical) series. Treatment of some at least of these cases by non-physical means has resulted in an apparently abiding cure.

One case will suffice for citation. The patient was at Dunkirk during the later part of the war, and he and his mates were liable to shell attack from land, sea, and air. On one occasion he had retired to a bomb-proof shelter, which was struck, and he was "buried alive"; when subsequently rescued he was found to be unconscious. Some time after the war was over he was in a cinema in South London with his fiancée. The place was dark and stuffy, and by some association there came into his mind a memory of the dugout at Dunkirk. At that very moment the orchestra began to play Rachmaninoff's well known prelude, which, as he, a student of music, was aware, is supposed to represent the feelings of someone who is being buried alive. Within a minute or two he lost consciousness, and developed a full epileptic fit, with tongue-biting and incontinence. He was treated by psychotherapeutic means, and has had no further epileptic attack.

Cases of this kind are no war novelty. They were recognized long ere the world conflict caused them to reappear in some numbers. Their significance resides in the apparent causation of physical fits by psychical excitations; if the latter can be checked the physical (neural) mechanisms pursue their normal activity undisturbed.

The practical lesson to be learned from the preceding discussion is, I submit, that the epileptic seizure is a phenomenon of normal nerve mechanisms, which can be roused (or, conceivably, released) into abnormal activity as a consequence of the action of factors (or combinations of factors) of different grades and classes. Such an occurrence may be unique in the patient's experience, or may be repeated, may, indeed, become chronic; whether single or multiple, the fit is itself no disease. If we will thus envisage our cases of "epilepsy" we shall be compelled to consider every case solely on its merits, and not by reference to ideas which have for too long a time led to the dismissal of any and every adjudged "epileptic" from the scope of therapeutic optimism.

I may turn now to the application of these considerations to the problem of the epilepsies as it confronts the officers of life assurance societies.

Prognosis as to Life.

In the first place, it seems fairly certain that medical decisions and office practice have been influenced and moulded, in some instances, by traditional conceptions as to the nature of epilepsy. It has been regarded, in its "idiopathic" form, as a chronic and incurable "disease," and its subjects have been held to be uninsurable. Doubtless, also, practice has been determined by the view that an element of risk is inherent in all cases, and forms an insuperable objection to acceptance. Possibly, indeed, the reader may be impatient of any effort to discriminate among the epilepsies, holding that every fit—organic, hysterical, psychogenic, idiopathic—is a risky affair, and its pathogenesis immaterial. The risk, we may be sure, is thought to be one of injury or death. Let us endeavour in some degree to assess it.

According to Sir William Gowers,⁹ "the danger to life in epilepsy is not great." Some of us have often seen the most severe fits passed through with apparent impunity, and conclude that in the fit itself the danger to life is minimal and negligible. The contention is rather that risk of "accident" accompanies every fit, in greater or less degree, and I have no thought of denying its existence. Deaths from choking, suffocation, burning, drowning—all are known and admitted. Yet in my experience of epilepsy of the "idiopathic" kind I have only had two cases of accidental death—one from smothering and one from drowning. The National Hospital figures given above indicate how trifling is the risk of a fatal termination by accident. Gowers concludes that "the danger of such accidental death is unquestionably small. The proportion of cases in which it occurs is not ascertainable, but, if all cases of epilepsy are considered, it is minute." With this conclusion I am in cordial agreement; the risk is continually and grossly overrated because its rare occurrence is allowed to colour our conceptions of the seriousness of the "disease."

However, we may approach this question from a somewhat different angle. What is the mean age at death in the case of epileptics? I quote from Aldren Turner's¹⁰ study of the subject the following figures.

TABLE I.—*Epileptics: Mean Age at Death.*

Authority.	Mean Age at Death.
1. Spratling ¹¹	29.4 years
2. Snell ¹²	33.0 "
3. Massachusetts Epileptic Institution ¹³ ...	39.0 "
4. Lord ¹⁴ (London County Asylums) ...	40.0 "
5. Muirhead ¹⁵ (Scottish Widows' Insurance Association)	48.0 "

So great is the disparity between these various figures that it is clear they must represent very different types of case. To apply indiscriminately such conclusions as these figures offer is obviously not permissible. They are vitiated, moreover, from still another point of view; we have no means of ascertaining the pathology of the cases forming the material, which has been classified solely by a symptom—a most precarious proceeding, as all must admit.

That incompleteness of classification and absence of pathological control are essential stumbling-blocks in the

way of reaching any even approximate conclusion as to average duration of life or mean age at death is apparent from consideration of quite another group of statistics. From the Registrar-General's Statistical Review of England and Wales (1925)¹⁶ I find in that year the cause of death certified as "epilepsy" in the case of 1,097 males and 1,026 females. The figures for the different age periods are as follows:

TABLE II.—*Deaths attributed to Epilepsy, 1925 (Registrar-General).*

Age Period (years).	Males.	Females.	Age Period (years).	Males.	Females.
0-1	22	12	45-50	70	68
1-5	39	30	50-55	64	74
5-10	46	18	55-60	70	73
10-15	55	39	60-65	65	68
15-20	87	75	65-70	54	71
20-25	96	77	70-75	43	51
25-30	82	74	75-80	29	37
30-35	83	94	over 80	29	23
35-40	83	67			
40-45	80	75		1097	1026

What can be legitimately inferred from the above table? It should be stated that according to the international agreement on which disease classification is based the group "epilepsy" does *not* include infantile convulsions, for which other statistical figures are supplied. The neurologist at once asks, What is the "epilepsy," separate from "infantile convulsions," which is given as the cause of death of 34 infants under 12 months, or of 103 children under the age of 5? To suppose all are cases of so-called idiopathic epilepsy is impossible. Again, has "idiopathic" epilepsy been responsible for 52 deaths at the advanced age of 80 and over? As long as "epilepsy" remains undifferentiated, just so long will tables of this kind prove nothing whatever. Taking them at their face value, however, and solely for the sake of comparison of age periods, we observe that just as many persons die from "epilepsy" between the ages of 70 and 75 as between 10 and 15, and that more live to over the age of 60, eventually to die as "epileptics," than succumb below the age of 20. I scarcely think figures of this kind favour the traditional views on the subject that still obtain currency.

We may look, in the second place, at the question of the frequency, among nervous diseases, of "epilepsy" as a cause of death—again with the proviso that this particular diagnosis covers as great a multitude of diagnostic sins as does influenza.

I have compiled from figures given in the 1925 Statistical Review (England and Wales)¹⁶ the accompanying table.

TABLE III.—*Deaths attributed to Nervous Diseases (England and Wales), 1925.*

Nervous Disease.	No. of Deaths (Male and Female).
Cerebral apoplexy	27,031
Epilepsy	2,123
Paralysis (unstated—for example, hemiplegia, etc.)	2,098
Meningitis (all kinds)	1,814
General paralysis of the insane	1,539
Diseases of ear and mastoid	1,183
Cerebral tumour	1,035

Incidentally, the valuelessness of these descriptive terms from the only correct classification standpoint—namely, the pathological—is seen at once in their mixed character; "paralysis" is a clinical diagnosis, and so is "epilepsy," whereas cerebral tumour and meningitis are pathological diagnoses. Be this as it may, of nervous causes of death "epilepsy" ranks second, being exceeded only by apoplexy. This seems serious, but only on superficial consideration. How many of the cases of "epilepsy" were syphilitic?

How many due to cerebral vascular disease? How many the result of intracranial pressure, of meningeal or cortical inflammation, even of trauma? In none of these respects can any information be gleaned.

My next table comes from the United States Mortality Statistics (1925),¹⁷ and embodies the figures for the two years 1921 and 1922, given, not in actual numbers, but in death rate per 100,000 of the population of thirty-seven States then in the registration area.

TABLE IV.—Death Rates: Nervous Diseases (U.S.A.), 1921 and 1922.

Nervous Disease.	Death Rate per 100,000.	
	1921.	1922.
Cerebral apoplexy	82.7	85.1
Paralysis	6.2	6.5
General paralysis of the insane	6.3	6.6
Meningitis	4.2	3.6
Epilepsy	3.1	3.3
Diseases of the ear... ..	3.2	3.1

According to these statistics, "epilepsy" is not second, but fifth, on the list of killing nervous diseases, and stands practically on a par with diseases of the ear. Since here also no attempt is made to differentiate varieties of the symptom or to distinguish pathological bases for its appearance, the table in reality is valueless; if discrimination were exercised I am convinced that "epilepsy" would rank still lower in the list. As it is, there is, in my opinion, clear justification for a revision of their mental attitude on the part of any life assurance officers who may look askance at cases thought to be "epileptic," and feel inclined to drop them.

In regard to the actual practice of offices I have little information to offer. Aldren Turner,¹⁸ who is one of the very few who have touched this aspect of an important question, cites in his book (1907) the experience of the Scottish Equitable Life Assurance Society. At that time the society had accepted twenty-three proposals, with a personal history of "fits," during a period of fourteen years. He says:

"It ought, however, to be stated that none of them was a confirmed epileptic, but only persons who had had at some previous period of life one or more epileptic seizures. The records were examined seven years later, when it was found that two persons had died—one from tumour of the brain, the other from uraemia. Of the remaining 21 cases, the eldest was 65 and the youngest 35 years of age. . . . The average age of the 21 surviving cases was 47 years. . . . It is therefore obvious that the acceptance of these cases was a justifiable procedure, more especially as the added years ranged from five to twenty."

The first comment I may make on this interesting experience is, that the two applicants who died were not cases of "epilepsy" at all; one was a case of cerebral tumour, and the other of renal disease. Scanty though these figures are, it is a remarkable circumstance that the only two fatal cases of "epilepsy" were as a fact wrongly diagnosed. A second comment is that acceptance of these "epileptic" cases was justified by the event. Turner adds a further point of some note in this connexion. Persons rarely present themselves for insurance under 21 years of age, and more than 75 per cent. of so-called idiopathic epileptic cases have already developed symptoms by this age. The prospect is distinctly in favour of freedom from the affection as the years go on. Otherwise expressed, if there is a family history of epilepsy and if the individual proposing has not himself developed epileptic symptoms by the age of 21, the chances are greatly against his exhibiting them at a later period. Gowers estimated these chances at 50 to 1 against, and if the reader will refer to the figures quoted earlier from Myerson he will agree that this ratio overstates rather than understates the risk.

I do not hope to be able to do more than disturb a little

the preconceptions of any who, accepting precedents and traditional practice, refuse proposals coming from "epileptics" of any kind or degree. Ideas dating from a less knowledgeable era have had so long a start that one doubts if they will be overtaken. Hughlings Jackson once said that it takes twenty-five years for new conceptions of disease to penetrate the mind of the profession, and if this is needlessly cynical, it at least embodies an element of truth.

CONCLUSION.

Summarizing the trend of argument as it makes its appeal to me, I may conclude as follows:

1. Epilepsy is not a disease but a symptom.
2. It is a symptom of abnormal function of normal neural mechanisms.
3. It is caused by a number of differing pathological processes.
4. These processes are the diseased processes which have to be diagnosed; they are the "disease," not the "epilepsy."
5. From the standpoint of life assurance it is the disease and not the epilepsy which is to be adjudicated on in the usual way.
6. Among the epilepsies is a group commonly called "idiopathic"—that is, as a fact, epilepsy of unknown origin.
7. This particular variety exists in different forms and degrees, of which perhaps the major part is benign, not malignant.
8. As an aid in differentiation, attention is to be given to the mental and physical "make-up" of the individual and to the family history and heredity.
9. Although heredity is not a negligible factor its influence has been much overestimated.
10. The risk of injury or of death in the fit itself is altogether minute.
11. The risk of injury or of death as an accident arising out of the fit has also been persistently overestimated, and is quite insignificant when epilepsy as a whole is considered.
12. Existing tables purporting to give mortality statistics in respect of epilepsy are meaningless and valueless, since the epilepsy they refer to is undifferentiated.
13. Such as they are, they do not substantiate the view that the life of epileptics is short.
14. If epilepsy of the so-called idiopathic variety does not reveal itself before the age of 21 the chances are greatly against its subsequent appearance in proportion as the years pass.
15. In my opinion a case has been made out for the individual consideration, strictly on its merits, of every case in which fits have occurred that may present itself to the life assurance medical officer.

REFERENCES.

- 1 Marie, Pierre, and Mocoquot, P.: "A quel age meurent les tabétiques?" *Semaine méd.*, October 28th, 1903.
- 2 Wilson, Kinnier: "The Epilepsies" (Harveian Lecture), *BRITISH MEDICAL JOURNAL*, July 3rd, 1926.
- 3 Thom, D. A.: "The frequency of epilepsy in the offspring of epileptics," *Boston Med. Surg. Journ.*, 1916, clxxv, 573.
- 4 Myerson, Abraham: *The Inheritance of Mental Diseases*, Baltimore, 1925.
- 5 Macdonald, M. E., and Cobb, Stanley: "Intracranial pressure changes during experimental convulsions," *Journ. of Neurol. and Psychopathol.*, 1925-4, ix, 228.
- 6 Eisberg, C. A., and Sicokey, B. P.: "Studies on epilepsy," *Arch. of Neurol. and Psychiat.*, 1923, ix, 613.
- 7 Clark, L. Pierce: "A psychological interpretation of essential epilepsy," *Brain*, 1920, xlii, 38.
- 8 Rows, R. G., and Bond, W. E.: *Epilepsy: A Functional Mental Illness*, London, 1926.
- 9 Gowers, W. R.: *Epilepsy and other Chronic Convulsive Diseases*, second edition, London, 1901.
- 10 Turner, W. Aldren: *Epilepsy: a Study of the Idiopathic Disease*, London, 1907.
- 11 Spratling, W. P.: *Epilepsy and its Treatment*, New York, 1904.
- 12 Snell, quoted by Aldren Turner (ref. 10).
- 13 Copp, Owen: "The State's relation to the epileptic," *Boston Med. Surg. Journ.*, 1905, clii, 124.
- 14 Lord, J. R.: "The care of the epileptic," *Journ. of Ment. Sci.*, 1899, xiv, 468.
- 15 Muirhead, Claude: *Scottish Widows' Fund, Report of Medical Officer*, 1902.
- 16 Registrar-General's Statistical Review of England and Wales, 1925 (New Annual Series, No. 5), 1926.
- 17 U.S. Mortality Statistics, 1922. Bureau of the Census, Washington, U.S.A., 1925.