THE PROBLEM OF EPILEPSY.

A study of the disease in its varied aspects.
The following pages are largely based on cases treated in the Colony of Mercy for Epileptics, founded by William Quarrier, at Bridge of Weir, Renfrewshire, of which the writer is Medical Superintendent.
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INTRODUCTION.

The Problem of Epilepsy seems to vary according to the standpoint or position of the observer. To the pathologist it is "What morbid changes are there to which the disease as a whole can be attributed?" That aspect of the problem seems as far from solution as ever. Universal agreement is at present impossible, the theories and facts bearing on the subject being numerous and conflicting. To the general practitioner the problem is "What should I do for those unfortunately afflicted with this miserable malady?" Bromides and other drugs are invaluable, but very frequently they seem to have no effect, and when the patients or their friends look to the Doctor for help and advice, he feels powerless. To the parliamentarian and social reformer who know little concerning Therapeutics and treatment and less about Pathology, as they consider the vast number of Epileptics, of whom there are 40,000 in England and Wales, 6,000 in London alone, apart from those who are insane, each, with few exceptions a burden to himself and his friends - to the parliamentarian and social reformer the problem is "What legal steps should be taken to help these people, to make their lot easier, and at the same time, to save the community from/
from the pernicious effect of their presence?"

As a matter of fact, these apparently varied problems are but different aspects of the same question, and there is no doubt, the solving of one would prove the solution of the other.

Could we but obtain a correct understanding of the Etiology and Pathology of the condition, we should be able to treat the condition intelligently and effectually, thereby subsequently lessening its incidence and presence in our midst, as Echeverria (1) has said - "The fundamental question in the study of Epilepsy is to establish the peculiar morbid conditions influencing its development to discriminate the general from the local circumstances in order to arrive at a rational and successful treatment."
Epilepsy is probably one of the oldest known diseases. Records of it date back to the earliest times. The ancients not infrequently ascribed the symptoms as being due to the malice of demons, or the anger of offended deities, hence the terms Morbus Demoni-cus and Morbus Sacer.

There are several references to the disease in the Scriptures, the most typical description being that of the only child who "suddenly crieth out and foameth at the mouth and gnasheth his teeth" and "often times he falleth into the fire and often into the water." (Matt.17:15) The word used in the original to describe him is which is translated "Lunatic" and means literally "moonstruck". It was a very general belief that the disease had some connection with the phases of the moon. A further interesting passage in this connection is that in Psalm 121:6, where we read "the sun shall not smite thee by day, nor the moon by night" doubtless referring to Epilepsy. This lunar theory of Epilepsy persisted till as recently as 1577 A.D. when it was put forward by Vicar, the physician of Henry VIII. If a person was seized with Epilepsy in the Forum, the Romans considered it an ill omen. The meeting was dissolved and all public/
public business suspended for the day. Hence the
disease was known as Morbus convitialis. The term
Morbus qui sputatur was given because those present
were accustomed to spit upon an Epileptic either to
express their loathing, or to avert the evil omen
from themselves. Other names have been used accord-
ing to characteristics of the disease: e.g. Morbus
caduceas, the falling sickness; morbus insputalis,
frothy sickness. The name for the disease that has
survived belongs to this class, being the Greek
word meaning a seizure.

Many men who have helped to make history have
been afflicted with the disease. For example, it
is said Hercules was an Epileptic, and for a time
the disease was known as Morbus Herculeus. Accord-
ing to Origen, epilepsy was the thorn in the flesh
for the removal of which St. Paul thrice besought
the Lord. Mahomet was an Epileptic, and it is
said that he attributed the attacks he suffered
from to the Almighty drawing near to him, and
communicating His will. Julius Caesar is related
by Suetonius to have had two fits in public places.
Plutarch also relates that he fell in convulsions
during the battle of Thapsus. It is recorded by
Mineval, his private secretary, and by Corvisart,
his physician, that Napoleon was subject to epileptic
seizures, and his occasional, temporary forgetfulness,
his confusion and apathy appear to coincide with the conditions occurring during the post paroxysmal epileptic stage. It is recorded that as auras he used to see the form of a "little red man" and at times "a star in the heavens". Accounts written of Joan of Arc show that she was an Epileptic. Swedenborg in his diary relates that he had visual illusions, which would appear quite suddenly, and his landlord in Fetter Lane described automatic actions after a sudden seizure in which he foamed at the mouth and fell. Jefferson in his biography of Byron refers to the Epileptic seizures which occurred when Byron was in his 36th year, and states that he had five epileptic seizures in 13 days. Moliere, the greatest of French comic dramatists, is also stated to have been an Epileptic.
DEFINITION.

The disease has been defined as a "paroxysmal neurosis affecting consciousness" - a nervous disorder characterised by sudden attacks of unconsciousness, occurring at irregular periods, with or without convulsions, and tending to progressive mental and motor weakness. That, however, is a definition which does not satisfy some observers, notably among these - Sir W. Gowers, who considers that as we can have Epilepsy, with or without convulsions, so we can have it without loss of consciousness. These observers refer to some few cases where the prodromata may be present, but the attack does not go beyond the "aura" stage, and consciousness is not at all impaired. It is necessary, however, to insist upon a state of mental confusion even in the lightest attack, such as to prevent perfect recognition of surroundings. Loss of consciousness is the essential characteristic of epilepsy. Again, while the definition states that the disease tends to progressive mental weakness, that is not an invariable rule, as has already been shown in the illustrations quoted of notable people who have been so affected.

As a disease, Epilepsy affects, roughly, two persons out of every thousand, and while found at all/
all ages, as Reynolds and others have shown, it most frequently manifests itself for the first time between the ages of 1 and 14, again at or about 40.

It is a disease that is not confined to the human race as might well be imagined. It is quite common in dogs and cats, and is found in highly bred pigs and cattle. In dogs it often follows distemper, and sometimes the muscles of the throat are so involved that fatal suffocation ensues. In cattle it is usually associated with engorgement of the second or third stomach, and, therefore, probably is of a reflex nature, and not the true idiopathic type.

Epilepsy is a disease probably not painful in itself, and although alarming, is seldom immediately fatal. The death rate among those afflicted with the disease is not abnormally high, yet it is a disease that carries infinite anxiety and dismay. The striking change from apparent full health to senseless helplessness, the piercing, terrifying scream caused by the tonic contraction of the respiratory muscles, and the forcing of inspired air through a closed glottis, the falling to the ground as if struck, the fearsome convulsion, then the short period of exhaustion, sometimes of stupor as he comes round to/
to apparently normal health again - the oft repeated condition too often deteriorating the mental calibre of the patient, driving him down the steep path leading to that type of insanity described as dementia, all tend to perpetuate anxiety and dismay in the heart of the patient and of his friends.
VARIETIES.

The term Epilepsy is applicable to and includes numerous subtypes differing from each other symptomatically. Hence the necessity for a classification of varieties.

A. The transient loss of consciousness without convulsions is known as "Petit Mal" or "Minor Epilepsy".

B. Loss of consciousness with general convulsive seizure is known as "Grand Mal" or "Major Epilepsy".

C. Convulsions which at first are localized but may become general, and usually occur without loss of consciousness or in which loss of consciousness comes on late, is termed Jacksonian, cortical or partial Epilepsy. Some writers in dealing with Epilepsy exclude the Jacksonian variety. In considering the Problem of Epilepsy, however, from a practical point of view we cannot exclude it. It is as truly Epilepsy as the so-called idiopathic variety differing merely in this respect that the cause is recognized, while in the other case it is not. Further, the distinction between partial and true Epilepsy is not a sharp one.
On the one hand chronic convulsions in true Epilepsy may occasionally be limited to a certain part of the body, and not be with unconsciousness. On the other hand, partial Epilepsy may end in general convulsions with loss of consciousness, producing a fit, indistinguishable from a Grand Mal seizure, as in the case of a lad under my care (G.J.). He feels the attack coming on, and dreading it cries for someone to help him, or rushes to a person near at hand. The left foot first stretches out and trembles slightly, gradually becoming more violent. The left arm then begins, and the muscles of the face and eyelid twitch very markedly. The fit may end with that, and if one near at hand grip him, and be firm with the lad, it does. Otherwise it goes on to a typical epileptic seizure.

These three varieties are the outstanding types which one meets with. There are others, which, while they may be classed under one or other of these types, have definite characteristics of their own, entitling them to a separate place by themselves. These characteristics may belong to preparoxysmal, the paroxysmal, the postparoxysmal, or interparoxysmal period, and depend largely on where the emphasis or stress of the fit falls.
Of these varieties may be mentioned: -

1. That form of Epilepsy that may occur without convulsions to which there has been applied the term Epileptic vertigo, faint sensation, blank darkness are variously applied to it. Esquirol called the variety "Masked Epilepsy", Maudsley, "the convulsive idea", Morel, "Epileptic larvae". It is characterised by certain phenomena of abrupt onset in the psychical, or motor volitional sphere. E.G. Automatic, causeless, but apparently purposive movements may represent the entire motor explosion or a transient stupidity or absence of mind may be the only evidence of impaired unconsciousness. A patient at Bridge of Weir (T.F.) illustrates this variety well. About 10 times every day, for a minute or so, no matter what his occupation may be at the time, he suddenly talks stupidly, waves his hands and twists his arms about. Then for a second, he stares, and is all right again. He has no remembrance of the affair afterwards. Another case is that of Kate Murray, aged 21 years, whose entire motor explosion consists of a movement of her hands, trying to get something about her dress that is/
is not really present. The attack begins with saliva flowing from her mouth, and she usually maintains a sitting posture although unconscious.

2. Psychical Epilepsy, a type that was first discovered by Weiss. Here objectively, at least, the explosion is entirely in the direction of a disturbed mental equilibrium; a condition of dream-like confusion, in which the patient moves about unnecessarily, undresses himself, exposes his organs, and performs complicated actions, which he afterwards cannot remember about; or a condition of abrupt and irregularly recurring paroxysms of insanity usually preceded with an aura, and also with no recollection on the part of the patient of the attack. It may be a condition of great anxiety with terrifying visions (2) called the **Petit Mal Intellectual** by Fabret (3); or a condition of Narcolepsy from which the patient cannot be wakened, and followed by delirium, as described by Westphal, Gilinean and Feri. Other writers have described this form as "Epileptic Psychical Equivalents." A patient, Willie Love, illustrates this type. In an attack, he becomes alarmed, thinking he is about to die. Frequently he tears the bedclothes, and throws himself about mercilessly, and springs from bed to bed.
After the attack is over, he is quite a normal individual. Another patient, Moses Nelson, who usually is very quiet and reserved, suddenly becomes very talkative, in a most genial manner. He walks very rapidly and performs many foolish acts. The fit lasts for a varying period, then passes off, leaving no recollection. Sarah Clark, another patient, during an attack, dresses and undresses herself, in doing so, invariably putting garments on upside down. She likewise has no memory of it.

3. Epilepsy Procursiva, or running Epilepsy as described by Bourneville, Ladame, and Hare. In this, the patient, as if driven by some blind impulse, runs some distance forward, less often backward, or in a circle, before an attack commences and often without further development. This type is peculiar to youth and childhood and is often complicated with moral insanity (4) occurring in congenital degenerates and perverts. It may be present many years before emerging into pronounced epilepsy, and may alternate with typical attacks. This is illustrated by a patient in this place, Douglas Irving, aged 17 years. At the outset of the attack, he becomes terror-stricken, then runs forward so rapidly, that a swift runner can scarcely make up on him. After/
After going about 200 or 300 yards, he falls down, clutches most violently whatever may be at hand, and there ensues a typical fit. At times he runs backwards, and once, on board ship, where he could not run forward, he ran in a circle before the fit came on. This is the only type of fit he has. He is a passionate lad and has to be carefully watched.

4. Muttering epilepsy, which has been described by Marmotante, and is characterized by the automatic repetition of a few senseless words. A patient, Janet Burt, aged 30 years, under my care, when a fit occurs, screams and falls down, then mutters automatically, senseless, yet quite coherent words. The convulsive seizure may or may not follow on this. Another patient, during a fit, keeps on saying "Yes, yes" all the time.

5. Epilepsy continua, as described by the Russian Muratoff, and is characterized by twitchings of short duration occurring in the periods between the attacks. Robert McConnachie, aged 22, illustrates this. On an average of once every three weeks he has a true Grand Mal attack. Every day between the attacks, he has twitching attacks, or suddenly jumps up, no matter/
matter what he be doing, eating, working or sleeping. Previous to a Grand Mal attack, and following on it, these seizures are more severe, causing him to fall down wherever he may be, although he is conscious all the time.

6. Reflex epilepsy. The chief cause of this is traumatism of the peripheral parts. Generally aura are present, usually parasthesia or twitchings which may become more and more extensive. The cicatrix, if one is present, may become sensitive and form what has been called an Epileptogenic zone: that is, a part which if stimulated will provoke an attack, as in a case I saw, when a student, operated on by Prof. Chienc in the Royal Infirmary, Edinburgh. Other reflex causes are intestinal worms, uterine disorders, and foreign bodies in the ear, as in a case recorded by Sir W. Whitla (5). We have in the Colony a girl named Kate Mabon aged 13 years, illustrating this type. If she receives a knock or blow on her abdomen there follows at once a Grand Mal seizure. This type of Epilepsy is regarded by some as Hysteria, but if, as is asserted, the absence of the pupillary reflex be the differential mark from Hysteria, it is not so, and Seeligmuller who has gone fully into the subject has clearly proved that fact (6).
7. The Apoplectic form of Trouseau, characterized by the absence of the tonic and clonic stages of the disease and the presence only of loss of consciousness.

8. The Retropulsive Epilepsy of Lanois.

9. Abortive Epilepsy as described by Trouseau, Arden, Deltail, and Bellsair (7) in which there is present Angina Paroxysmal Dachycardia, spasms of the Glottis, Asthma, Neuralgia, Aphasia, profuse salivation, or gastric disorders in place of the attack. Fere has described attacks of a similar nature, in which transient deafness, great fatigue, priapism, paroxysmal bulima or pica and apathy of short duration have occurred as equivalents to the fits. (8) The proofs, however, that these represent abortions of epilepsy are not satisfactory in the opinion of some observers. A patient, George Jobson, who is with us, however, clearly demonstrates the variety. He is normally in perfect health, then suddenly he is seized with great sickness. His pulse becomes very rapid and intermittent, and he vomits pale, green fluid. So ill does he look that every moment appears as if it would be his last. Then in a very short time, everything passes off and he/
he becomes quite well.

10. Grondome (9) has described a type which he has termed Epileptic Choreica.

11. Vaso-motor epilepsy has been described by P. Meyer, in which the patient suffers from repeated attacks of hypothermia. According to some observers, Reynaud's Disease might possibly come under this heading.

12. Epilepsy mutans - this is said to be a minor form of Jacksonian epilepsy. The motor spasms are limited to the muscles of the neck, causing nodding of the head.

13. Cardiac epilepsy. This form resembles Angina Pectoris or simple cardiac syncope. There may be little more than an aura of praecordial anxiety, or an attack of Bracy cardia with transient unconsciousness but without motor spasm. There is usually no organic cardiac disease present, although there may often be arterio-sclerosis. Generally, these cases are of the Petit Mal type at first, but ultimately they develop into Grand Mal. Agnes Docherty, aged 30 years, once every 2 or 3 weeks, has acute pain in the region of the heart followed by/
by attacks which are marked by the absence of convulsions.

14. Migranous epilepsy. Habitual migraine may be either succeeded by true epilepsy, or epilepsy may be succeeded by migraine, or the two conditions may alternate or many phenomena of both may be noted together. The epilepsy, however, usually appears later than the migraine. In a typical case it is not easy to decide whether epilepsy or migraine is the main pathological condition. A neuropathic condition is always present in these cases and frequently secondary etiological elements are present. E.g., Syphilis, alcohol, or other intoxicants, injuries, arterio sclerosis, and excessive physical and mental efforts. (10)

15. Tetanoid epilepsy first described by Pritchard in 1822. The tetanic state alone is present to the exclusion of the clonic or alternating contraction and relaxing period. J.F. aged 13 years, so afflicted is of normal intelligence and well developed. When the attack comes on he gives a sharp cry, his face becomes flushed, his legs stretch out. He grasps firmly whoever may be near at hand. His body becomes perfectly rigid, and remains so for about half a minute, then he becomes normal.
normal again.

The danger of this type is the sudden, sharp, and complete inhibition of respiration causing death, as in a case recorded by Spratling (11).

16. Serial Epilepsy - in which Grand Mal and Petit Mal seizure occur in regular sequence for 20 or 30 times at varying period.

17. Status Epilepticus - Stat de Mal. In this condition the patient passes from one fit into the other without an intervening paroxysmal period. The temperature rises with each attack, reaching perhaps 106° and continues to rise after death. One case reported reached 107.6° and another case mentioned by Bournville 111.2°. The pulse is small and very rapid. The attacks may last for several days, and eventually cause death by exhaustion. The cause of Stat de Mal is unknown. Clark Prout claims that the withdrawal of large doses of bromide has caused it. There are variations of Status Epilepticus. Weber has reported a case where fever was the only symptom, and Pick, a case where coma without convulsions was the only sign.
We have classified Epilepsy according to the symptoms observed. A better classification would be into 3 groups.

A. Idiopathic Epilepsy.

So called because until the present time no recognised and tangible condition has been described to account for it. Although Alexander of Liverpool has found Oedema of the meninges in certain cases where he has performed the decompression operation.

B. Symptomatic Epilepsy.

Epilepsy that is accounted for by some lesion of the brain, an injury, a tumor, or thickening of the membranes from encephalitis, haemorrhage and thrombosis, etc. by degenerative cardio-vascular disease, by intoxications, alcoholic, lead, etc. by eclamptic conditions, such as uraemia.

C. Reflex Epilepsy.

Epilepsy that is due to injury of the peripheral parts implicating the nerves of that region, to intestinal worms or foreign bodies in the cavities.

The best classification, indeed the ideal classification would be according to Etiology, but
"the disease is not a morbid entity" as Echeverria (1) has remarked, "but a manifestation of manifold derangements disturbing the nervous system, and giving rise to definite, inseparate conditions, that remain the same whatever be the occasional cause of Epilepsy." The variations and irregularities that spring from every form, phase, type and variety of Epilepsy, constitute one of its most pronounced characteristics, whatever the cause or causes may be, and make an etiological classification at present well nigh impossible.

Spratling takes as his basis the two facts:-

1. That Epilepsy is a condition or disease dependent on nervous or degenerative disease in the parent more frequently than any other single cause.

II. That fully eighty per cent or more of all cases of Epilepsy begin before the 20th years.

On these premises, he builds up a practical classification:-

1. Those common in the Infantile period, from birth to the 3rd year.
   (1) Infantile inherited Epilepsy.
   (2) " accidental "
   (3) " traumatic "
   (4) " idiopathic "

21.
2. Those common to childhood and early life, from 4th to 20th year.

   (1) Accidental Epilepsy.
   (2) Traumatic "
   (3) Developmental "
   (4) Idiopathic "

3. Those occurring after 20th year with no history of convulsions prior to that period.

   (1) Accidental.
   (2) Toxic.
   (3) Traumatic.
   (4) Idiopathic.
   (5) Senile.

All of these, however, are merely heads that require to be divided and sub-divided again and again leading to hopeless confusion.

Many years of research in the Laboratory by specially trained and qualified scientists, combined with additional years of studious observation of the clinical side of Epilepsy, and of the Epileptic must intervene before we can construct an etiological classification that will meet the scientific demands for it.

I have appended tables that may be of interest, classifying a number of Epileptics with whom I have come into touch professionally.
ETIOLOGICAL CLASSIFICATION OF 156 CASES OF EPILEPSY.

A. Infantile Period - Birth to 3 years.

<table>
<thead>
<tr>
<th>Etiological Variety</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>1  Inherited Epilepsy</td>
<td>9</td>
<td>1</td>
<td>10</td>
<td>6%</td>
</tr>
<tr>
<td>2  Accidental Epilepsy</td>
<td>12</td>
<td>2</td>
<td>14</td>
<td>9%</td>
</tr>
<tr>
<td>3  Traumatic Epilepsy</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td>5%</td>
</tr>
<tr>
<td>4  Idiopathic Epilepsy</td>
<td>7</td>
<td>7</td>
<td>14</td>
<td>9%</td>
</tr>
</tbody>
</table>

B. Childhood and Early Life - 4th to 20th year.

<table>
<thead>
<tr>
<th>Etiological Variety</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Accidental</td>
<td>13</td>
<td>8</td>
<td>21</td>
<td>14%</td>
</tr>
<tr>
<td>2  Traumatic</td>
<td>17</td>
<td>5</td>
<td>22</td>
<td>15%</td>
</tr>
<tr>
<td>3  Developmental</td>
<td>15</td>
<td>4</td>
<td>19</td>
<td>12%</td>
</tr>
<tr>
<td>4  Idiopathic</td>
<td>21</td>
<td>10</td>
<td>31</td>
<td>20%</td>
</tr>
</tbody>
</table>

C. Those occurring after the 20th year with no history of convulsions prior to that period.

<table>
<thead>
<tr>
<th>Etiological Variety</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Accidental</td>
<td>5</td>
<td></td>
<td>5</td>
<td>3%</td>
</tr>
<tr>
<td>2 Toxic</td>
<td>1</td>
<td></td>
<td>1</td>
<td>0.6%</td>
</tr>
<tr>
<td>3 Traumatic</td>
<td>2</td>
<td></td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>4 Idiopathic</td>
<td>8</td>
<td>2</td>
<td>10</td>
<td>6%</td>
</tr>
<tr>
<td>5 Senile</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>

Fuller particulars of those cases are to be found in the appendix where they are dealt with comprehensively seriatim.
ETIOLOGY.

We all inherit a predisposition to the characteristics of our parents, physical, mental, and moral. This is true not only in regard to what is normal, but also in regard to the abnormal. Phthisis occurring in a person whose parents have died from the disease is generally held to be worse from the point of view of prognosis than in one whose family history is free from such a taint. Epilepsy to a very large extent, more so perhaps, than in the case of any other well known disease, is dependent on a definite diathesis towards it. In considering the etiology of epilepsy, it is therefore needful to do so in two distinct sections, and treat:

1st of predisposing causes.

2nd of exciting or determining causes.

Undoubtedly as a predisposing factor, heredity must be given the first place. This is universally recognised. Authorities are agreed on that point. Gowers (12) goes as far as to say that Epilepsy is an inherited disease. "Heredity" says Voisin (13) "in Epilepsy, plays the chief note." Notthnagal (14) points out that heredity no longer needs to be proved, by special instances and statistics, and that the fact is noted and conceded by all observers. Aldren Turner (15) emphasises the fact that the most/
most predisposing cause of epilepsy is ancestral epilepsy. Opinions vary regarding the percentage in which heredity plays a part. Echeverria (16) placed it as low as 25%, and Finck as high as 75%. Between this 25% and 75% other writers vary. Reynolds' (17) cases gives 31%: Gowers in 2,400 cases, 40%: Spratling (18) in 1,070 cases, 56%, Binswanger (19) at 35% to 40%. Out of 156 cases, I have traced hereditary influence in 68%, over 23% of that number being alcoholism in one or both parents, as the appended table shows. Trouseau pointed out and forcibly insisted that hereditary transmission may be direct or indirect. Nervous diseases are remarkable for their tendency to transformation. For example, hypochondriasis, dipsomania, weakness of mind, neuralgia, chorea, stammering or spasmodic asthma in one generation, might produce epilepsy or insanity in the next - the tendency to these being the product of a mentally unhealthy stock. Further, it is generally accepted that the neuropathic diathesis is "anticipated" in the offspring: that is to say, the disease comes on earlier with them than it did in the parent. A striking case illustrative of that is one met with in the writer's private practice. J.G.'s father was a nervous individual, and suffered from spasmodic asthma. J.G. himself when he reached manhood's years became addicted greatly/
greatly to drink, and loose living, no doubt on account of inherited mental weakness. When about 30 years of age, he first became affected with epilepsy due also to the inherited predisposition, plus the vicious life he had led. When I was treating him he was about 45 years of age. He called me in to see his son, a lad of 15, who just at that time had begun to have epileptic seizures: his other children were not insane or imbecile, but decidedly weak minded.

Other factors in a parent, predisposing to epilepsy in offspring in addition to the neuropathic condition are:-

1. Consanguinity in the parents; I have two patients under my care just now whose parents are cousins.

2. Tuberculosis - in nearly 156 cases whom I have treated, a distinct tubercular history was obtained; 30 of the fathers and 23 of the mothers making roughly a total of 21%. Although doubt regarding pthisis as an etiological factor is expressed by Gowers, the percentage is very high, and there is more than a possibility that it may be a predisposing factor. Out of 980 cases of Hamilton there were 230 physically inclined.
3. Syphilis in the parent undoubtedly in a certain number of cases seems to predispose to the disease in the children. Again and again in treating children and young people, and finding Bromides to fail, on putting the patients on antisyphilitic remedies in addition, an improvement has resulted. Occasionally, one gets a history of it from the parent, but it is difficult to obtain.

4. Alcoholism in one or both parents comes next to a neuropathic diathesis, among the predisposing factors in the production of epilepsy. Bourneville who studied 2,554 children admitted to the Bicthe and Fondation Valee, all of them suffering from idiocy, epilepsy, imbecility, or hysteria, found that 1,053 of them were offspring of drunken parents. Of the epileptics at present at Bridge of Weir, 23% are the offspring of alcoholics. Parental intoxication at the period of conception has been mentioned by Esquirol especially, as a predisposing factor, but it is difficult to see how the mere intoxication at that special time could influence the ova or the spermatozoa, in such a way as to have a lasting, deleterious effect on the ultimate product of conception. One can understand, although/
although it may be difficult to explain how chronic alcoholism or persistent drinking for some time prior to conception or during pregnancy could have such an effect. Other predisposing causes which need merely be mentioned are:

5. Constitutional anaemia.
7. Rheumatism.
8. Organic degeneration situated in the ovaries testas.

The experiments of Brown, Seguard, and Luciani were very interesting and instructive in this respect. Working with guinea pigs, they divided certain portions of the sciatic nerves. As a result, convulsions indistinguishable from Epilepsy were produced. These convulsions lasted long after the primary effects of the injury had ceased, and animals with this artificially produced Epilepsy acquired a hereditary and congenital morbid tendency. Their offspring were Epileptics. M. Sommers and others, however, have raised objections to this, having failed in their experiments to obtain like results.

The presence of a predisposition cannot in itself/
itself account for Epilepsy, hence the necessity to look for some agent or agents which act as stimuli to the organism, and excite the degenerated brain to abnormal activity.

The immediate determining and exciting causes of Epilepsy are apparently numerous.

1. Infantile convulsions associated with dentition, or rickets, is the exciting cause of a great number. Sir L.S. Clouston says "I have seen the convulsions of dentition followed by prolonged delirium, ending in true Epilepsy. Dr. Jacobi, writing in "Medical News" (20) says - "The spasms and convulsions of infancy are serious manifestations, and if allowed to go unchecked may lead to explosions of genuine epilepsy."

Voisen, (21) says "Dentition is the touchstone of the hereditary predisposition of Epilepsy." Gowers says "A considerable number of cases of Epilepsy date from Infantile convulsions." He found that 10% of his cases had a history of late teething and walking, crooked limbs, convulsions, and other signs of rachitic condition.

In going over the records of cases I have been struck by the numbers that have given like histories, 22% of the cases showing them in infancy.
The ratio of cases in which simple convulsions may pass into Epilepsy is governed entirely by the original stamina of the patient, - the constitution he has inherited from his parents. If the predisposition be there, in time the reflex convulsions will degenerate into true Epilepsy.

2. Cerebral haemorrhage due to injury is a frequent cause of Epilepsy. These haemorrhages may be very small indeed and show themselves in the form of hemiplegia, diplegia and paraplegia, these in time perhaps, clearing up to a large extent, and only discovered by careful examination of the varied reflexes and testing of muscular power and cutaneous sensation.

Often it is revealed best immediately after an attack by local muscular weakness, the attack having for a time depleted the weakened foci of muscular innervation in the brain.

3. A toxiopathic condition is a frequent exciting cause. Alcohol, lead, absinthe have caused it in adults, as well as predisposed the children of such people to the disease. The importance of alcohol has been differently estimated.
estimated by various authorities. P.M. Thomsen from his experiments in the Charite looked upon it as the principal cause. Wildermuth (22) on the other hand, claims that it is the cause of but a small proportion. Wartman (23) found 250 alcoholics in 452 Epileptics.

It is difficult to decide the real importance of alcohol as a determining cause. There can be no doubt that alcoholism is the factor in producing a certain number of epileptics, but in certain other cases, it is quite likely that the alcoholic habit and the epilepsy are both due to the inherited mental degenerated condition. (24) In Germany where statistics of epilepsy are more easily obtainable it is found that the percentage of the disease keeps pace with the consumption of alcohol. In certain districts where distilleries flourish the number rises from 2 to 4 and 6 per 1,000 of the population. Other drugs which have caused convulsions indistinguishable from epilepsy are cocaine, stovaine when used for lumbar anaesthesia, arsenic, ether, antipyrin, chloroform, theophyllin, physostigumum, and camphor, as in cases reported by Rosenthal, and Salmonsen.

Roasted coffee beans 25 to 180 grains per/
per day, taken over a period of many years caused it in a case recorded by Marburg. (25)

4. **Auto-Toxaemia.** The theory that the epileptic attack is the direct outcome of some organic poison manufactured in the body, is not a new one, but lately it has been gaining ground. McLane Hamilton (26) lays great stress upon this point. The source of the poison in his opinion is most probably some disintegrating process in the intestinal canal, staphyloccoci in the blood, or degradation products of nerve tissue. Aldren Turner and J. Turner are also convinced of the presence of some toxic substance in the blood as a provoking agent.

In support of the auto-toxication theory Lewis Bruce (27) and Pugh (28) have pointed out that in the blood of epileptics there is to be observed a hyperleucocytosis when it is examined after a serial outburst or an attack of status epilepticus.

Mott and Halliburton have found cholin, a disintegrating product of Lecithin in the cerebro spinal fluid in organic nerve disease, and Donath (29) and others have frequently found it in Epileptics.

Voisin and Kramski (30) have shown by experiment that after a fit the urine of epileptics/
epileptics is toxic if it be injected into the blood stream of rabbits. So far experiments have failed to demonstrate the toxicity of the blood of epileptics. Kramski (31) considers that the poison is ammonium carbonate in the blood: he also declares that an attack can be predicted by the amount of uric acid excreted. The source of this intoxication may be a transient disorder of the kidneys caused by some congenital morbid condition of the nervous system, preventing the excretion of toxic substances to a normal extent, or it may result from gastro-intestinal disorders.

Haig (32) propounded the view that the convulsions of epilepsy were due to the excess of uric acid in the blood.

Herter and Smith (33) have tried to show that fits run parallel with the ethereal sulphates of the urine. According to their investigations, the fit is preceded by a rise in the ratio of complex to simple sulphates in the urine. This rise they claim to be due to intestinal putrefaction.

Ceni claims to have demonstrated an auto-cytotoxine and an anti-auto-cytotoxine in the epileptic blood which does not exist in a free state in the plasma but is latent chiefly in the blood cells from which it is set free.

A very interesting series of experiments lately/
lately carried out on six patients, seems to indicate that free ammonia in the blood might be the cause of Epilepsy. The convulsant effects of ammonia when injected into the circulation experimentally are well known.

Urea is formed chiefly by the recombination of ammonia and carbonic oxide by the hepatic cells. If, through an error of metabolism, there be too much ammonia or too much carbonic oxide, or if the special junction of the liver cells be to any degree interfered with, less urea will be excreted, and ammonia in some form will escape into the blood. Though small in quantity it might be sufficient to affect sensitive nerve cells.

It was found that if the urea ammonia ratio of the urine were taken regularly; it varied very much (from 9.3 to 100) and the fits appeared to have some correspondence to a low ratio. It is difficult to obtain specimens of urine immediately after a fit, so many epileptics micturate unconsciously during the fit. The urea ammonia ratio, however, of 8 specimens obtained not more than four hours after a fit ran –

7.6, 12: 5; 5.7: 3: 12: 38: 15.

In general terms it may be said that the majority of good observers in chemical pathology/
ology believe that there is a hypertoxicity of the urine, the blood and the sweat, from
the paroxysmal to the post paroxysmal stage and in the interparoxysmal stage there is a
hypotoxicity. There is no agreement, however, upon the toxic agent or agents causing this.

5. Mental excitement or shock has been the
determining cause in a large percentage of
cases acting somewhat as in hystero epilepsy,
and chorea. Gowers (34) claims that of all
the immediate causes of epilepsy, the chief
are psychical, fright, excitement, and anxiety.

Fere says that it is beyond doubt that
in predisposed cases a fit may be provoked
immediately by a more or less intense shock to
the nervous system, and that these physical
states are associated with an over excitability
which is very favourable to the evolution of
convulsive phenomena.

One patient whom I have been treating
for some time had her first attack after a
period of intense joy. Another traced her dis-
ase to being frightened by a strange man, when
at play in the school play ground. Another
blamed the fits to a period of great anxiety
during the illness of a friend.

Gowers tells of a child who was seized
with a fit on hearing its father sneeze violent-
ly/
The fit was typically epileptic and frequently recurred. Anger and coitus have brought on convulsions. The latter, it is said, used to cause attacks in Napoleon. Thos. Watson, in his classic work, "The practice of Physic" says, "There is another very singular occasional cause of epilepsy, that deserves to be mentioned, viz. the sight of a person in a fit of that disease."

I have frequently noticed during a religious service at which Epileptics attend, that several Sundays may pass without anyone having a seizure. If on any day one has an attack, almost invariably others follow. Evidently the seizure in one Epileptic excites seizures in others. That is especially the case if the others secondarily affected are not members of the same colony, but of a neighbouring one.

Of the 156 cases which I have had those apparently due to this cause are not very numerous. In all there are 28 cases, 7 men, 10 women, 11 children - nearly 20%.

The infectious fevers are the cause of Epilepsy in a certain percentage of cases. I have three who can trace the disease to that. Scarlet Fever in two of my cases caused it, as in a case recorded by Jacobi (35).

Whooping cough, Spratling records five cases from this/
this cause. Typhoid Fever - Dide (36) reports cases of epilepsy caused by this infection. In some the convulsions appeared during the fever due to the toxins; in others they occurred after the fever was over resulting from cellular changes induced in the nervous system by the actions of the poisons generated in the course of the disease.

A. C. Brown of Edinburgh (37) reports a case of Jacksonian Epilepsy due to an abscess of the brain, in the Rolandic area of the right side. The abscess according to the author was due to the same pyogenic organism that caused the fever.

Measles: Gowers speaks of 12 cases caused by measles.

Redlich has reported a case caused by vaccination. I have two cases at present under treatments whose fits are traced to vaccination, the first fit, in each case, having occurred when the vaccination was at a head.

Organic disease of the cerebral cortex is, in the opinion of Allan Starr and several other observers, the cause of a certain percentage of cases (38) and other cases have been traced to injuries to the head, trephining and to the prolonged use of douches to the head. (39)
Falls on the head account for a fairly large number of cases, no less than 48 of my patients have given histories such as -

"Fell down stairs on the back of the head"
"Fell from a height, landing on the head"
"Fell on the fender on the right side of the head"

a short time before the commencement of the fits.

Gutman (Prolonged and tedious labour and forceps delivery as a cause of Epilepsy Abs. Journal Am. Med. Assoc. Vol. 52. p.923) points out that injuries at birth caused by forceps deliveries in prolonged and tedious labours is at the bottom of a large number of cases.

Syphilis inherited and acquired, has been specially emphasized as a cause of a certain percentage of cases, by several writers. E.g. Bratz and Luth could trace 5% of their cases to this (40)

There is a large number of cases which present convulsions, epileptiform in character, that are associated with reflex causes. Among these may be mentioned:—

1. Injury of peripheral nerves. One patient I saw traced the origin of her disease to an injury/
injury to his thumb. Whenever anything touched the cicatrix, there intense pain accrued and then followed a typical epileptic seizure. Nothengal, as recorded by Spratling, in his book on Epilepsy, has also recorded a number of cases, in which pressure on a cicatrix caused typical attacks.

2. **Imitation by a foreign body.** Sir W. Whitla (41) had a patient who suffered from epileptic attacks on account of a mass of glazier's putty which filled up the auditory passages, and became as hard as porcelain, without setting up inflammatory adhesions.

3. **Cicatrix of the scalp,** probably involving the meninges.

4. **Irritation of the uterus.** In the New York Journal of mental Pathology, a case is recorded where bromides were ineffectual in controlling fits which recurred every month periodically, prior to the menstrual flow. Scarification, and removal of about half an ounce of blood from the cervix for a day or two before the flow, was effectual in warding off the attacks. When this precaution was omitted, the fits recurred. Eventually they ceased.
ceased altogether under hot applications.

5. **Intestinal parasites.** According to Peiper, they cause convulsions, not because of the irritation they cause in the alimentary canal, but on account of the toxins they produce which get into the blood. This, therefore, ought, perhaps, to be included in the section dealing with toxic causes.

6. **Stimulation from irritation of any part of the body**—the nose and sinuses, by polypi, the stomach, the liver, phymosis, carious teeth, refractive errors have all caused attacks. After careful study and experience, Frey and Fuchs conclude that any such thing is capable of producing the disease, provided the predisposition be present. That predisposition may be congenital, may be due to the age of the child, may be injury to the brain from focal disease, trauma, etc. (43)

There are many other conditions that have been mentioned as causal agents in the disease, such as affections of the thyroid, masturbation, aortic stenosis, arthroma, persistent thymus, increased tendency of the blood to coagulate (44), cerebral anaemia (45), a morbid lymphatic constitution, but there can be little doubt as Leser states, that many/
many of these conditions which have been regarded as causal, are merely accidental complications of the disease (46).

I have been able to trace a direct and exciting cause in 90 of the 156 cases which I have treated, and of which I have records. In the appendix further particulars of these are given. Classified briefly they might be arranged as follows:

1. Mental Excitement. E.G. Anxiety, Fright, Worry, Joy, etc. .................. 28
2. Falls on the head ......................... 19
3. Convulsions associated with rickets and dentition .......................... 12
4. Injuries to various parts of the body, such as burns, fall of on the foot, etc. probably in most cases reflex ............................... 10
5. Gastric derangement ...................... 8
6. Toxiopathic ............................... 3
7. Self indulgence ........................... 2
8. Cerebral haemorrhage ................... 2
9. Fevers, Measles, Influenza, etc. ....... 3
10. Vaccination ............................... 2

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PATHOLOGY.

Of the pathology of epilepsy nothing definite and certain is known at present, in spite of the fact that the subject has engaged the attention of neurologists since the dawn of neurohistology. Innumerable pathological conditions have been described by observers. E.G.

Fere. (47) claimed that it was due to sclerosis of the cortex, a hyperplasia of neuroglia which resulted from a primary lesion, the traces of which have passed away.

Sachs (48) says that epilepsy has arisen from a long-forgotten accident or injury, that it was in its earlier years associated with paralysis, the paralysis having left but the slightest trace, while the epilepsy remains. There was a primary lesion with secondary sclerosis, and this sclerosis induced the epilepsy. He therefore agrees with Fere.

Hughlings Jackson (49) elaborated the theory of interference with inhibition through irritation of the higher cells in the cortex, for example, by plugging of the small arteries in that region by emboli.

Allen Starr (50) holds that idiopathic epilepsy is due/
due to mal development of the brain, and that epilepsy is the manifestation of this condition.

Barthez & Rilliet found tuberous of hypertrophic sclerosis chiefly in the convexity of the convolutions in the autopsies.

Chaslin (51) describes a gliosis invading the normal cellular tissue.

Bevan Lewis (52) a vacuolation of cortical cells, specially of the second layer, with an increase of spider cells.

Von Geison a hyperplasia of neuroglial tissue with reduction in size and deformity of the nerve cells.

F.W. Mott (53) has described especially in cases which have suffered from status epilepticus, swollen globose cells with diffuse chromatolysis and enlarged eccentric nuclei.

Bratz. (54) in an examination of 70 cases, found in 50 a typical proliferation of neuroglia, 25 giving no change in the cornu ammonis, nor in the motor area of the cortex, and in the other 25 cases, the cornu ammonis was diseased, on the right side 11 times on the left 13 times, and once on both sides.

The/
The change consists in:-

A. Atrophy of the pyramidal cells in the 3rd layer, sometimes extending towards the termination of the gyrus. In some cases these disappeared entirely, in others they contained yellow pigment.

B. In the stratum granulosum some cells escaped entirely, the atrophy was not uniform.

C. The myelinated fibres were corresponding atrophied, the subependymal layer was in all cases normal.

D. The atrophied cells were replaced by neuroglial fibres. Old cases were no worse than recent cases, and three of the cases never had grand mal attacks, therefore, the sclerosis cannot be ascribed to excessive motor impulses.

J.W. Turner (55) believes that the primary etiological factor is the results of (1) a defective-ly developed nervous system and unstable cortical cells and an altered condition of the blood causing, leaving the cortical stasis with subsequent atrophy, sclerosis and blood tumours according as the clothing occurs in the arteries or the veins.

De Fleury (56) believes meningocencephalitis is in existence/
existence in all cases of epilepsy acting as the predisposing and exciting cause of the disease. He quotes experiments of Claude and Lejonne in which a subdural injection of zinc chloride set up a meningo-encephalitis of the motor area. When apparently cured, small doses of strychnine were given those animals. This was followed by epileptoid convulsions. Control animals were in no way affected. Meningo-encephalitis he says may occur in intrauterine life followed by convulsive attacks in infancy.

L.P. Clark and S.P. Prout (57) examined 21 cases from the Craig Colony and found practically the same lesions in all of them. The conditions found were quite analogous to those caused by toxic agents. There was a diffuse chromatolysis and other characteristic protoplasmic changes, swollen nuclei, destruction of the nuclear membrane, and intranuclear network, giving a granular condition, and finally the nucleolus was rendered easily possible by the knife.

Bleular (58) found in the brains of 26 epileptics a definite hypertrophy of bundles of neuroglia lying between the pia mater and outermost nerve bundles.

Chaslin and Bleular (59) in their investigations found/
found the following changes in the cerebral cortex.

A. An atrophy of nerve cells.

B. Proliferation of glial fibres in the cortex. These fibres are arranged in compact bundles which are apparent to the naked eye.

C. Hypertrophy of the glial layer of the cortex.

D. Atrophy of the tangential fibres.

E. Chromatolysis of nerve cells.

Olmacher who has had a large experience in a colony of over 1,000 epileptics, and who has performed nearly 100 post mortem examinations on epileptics, has found three conditions in a very large percentage -

(1) Persistance of the Thymus.
(2) Typically morbid lymphatic constitution.
(3) Evidence of early rickets.

He concludes that epilepsy is often due to a persistent thymus, leading to a lymphatic condition, hence to laryngis simus stridulus and tetany. From this, the step to infantile convulsions or eclampsia and typical epileptic seizures, is short.

It is difficult with this multiplicity of results, and want of unison in these, to fix on anything anatomical as the real pathology of the condition/
condition. There is no doubt that the cortical layer of the cortex, in many cases, do show some changes. These, however, are not uniform, and by no means always present, and they may not, in fact in many cases are not the cause of the convulsions, but the result of the convulsions. Weber (60) found in the majority of cases who died from status epilepticus, vascular lesions, and extravasation of blood into the cortex and medulla with destruction of adjacent nerve elements. Such primary lesions resulting from the convulsion, might, in many cases, produce the secondary lesions so frequently described.

Further, many of the pathological conditions described are by no means found in epilepsy alone, and pathognomonic of the condition, for example -

1. The vacuolation described and emphasised by Bevan Lewis especially of the 2nd cortical layer, Campbell has shown is met with in such diseases as Tuberculosis and Pneumonia, being no doubt the result of a toxaeinic condition. (61)

2. The swollen globose cells described by Mott is found in a large number of imbeciles.

3. The intravascular clotting described by Hughlings Jackson and Turner may be the result of/
of the congestion that occurs during the
tonic stages of the attack, or the result of
the violent paroxysms.

4. The disappearance of the nuclear membrane and
granular condition of the nucleus, described
by Clark and Frout is found in other mental
diseases.

5. The hypertrophied bundles of neuroglia des-
cribed by Bleular, are also found in other
mental diseases. Not yet is the theory of
autotoxication established. Results of
investigations are by no means uniform. The
epileptic fit may alter metabolism as a motor
act and may cause abnormal products to appear
in the urine. The accumulation of poisonous
products in the blood may be the result of
alteration in the function of the nerve cells
due to pathological nerve irritation, and the
epileptic attack is an effort of nature by
the discharge to remove these toxins.

It is generally held by authorities in this
country that epilepsy depends upon the cells of the
cerebral cortex, being a state of high excitability
and prone to pass from normal functional relations
into spasmodic activity evinced by explosive dis-
charges of nerve energy. What may be the nature of
the molecular action that precedes the discharge, it
is/
is useless to speculate. It may be chemical, it may not. As to the site of the discharge, there can be no doubt. Clinical experience and laboratory experiment have shown it to be almost certainly in the motor areas of the cortex, in those cases where there are muscular convulsions, and in the sensory centre, in those cases where consciousness alone is lost or impaired.

What the cause of this instability of the cortical cells is, we cannot tell. If it is hereditary in the sense of an inherently defective nervous system from a hereditary vicious organism, the outlook is hopeless of the individual epileptic, and our only remedy is eugenic, and the limitation of the class. No one, however, can find heredity in more than 40 to 50% of Epileptics, and we continually meet with a large number of cases where traumatism plays an undeniably prominent part in the production of the disease. 31 out of 156 of my cases showed that, and often no hereditary taint has existed within the remotest time available in these cases.

Heredity probably means no more in the Epileptic than it does in a Phthisical case, namely, a deficiency of resistance to the particular agency by which the disease is produced. It is of interest to note that with the Epileptics in the colony at Bridge of Weir, and with the Phthisical cases in the Sanatoria at the same place, hereditary percentages/
In seeking for the real pathology of the condition, I feel strongly that we are searching in the wrong direction when we try to find out from minute changes in the cortical cells. The change may be purely psychical, and as difficult to investigate and grip as the problem of life itself.

The varied changes described by reliable observers, and the stupidity, irritability and nervousness, so characteristic of epilepsy, might be the result instead, of the predisposing or the exciting cause of the disease.

It is highly probable (62) that the large majority of cases of genuine epilepsy is essentially due to some error of metabolism whereby auto toxicity results.

The tissues seem to have lost the power of eliminating and destroying certain poisonous products of metabolism, which have special affinity for the cerebral cortex. Such toxins gradually accumulate till they reach a certain amount, then the body tries to remove them by a cortical explosion.

We are still in the dark as to the exact constitution of such poisons. Possibly they belong to the compound ammonias.

With this toxic theory in one's mind, it is interesting to note that there is present in the brain/
cavity of epileptics, an oedema of the Pia arachnoid, a clear and somewhat flueulent fluid (63)
The fluid lies emmeshed in the Pia and visceral arachnoid. The cortical cells live therefore, as it were, in a marsh, causing, consequently, in all probability, a malnutrition of the cortical cells, leading to Epilepsy. In focal epilepsy, this oedema is most marked at the focus of the disease. In non focal cases, it is distributed more or less equally over the motor areas of both sides of the brain.

Several writers have noted this oedema, notably -

Dr. John Turner, who writes about it as "a foam-like exudate constantly present in Epilepsy", Sir H. Butler, Sir T. Oliver, Dr. Bendandi of Bologne, and Spratling of New York, who, on giving directions for operation on Epileptics, remarks, that the Pia may be so oedematous as to obscure the outlines of the convolutions, and states that it will be necessary to incise the pia, to allow the escape of the fluid (Epilepsy p.315)

This fluid has been looked upon as the result of the Epileptic attack by many, but it may quite likely be of a toxic condition, and a cause of the convulsions. It is also found in general Paralysis of the Insane, associated with Epileptoid attacks.

It is further interesting to remember the fact that/
that Epilepsy is not infrequently associated with a mysterious and sudden onset of cedema of both lungs, this cedema of the lungs being no doubt, a part of the circulatory changes that produce the cerebral cedema.

It is also interesting to note that an operation for draining this cerebral cedema, called "fenestration of the aura mater" has been very successful in many cases. There is a case recorded by Williams (64) of a patient who had 40 fits per day, and who after two such operations was entirely cured, and ceased to have convulsions: and Zimmerman (65) had four successful cases out of five.

Dr. D.M. Alexander (66) working along fresh lines and applying the newer means of immunological research to the investigation of the disease, has obtained a definite precipitation reaction in Epilepsy, giving further evidence of such a toxin as this precipitation is evoked by some substance present in epileptic body fluids, but not in normal human serum.

Further research along these lines may lead to some useful discovery. By immunising animals separately, with various body fluids and even tissues of Epileptics, some idea may be obtained of the seat of origin of the disease by the strength of the reaction produced.
LIFE OF THE EPILEPTIC.

The life of the epileptic might be said to be divided into four distinct stages. The general mental state of the patient before a fit is called the preparoxysmal stage. There are frequently present in this stage prodromata. Aura frequently precede the petit mal type, but not quite so frequently the grand mal form. The paroxysmal stage is the culminating point in the fit, and is described by the patient as heavy, severe, bad or serious, according to the nature of the convulsions. The portion of the fit after the first loss of consciousness, in petit mal, and after the convulsive part in grand mal, is termed the post-paroxysmal stage. The period between the fits is termed interparoxysmal. Each patient may differ in some major or minor particular from others, although preserving an essential factor revealing a common identity. Any of these divisions may be absent, or the fit may be characterised by the special features of one.

As Herpen (69) pointed out, the cramps, partial convulsions, spasms, giddiness, which occur irregularly in the intervals between the major attacks in Epileptics are the complete seizures reduced to their initial symptoms.
PREPAROXYSMAL STAGE.

In Epilepsy immediately before the fit, there is frequently a very marked and characteristic mental stage. The patient becomes moody and suspicious. He may suddenly give way to most exceptional violence and fury. Before the fit comes on he may be so desperately violent as to lose all self control, and becoming regardless of all consequences, he observes no obligations to others, is indifferent to law and order, and his fury knows no bounds. His conduct is blindly impulsive, he is raging and furious, and all the time unconscious of his own destructive energy. He may be subject to gusts of passion, shouting and raving with vociferous force. He is sleepless at nights, refuses food, and his eyes stare in a fearsome manner. If a fit occurs at this stage, a calm succeeds, and excitement ceases: the "furor transitorius" of Maudsley subsides and reason returns. Any attempt to control or to cajole such a patient only makes him worse. In the milder form of petit mal, the duration of which may be only momentary, and when there are no convulsive happenings a dozed and stupid dulness may characterise the preparoxysmal stage, during which the patient may wander about, in a dreamy state, and during which he may perform actions of which he has no subsequent recollection. More commonly, however, this dreamy state/
state follows rather than precedes the fit.

It may be that instead of the violent exhibition of passion such as described, there may simply be an abnormal moroseness, a morbid irritability, a tendency to wander in a depressed manner, an unusual liveliness, or some distinct delusion may indicate the approach of a fit. On the other hand headache, giddiness, and loss of appetite may take the place of these phenomena.
The term "aura" was first used by Pelops, the master of Galen. Originally it referred to the ancient idea that the arteries contained air and the ascent of the sensation implied the ascent of the vapour along the limbs or passing up towards the head. It is the warning of a fit. Aura are said to be present in about 40% of cases (70). I have found them in 46.3% of my cases (See Appendix). When they do occur, they immediately precede the fit. An aura is the last act which the patient remembers before memory is suspended or consciousness abolished. The period between the aura and the fit varies. It may be from a few seconds to a few minutes, sufficient to enable the patient to make himself comfortable and safe from injury before the subsequent inevitable fall. In one or two of my cases half an hour elapsed between the aura and the fit. Sometimes the aura arises and persists for an indefinite period, then disappears without an attack following.

Aura are met with rather frequently in patients suffering from Epilepsy of the Jacksonian or organic type. Their presence may indicate the existence of some causal lesion such as a growth, disease of the brain, a depressed fracture, meningeal thickening or adherent membranes following on cranial/
cranial injury or cerebral disease. For example, a horrible taste and smell in a case recorded by Brevor and Horsley pointed to the uncinate and hypocalcium gyr and on post mortem examination, a lesion was found in that region. When aura occur in the idiopathic variety of Epilepsy they do so most frequently in the petit mal type. It is possible that they indicate in these cases the part of the brain in which the discharge begins, or where it first attains an intensity before becoming general. They may also indicate the etiology of the disease. For example, a sense of coldness preceding an attack, especially if associated with a subnormal temperature, is diagnostic of cardiac epilepsy, as is also a sense of precordial anxiety. The varieties of aura met with are very numerous. They may be -

- Visual
- Auditory
- Gustatory
- Olfactory

- Visceral
- Cardiac
- Aphalic
- Sensory

- Motor
- Vasomotor
- Secretory
- Psychic

- Respiratory
- Dysarthric

(1) **Auditory.** These are said to be commonest.

Out of 257 cases of one observer 54% were auditory, 40% were visual and 6% were olfactory. I have not found it so, however, with my cases. Visceral aura come first, then sensory, cephalic, visual, motor, psychic, and sixth in the list, auditory, the visceral being four times as numerous as the auditory. Allen Starr (71) in a/
a series of 65 cases also found that the visceral aura headed the list. Gowers also found it to constitute half of his cases with aura. Usually auditory aura are sudden explosions, sometimes whistlings, whizzings and hissings, less often music or voices. There may be an inhibition of the auditory centre, and complete silence occurring in the middle of actual conversation or noise. One patient I have, a girl, who is deaf, hears as an aura, the sound of a trumpet in her ear. She became deaf at the age of 8 years a short time prior to the onset of the fits.

(2) Visual. Patients may see only simple colours, but at times complex objects are experienced, flashes of light, sparks, pictures, etc. At times, as in the case of the auditory aura, there may be a sudden and complete inhibition of the visual centre, and the patient complains of sudden loss of sight, or of being in total darkness. Sometimes visual objects are seen when the sight is lost, showing that discharges may occur in a disused or an inhibited centre. The patient may complain of objects becoming larger or smaller, advancing or receding. One who was at Bridge of Weir said he saw a tiger with red, white and blue stripes, before each fit.

(3) Gustatory aura are fairly common, and are frequently/
quenty combined with the next variety -

(4) **Olfactory.** The patient complains of a bad smell and taste.

(5) **Visceral aura** are most commonly located in the stomach. Generally, a sense of fulness, oppression or pain is felt, or a sensation of sickness. One patient under my care describes his aura as a "fright in my inside", meaning, I suppose, a sudden starting or contraction of the abdominal viscera. They are probably connected with the pneumogastric nerve. The fits that follow this variety are frequently very severe.

(6) **Cardiac aura** are described as very severe. Some complain of palpitation with a choking sensation, others a feeling as if the heart had stopped. One of my patients describes it "as if strings were being wound round the heart."

(7) **Cephalic aura,** such as sudden vertigo, or somnolence or a sense of swimming in the head are often met with. Vertigo is a common accompaniment of other sensory aura. Severe headaches also are occasionally met with as aura. "A silly feeling coming into the head" is the description by one patient of her cephalic aura.
Sensory aura occur in the hand, arm, leg or trunk, and take the form of fornication, numbness, a creeping sensation, tingling heat or cold. Goodhart records a case, where as an aura the patient had a peculiar sensation as if the shoe would burst open. Later, the same patient experienced the sensation of being revolved. He also shouted, but the sound of his voice seemed to come from some other person. Heat in the eyes, a feeling as if the teeth (not artificial!) were falling out, the patient holding up a hand to catch them, have been described by some of my patients.

Motor. Muscular twitchings, usually affecting one group of muscles, are common. According to Reynolds, Charcot and others, they may, for a long time, be the only sign present. They may take the form of a stiffness or limpness, or a general trembling of the whole body: or they may be complicated movements, such as running backwards or forwards (Epilepsia procursia) or in a circle, (Epilepsia circumcursiva) or a rotation on the formation of circles (Epilepsia rotatoria). These complicated movements are more often preparoxysmal symptoms or they may replace the convulsive seizure. Generally there is no remembrance of them.
Vasomotor aura are described as pallor, and flushings of the face, generally of one side only. Red spots, urticaria, erythema, are less common.

Secretory profuse perspiration or salivation are occasional prodromata.

Respiratory disturbances form rare prodromata, for example, singultus, inspiratory spasm, or fits of yawning, speech disorders, such as aphasia; memory hallucinations, mental anxiety, timidity, and depression, dysthritic conditions (74) have been recorded as aura in various cases. Aura may be purely psychical in nature. For example, the same idea may always occur before a fit - a command, an imperative idea, a directing voice. Thoughts occurring before a fit may be direct incitement to impulsive actions, subsequent to the fit in the post paroxysmal stage, and that without consciousness, although the person be to all appearance quite conscious. This may be of importance from a medico legal point of view. One lad I have under my care, has as an aura, an irresistibile impulse to use foul language. Another man under treatment at present, as an aura imagines that he is in South Africa, and that the people around him/
him are different entirely from what they profess to be.

Generally, the more severe the Epileptic attack is, and the more sudden and complete it is, the less likely is it to be preceded by an aura: while the further the attack departs from the classical type, the more frequent and persistent is the aura. The presence of aura is most important as a guide to the seat of the disease, and a study of them is essential in determining the line of treatment required by particular cases.

I have found aura present in 46.3% of my cases. This is higher than the figures given by some writers on the subject. Binswanger found an aura in 31% of his cases, Herpen in 27%, Hughes Bennet in 34%. Gowers, however, found it in a little over 50% of his cases.

I have appended a list of some of the aura met with in my patients, classified according to the nature, together with the age when fits first showed themselves, and the number of fits per month.
A. VISCERAL AURA.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age of onset</th>
<th>Type</th>
<th>Fits per Month</th>
<th>Aura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>G.M.</td>
<td>13</td>
<td>Gastric sensation of nausea.</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>G.M.</td>
<td>4</td>
<td>Indescribable gastric sensation.</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td>G.M.</td>
<td>5</td>
<td>Nauseating sensation.</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>G.M. &amp; P.M.</td>
<td>2</td>
<td>Acidity of Stomach.</td>
</tr>
<tr>
<td>5</td>
<td>1(\frac{1}{2})</td>
<td>G.M.</td>
<td>5</td>
<td>Swelling in stomach 2 or 3 mins. before</td>
</tr>
<tr>
<td>6</td>
<td>2(\frac{1}{4})</td>
<td>G.M. &amp; P.M.</td>
<td>6</td>
<td>Gastric discomfort is felt.</td>
</tr>
<tr>
<td>7</td>
<td>18</td>
<td>G.M. &amp; P.M.</td>
<td>6</td>
<td>Strange feeling in stomach.</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>G.M. &amp; P.M.</td>
<td>5</td>
<td>Nausea and sickness.</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>G.M. &amp; P.M.</td>
<td>1</td>
<td>Feeling of sickness.</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>P.M.</td>
<td>14</td>
<td>Heavy feeling in stomach.</td>
</tr>
<tr>
<td>11</td>
<td>14</td>
<td>G.M. &amp; P.M.</td>
<td>17</td>
<td>An excited feeling in the stomach working up to the head.</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>G.M.</td>
<td>8</td>
<td>A strange sensation in the stomach which runs from the back of it to the head.</td>
</tr>
<tr>
<td>13</td>
<td>19</td>
<td>G.M.</td>
<td>6</td>
<td>A pain in the gastric region.</td>
</tr>
<tr>
<td>14</td>
<td>7</td>
<td>G.M. &amp; P.M.</td>
<td>4</td>
<td>A slight gastric pain and then a choking sensation.</td>
</tr>
<tr>
<td>15</td>
<td>3</td>
<td>G.M. &amp; P.M.</td>
<td>8</td>
<td>Feels as if his stomach got a fright.</td>
</tr>
<tr>
<td>16</td>
<td>5</td>
<td>G.M.</td>
<td>2</td>
<td>Feeling of sickness followed by a headache.</td>
</tr>
</tbody>
</table>

G.M. = Grand Mal attacks.
P.M. = Petit Mal attacks.
**B. SENSORY AURA.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Age of onset</th>
<th>Type</th>
<th>Fits per month</th>
<th>Aura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>6</td>
<td>G.M. &amp; P.M.</td>
<td>77</td>
<td>Feeling of great nervousness.</td>
</tr>
<tr>
<td>2.</td>
<td>17</td>
<td>G.M. &amp; P.M.</td>
<td>13</td>
<td>A strange feeling passes down left arm, the hand twitches three times, then the feeling goes to his head.</td>
</tr>
<tr>
<td>3.</td>
<td>16</td>
<td>G.M.</td>
<td>6</td>
<td>Feels as if he were holding a galvanic battery.</td>
</tr>
<tr>
<td>4.</td>
<td>15</td>
<td>G.M. &amp; P.M.</td>
<td>8</td>
<td>A nervous feeling is experienced.</td>
</tr>
<tr>
<td>5.</td>
<td>1</td>
<td>G.M. &amp; P.M.</td>
<td>2</td>
<td>Sharp pain in left foot.</td>
</tr>
<tr>
<td>6.</td>
<td>1</td>
<td>G.M. &amp; P.M.</td>
<td>4</td>
<td>Feeling of being gripped by the arm.</td>
</tr>
<tr>
<td>7.</td>
<td>28</td>
<td>G.M. &amp; P.M.</td>
<td>13</td>
<td>An electric shock working up from the left foot to the head with a stiffening of the tongue.</td>
</tr>
<tr>
<td>8.</td>
<td>14</td>
<td>G.M.</td>
<td>4</td>
<td>General nervousness.</td>
</tr>
<tr>
<td>9.</td>
<td>1</td>
<td>G.M.</td>
<td>22</td>
<td>Nervousness with vertigo.</td>
</tr>
<tr>
<td>10.</td>
<td>7</td>
<td>G.M.</td>
<td>1</td>
<td>Cramp in the left hand.</td>
</tr>
<tr>
<td>11.</td>
<td>16</td>
<td>G.M.</td>
<td>3</td>
<td>A feeling of faintness comes on.</td>
</tr>
<tr>
<td>12.</td>
<td>21/2</td>
<td>G.M. &amp; P.M.</td>
<td>6</td>
<td>Something going over her.</td>
</tr>
<tr>
<td>13.</td>
<td>3</td>
<td>G.M. &amp; P.M.</td>
<td>5</td>
<td>A sensation of something at the right shoulder going down to finger tips and causing them to move.</td>
</tr>
<tr>
<td>14.</td>
<td>1</td>
<td>G.M.</td>
<td>10</td>
<td>Feels shaky and lies down.</td>
</tr>
</tbody>
</table>
### C. CEPHALIC AURA.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age of onset</th>
<th>Type</th>
<th>Fits per month</th>
<th>Nature of Aura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>5</td>
<td>G.M.</td>
<td>10</td>
<td>Slight giddiness.</td>
</tr>
<tr>
<td>2.</td>
<td>35</td>
<td>G.M.</td>
<td>84</td>
<td>Giddiness and weakness.</td>
</tr>
<tr>
<td>3.</td>
<td>1</td>
<td>G.M.</td>
<td>8</td>
<td>Headache and heaviness all over his body.</td>
</tr>
<tr>
<td>5.</td>
<td>7</td>
<td>G.M.</td>
<td>3</td>
<td>Vertigo.</td>
</tr>
<tr>
<td>6.</td>
<td>3</td>
<td>G.M.</td>
<td>6</td>
<td>Headache half an hour before.</td>
</tr>
<tr>
<td>7.</td>
<td>7</td>
<td>G.M.</td>
<td>1</td>
<td>Giddiness.</td>
</tr>
<tr>
<td>8.</td>
<td>20</td>
<td>G.M. &amp; P.M.</td>
<td>18</td>
<td>Dull feeling in the head.</td>
</tr>
<tr>
<td>9.</td>
<td>16</td>
<td>G.M.</td>
<td>11</td>
<td>Vertigo.</td>
</tr>
<tr>
<td>10.</td>
<td>10</td>
<td>G.M.</td>
<td>18</td>
<td>Vertigo.</td>
</tr>
<tr>
<td>11.</td>
<td>11</td>
<td>G.M.</td>
<td>5</td>
<td>A silly feeling comes into his head.</td>
</tr>
<tr>
<td>12.</td>
<td>15</td>
<td>G.M. &amp; P.M.</td>
<td>2</td>
<td>Headache.</td>
</tr>
<tr>
<td>13.</td>
<td>6</td>
<td>G.M.</td>
<td>2</td>
<td>Headache.</td>
</tr>
<tr>
<td>14.</td>
<td>6</td>
<td>G.M.</td>
<td>2</td>
<td>Headache.</td>
</tr>
</tbody>
</table>
### D. VISUAL AURA.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age of Onset</th>
<th>Type</th>
<th>Fits per Month</th>
<th>Nature of Aura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>9</td>
<td>G.M.</td>
<td>9</td>
<td>Eyes dazzle.</td>
</tr>
<tr>
<td>2.</td>
<td>13\frac{1}{2}</td>
<td>G.M.</td>
<td>8</td>
<td>Sees a tiger striped red, white and blue.</td>
</tr>
<tr>
<td>3.</td>
<td>1</td>
<td>G.M.</td>
<td>6</td>
<td>Blackness before the eyes.</td>
</tr>
<tr>
<td>4.</td>
<td>10</td>
<td>G.M.</td>
<td>18</td>
<td>Blindness comes over her.</td>
</tr>
<tr>
<td>5.</td>
<td>5</td>
<td>G.M.</td>
<td>3</td>
<td>Eyes dazzle and have pain.</td>
</tr>
<tr>
<td>6.</td>
<td>15</td>
<td>G.M.</td>
<td>7</td>
<td>Five minutes prior to the attack something passes before her eyes.</td>
</tr>
<tr>
<td>7.</td>
<td>3</td>
<td>G.M.&amp; P.M.</td>
<td>2</td>
<td>His vision is blurred.</td>
</tr>
<tr>
<td>8.</td>
<td>6</td>
<td>G.M.</td>
<td>5</td>
<td>He sees flashes of light.</td>
</tr>
<tr>
<td>9.</td>
<td>10</td>
<td>G.M.</td>
<td>4</td>
<td>At times he sees all the colours of the rainbow. He sees a coloured light, sometimes yellow, at other times black.</td>
</tr>
</tbody>
</table>

### E. MOTOR AURA.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age of Onset</th>
<th>Type</th>
<th>Fits per Month</th>
<th>Nature of Aura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>18</td>
<td>G.M.&amp; P.M.</td>
<td>6</td>
<td>Shaking of both hands and nervousness</td>
</tr>
<tr>
<td>2.</td>
<td>1</td>
<td>G.M.</td>
<td>22</td>
<td>Loss of power in the hands.</td>
</tr>
<tr>
<td>3.</td>
<td>13</td>
<td>G.M.</td>
<td>1</td>
<td>Weakness in lower limbs.</td>
</tr>
<tr>
<td>4.</td>
<td>7</td>
<td>G.M.&amp; P.M.</td>
<td>1</td>
<td>Severe twitching of legs, arms and tongue.</td>
</tr>
<tr>
<td>5.</td>
<td>-</td>
<td>G.M.</td>
<td>-</td>
<td>Runs as swiftly as a deer for a varying distance, then falls down in a severe major seizure.</td>
</tr>
</tbody>
</table>
F. **PSYCHIC AURA.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Age of onset</th>
<th>Type</th>
<th>Fits per month</th>
<th>Nature of aura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>G.M.</td>
<td>7</td>
<td>Confusion of thought.</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>G.M. &amp; P.M.</td>
<td>5</td>
<td>A feeling as if someone was chasing her.</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>G.M.</td>
<td>3</td>
<td>Feels happy and a smile comes over his face.</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>G.M.</td>
<td>6</td>
<td>Becomes bad tempered and uses very foul language.</td>
</tr>
</tbody>
</table>

G. **AUDITORY AURA.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Age of onset</th>
<th>Type</th>
<th>Fits per month</th>
<th>Nature of aura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 ½</td>
<td>G.M.</td>
<td>4</td>
<td>Hears voices and then feels palpitation.</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>G.M. &amp; P.M.</td>
<td>14</td>
<td>Trumpet blowing, singing and noises of various kinds.</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
<td>P.M.</td>
<td>1</td>
<td>Sounds of singing in ear.</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>G.M. &amp; P.M.</td>
<td>6</td>
<td>Humming noises heard a few minutes before the fit.</td>
</tr>
</tbody>
</table>
PAROXYSMAL STAGE.

After the aura or more frequently without any aura, the patient falls down unconscious and the climax occurs.

There are two distinct stages in the paroxysm—the tonic and the clonic.

A. Tonic contraction of muscles occur, the respiration ceases. Simultaneously air is suddenly forced through the tetanically closed glottis, giving rise to a short deep, shrill cry. This cry is often the first signal of the fit. Often it seems to occur along with the aura, the cry being the objective phenomenon, the aura being distinctly subjective. At times, instead of this cry, a gurgling inspiratory noise is heard. The face becomes red and purple and looks bloated and distorted. The pupils are dilated and what is almost pathognomonic, the pupillary reflexes are gone. The pulse is small and rapid. The eyes start apparently out of their sockets, due to the tetanic contraction of the orbital muscles. The head is drawn backwards and is generally turned by jerks to one side, the eyeballs are directed to the same side.

The/
The arms are flexed or extended, the hands are clenched and often writhing, the legs are generally stiffly extended, but may be flexed. In rare cases there may be flexion causing the patient to assume a crouching attitude. The tongue may now be caught between the teeth and from the mouth come mucous and saliva. The tonic contractions may cause urine to be discharged, occasionally faeces.

B. The tonic stage generally lasts a few seconds, but may extend to ten minutes. At the close the tonic contractions may be combined with a general tremor ushering in the clonic stage, which begins with short, twitching of muscles followed by clonic tumultuous spasms of muscles causing strong contractions of head, trunk, and limbs. The intensity and rapidity of the clonic contractions may be so strong as to injure bones and joints and tear muscles from their attachments. I have two patients who have dislocated the shoulder joint several times. Openheim has recorded a case where bilateral dislocation of the humerus resulted. Stanley and Jones have recorded cases of dislocation of the lower jaw, and Broadbent, embolism of the cerebral arteries in a case where there was previous heart disease. The teeth are gnashed and the cheek and tongue may/
may be bitten. Pieces of the latter have been bitten off. Air enters the lungs at the beginning of this stage and the cyanosis passes off, the breathing becoming noisy and rapid. Foam issues from the mouth and perspiration becomes profuse. The contractions may cause urine, faeces, and seminal fluid to be discharged. In rare cases there is faecal vomiting. At the end fewer muscles are convulsed and the attack passes off.
**POST-PAROXMAL STAGE.**

At the close of the paroxysm the eyes open for about a minute and both after Petit mal and Grand mal attacks alternate dilatation and contraction of the pupils occur, then the patient may pass into a semi-conscious sleep lasting from a few minutes to several hours. He wakens dazed, with headache and fatigued. There is complete amnesia for the time of the attack, also in a few cases for a period preceding it. Alzheimer mentions amnesia of still longer duration.

Vomiting may follow an epileptic fit. In some cases it is a constant feature. When it occurs it forms an element of danger owing to the risks of choking.

At other times this post convulsive somnolence is followed by or even replaced by an outburst of excitement or delirium, or by stupor with dreamy confusion, by simple apathy and dementia, or by states of altered personal identity in line with the theory of dual consciousness during which embarrassing and reprehensible actions may be committed.

This is probably the most dangerous stage of the epileptic's life, towards himself as well as towards others. Epileptics are often under the influence of peculiar hallucinations or systematised delusions. They can see and hear their enemies and their/
their friends when no one is near, and they behave in a weird and irresponsible way. For example, one lad, J.T. was found in a field one day looking for a door with a brass handle that he might clean it. Again, if after a fit he wanted to go in a certain direction he went in the opposite.

Automatism is nearly always a post-epileptic phenomenon. It resembles somnambulism; in both there is a partial suspension of consciousness, and many authorities refer both conditions to a common origin in the neurotic temperament. Anger, violence, retaliation for imaginary wrongs, purposeless assaults, indecent exposure and even murder are all records of this stage. Generally speaking, actions repeated during automatism are those performed daily by the person himself "professional automatism". As the cortical centres in most common use discharge most rapidly when the inhibition of the higher ones is withdrawn.

Persons have wandered from home after fits, without knowing where, and could not explain how they got there (Comital ambulatory automatism). One patient I have, after a fit, invariably wanders to some place that he has no right to be in. When he comes to himself he cannot explain how he got there. Another who was in the habit of wandering automatically was found lately drowned in a burn near by. Knowing the characteristic of the lad we have no/
no doubt that this was owing to his post-paroxysmal characteristic. This, however, is exceptional, for the instinct of self preservation is usually as active at such times as under normal conditions.

During this post-epileptic stage, epileptics may commit every kind of crime, theft, arson, rape, assault and homicide; sometimes they are pyromaniac and often entirely without reason. This utter absence of motive or the disproportion of the apparent motive to the degree of the crime is the strong point in clearing an epileptic from responsibility.

The symptoms of this post-paroxysmal period are as important as those of the two preceding, in indicating essential facts. The sensory loss, aphasia, amnesia, or acute psychosis, may have a localising significance.
INTER-PAROXYSMAL PERIOD.

Curious and interesting phenomena are frequently found in this period - various states of mental alteration, of abnormalities, of amnesia, and morbid propensities, interesting not only clinically but sometimes medico legally, and often of value in forming a prognosis of the case.

Herpen in his classical work (69) has pointed out that the symptoms occurring during the interval of the major seizures of the disease, for example, cramps, jumps, twitching spasms, partial convulsions, vertiginous attacks, cephalic sensations, visual hallucinations or other subjective phenomenon are the major or complete seizures reduced to their initiator symptoms or sensations. To this stage should be referred those conditions generally spoken of as psychical epileptic equivalents. A patient who usually has a moody, depressed condition before a fit may have that without a subsequent fit. Another who in the past convulsive period catatonic rigidity and stupor may from time to time in the intervals and without convulsions have catatonic stupor states (75) or an epileptic, who in the post convulsive stage generally shows great quarrelsomeness and pugnacity may have occasional transitory attacks of a similar kind without convulsions. If a patient usually has a particular aura preceding the fits, such as epigastric sensation, choking sensation, a collection/
collection of saliva in the mouth, a feeling of cardiac oppression, these may occur between the fits, and yet not be followed by convulsions.

Almost all epileptics who have attacks of Grand mal in the intervals have these abortive conditions. They are frequently associated with what has been termed by Hughlings Jackson (76) the "dreamy state" which may be of the nature of reminiscence, a feeling of unreality as if the surroundings were strange, or a sensation that what is happening has already occurred.
LE PETIT MAL.

The chief symptom here is a sudden loss of consciousness without an obvious muscular spasm, and generally without a premonitory aura, although in the idiopathic variety, aura are more frequent in the Petit Mal than in the Grand Mal attacks. It lasts from five to thirty seconds. Friends in giving accounts of attacks talk of the patient looking "queer". The patient generally refers to them as fainting fits, feeling dazed, or of having sensations. Should he be working or talking, he stops suddenly; if he be walking he changes position or staggers, or he may lean to one side. The face becomes pale, rarely flushed, the pupils dilate, the expression becomes blank. The patient rarely falls or lets an object fall from his hands. Sometimes the attack is represented by a mere motor spasm such as slight clonic twitchings of the lips and tongue, and the limbs, smacking noises and blinking. The tongue is not bitten and urine is not passed. A transient loss of speech or of comprehension may be observed or a passing vertigo. There may be in rare cases a transient paralysis, evidenced only by a giving way of the knees, or sudden signs of motor excitement, consciousness being retained (77) Such symptoms can only be diagnostic of Le petit mal when they occur in one who/
who is an epileptic. According to Armand and Trouseau, Petit Mal generally precedes Grand Mal. That appears on the whole true, but more frequently it intermingles with Grand Mal, and in one patient of mine, who, since girlhood was afflicted with Grand Mal attacks, when she became 60 had these replaced entirely by the Petit Mal variety. Many patients present the Petit Mal type throughout.

Reynolds has described a form of Petit Mal with slight convulsions and has termed it the "Epilepsia Mitior" with evident spasm. It is not a very uncommon form and at the beginning it is somewhat difficult to differentiate it from local cerebral disease. The convolution, however, is always associated with temporary loss of consciousness. The convulsive element may consist of a momentary deviation of the eyes, the turning of the head and neck to one side, a hemiplegic jerking of the arm or leg.

These attacks are of short duration, but may recur very frequently during the day. Generally this form is found in children and young people. When it occurs during the night, it frequently leads to wetting of the bed.

The rare and typical forms of epilepsy referred to in the subtypes. For example, Epilepsia Nutans, Epilepsia Procursiva, Epilepsia Loquax, Cardiac Epilepsy/
Epilepsy, Migranous Epilepsy, and Vaso-motor Epilepsy mostly belong to the Petit Mal class.

This type of epilepsy, though less severe than the Grand Mal variety has generally a more deteriorating effect on the mental faculties. Frequently it is present with the major variety in the same patient. Of my cases nearly 50% suffered or suffer from both the major and the minor types.

The following list gives the conditions found in these cases:

"Fainting Fits" occurring suddenly.
Epigastric sensations.
Vertigo.
Sudden twitchings of muscles or limbs.
Blindness and other visual sensations.
Choking sensation.
Sudden starts and jerks.
Constrictions of throat and dypnoea.
One patient cried "yes, yes, yes."
DIAGNOSIS.

The symptoms of Epilepsy have been so fully described that there can be little difficulty in recognising it, in its most typical form. One is struck in going round a Colony of Epileptics with something in the facial appearance that is similar. It has been termed the Facies Epilepticus by some writers. Its diagnostic value, however, is of little or no account for it is most marked in those cases where the disease is already well established, and only too easily recognised.

The facial expression is produced by the formation of changes in the contour, in the skin, and underlying structures, due to trophic alterations, and to the patient's habit of mind and temperament, giving it in its most marked form, a heavy and sodden appearance. There may be in addition, a "tell-tale" acne rash caused by the Bromide medication.

A history of repeated convulsions of abrupt onset, and without assignable cause is in itself almost pathognomonic.

Aside from accidental or incidental convulsions, which may accompany Nephritis, Diabetes, Lead-poisoning, certain forms of meningitis and hysteria, there are but few conditions that are likely to confuse the diagnosis.

A. "spasmophil diathesis" of infancy brought about?
about by improper feeding, and teething convulsions are not necessarily epileptic, and should not be considered such, until the opposite is proved.

B. In the fits associated with alcoholism, there is no aura, and no cry, and the convulsions are mostly of the clonic type.

In the coma that follows alcoholism, the patient can usually be easily aroused, as contrasted with the profound state, that so often follows on an epileptic attack. The alcoholics in whom they occur should be led to understand that such convulsions indicate acute poisoning, and unless checked, will, sooner or later, pass into the essential disease, as in a case at present under my charge. When the convulsions in an alcoholic appear independent of the intoxicated state, they must be regarded, not merely as symptomatic but indicative of a profounder state of instability.

C. Tetanus differs from Epilepsy in that consciousness is retained, and the spasms are tonic only, never clonic. They are also more severe, and longer in duration. Meniere's vertigo is distinguished from Epilepsy by the co-existence of vertigo, tinnitus, and deafness; and by the tendency to slight giddiness to persist between the attacks. Loss of consciousness is rare in labyrinthine/
labyrinthine vertigo, while it is the rule in Epilepsy. A patient may suffer from both aural vertigo and epilepsy.

D. Syncope which is due to anaemia of the brain, to a weak heart, to vascular spasm, or to a peculiar sensibility to certain impressions, such as the sight of blood. There will be the history of these or symptoms connected with them, the pulse will be small and weak, and the reflexes, especially the pupillary are not abolished.

Further, the fits of epilepsy occur in the strong as well as the feeble, at all times, and under all circumstances, and in Epileptics the volume of the pulse remains good. Micturition which occurs frequently in Epilepsy, is unknown in Syncope.

E. Malingering is sometimes difficult to detect. It is always practised for some ulterior motive, such as to obtain money, to escape punishment for some crime, or to elicit sympathy. The malingerer chooses the time for the attack - the Epileptic does not - and in falling he does not injure himself. Further, the other symptoms of epilepsy are not present, dilation of the pupil, anaesthesia of the cornea, Babinski's extensor reflex, absence of the pupillary reflex, Beirnacki's test - anaesthesia/
anaesthesia of the ulnar nerve between the internal condyle, and the oberanon, increase of the bodily temperature, etc. The tongue is not bitten severely enough to draw blood, and the Epileptic cry is absent.

The malingerer is generally red and heated by his efforts to produce the clonic spasms, and he reacts at once to painful stimuli, that leave the Epileptic unmoved. One well known malingerer was detected by Dr. Prichard of New York by the violation of a physiological, as well as a physical law in the spasms, in that the thumb was contracted in flexion outside instead of inside the other fingers.

F. Hysteria simulates the disease very well, so much so that to differentiate true epilepsy is sometimes very difficult indeed. The disease picture presented by Hysteria in these cases is, as in other manifestations of that disease, generally overdrawn. There are, however, some very marked differences.

(a) A strikingly constant physiological mistake in hysteria is that the convulsive movements are reversed. They begin with the clonic instead of the tonic convolution. I have one patient, however, in whom the clonic precedes the tonic and there/
there is no doubt of the Epileptic diagnosis.

(b) Prodromal symptoms are rare in Hysteria, but frequent in Epilepsy.

(c) Hallucinations urging to murder, burnings, and robbery are frequent with Epileptics. In hysteria they are less alarming, but of longer duration.

(d) The initial cry in Epilepsy is piercing and the patient becomes unconscious. In Hysteria the patient is never entirely unconscious, and does not suffer injury.

(e) Dilatation of the pupil, rigidity, facial congestion and salivation are more constant in Epilepsy than in Hysteria.

(f) The spasms in Epilepsy are more intense.

(g) Involuntary micturition and defecation, and seminal emission are more frequent in Epilepsy, but according to Charcot, urine is very often passed in Hysteria.

(h) The pulse in Epilepsy is usually small, and scarcely palpable during the attack. In Hysteria it is little changed.

(i) In Epilepsy the termination of the attack is hyptic, in Hyste ria it is critic.
Hysterical patients never bite their tongues, or injure themselves in falling, but often the lips are bitten, and they snap at people around them, like a mad dog.

Babinski's sign is present, during and after an attack in Epilepsy, especially of the Jacksonian variety, and that on the convulsed side. It is never present in Hystera.

Biernacki's sign which is analgesia of the ulnar have in the Ephitrochlear space between the internal condyle of the humerus and the oberanon is present in varying degrees in from 60% to 70% of Epileptics (68) but never in Hystera.

Complete anaesthesia is usually present in Epileptics but not in Hystera.

The pupillary light reflex is generally absent in Epilepsy - very rarely is it absent in Hystera. Some writers, e.g. Westphal and Krep question the diagnostic value of this sign for in certain cases of epilepsy the parts concerned with the pupillary light reflex seems endowed with great resistance, and even in profound coma it may remain unaffected.

The Arc de Circle i.e. Salaaming movements, passionate/
passionate attitudes, laughing and weeping spasms, frenzy and crying all point to the hysterical nature of the attack. On the other hand, according to Haverock, singing and whistling may form the aura in Epilepsy.

(q) Donath has found Cholin present in the cerebral spinal fluid on performing lumbar puncture after epilepsy.

(r) If pressure on the ovaries influences or arrests the attack of commencing loss of consciousness, it is hysteria and not epilepsy.

(s) The duration of the attack in Epilepsy is 1 to 3 mins. usually, 10 minutes at the outside - in hysteria it is 15 to 30 minutes.

(t) In Epilepsy, the temperature of the body in more than half the cases, is raised after an attack from .50 to 2.50. That is not so in Hysteria.

Nocturnal Epilepsy may pass unrecognised for years. The attacks are indicated by irregular breathing, moaning, gurgling, biting of the tongue and blood on the pillow, subcutaneous and subconjunctival haemorrhages, sleep walking, persistent nocturnal enuresis, dull headaches, and a feeling of dulness and depression in the mornings.

Symptomatic and reflex Epilepsy may require to be differentiated/
differentiated from idiopathic epilepsy. This is not always easy - sometimes it may be impossible.

(1) Brain tumour with increased intra-cranial pressure may cause convulsive attacks. There are present here, the other signs of tumour of the brain - most important of these are the ophthalmic signs.

(2) Cortico Epileptic attacks. The convulsions are localized, and there are usually present the symptoms of palpable brain disease. As a rule, convulsions of true epilepsy quickly become generalized.

(3) General paralysis of the Insane is generally complicated with convulsive seizures. The Argyll Robertson pupil, lumbar puncture and the Wasserman reaction should clear up any doubt. The convulsions too, in these cases, usually occur at the beginning of the attack. They are often unilateral, and may or may not be accompanied by unconsciousness.

(4) Cerebral paralysis of children. This is of unilateral onset of twitching character. There is also a persistent Babinski and slight Athitom movements.

(5) Intestinal worms. The convulsions in this are longer in duration, and the diagnosis may/
may be cleared up by microscopic examination and appropriate treatment.

(6) In old or advancing age Epilepsy may be symptomatic of cerebral tumour, cerebral syphilis, paralytic dementia, chronic nephritis, arterio sclerosis, cysticercus cerebri.

(7) In epilepsy of a syphilitic origin, the first convulsion is preceded by periodically recurring headaches, of evening onset and nocturnal exacerbation associated with marked insomnia, general malaise and irritability.

In doubtful cases records of the attacks should be noted until a decided diagnosis is arrived at. Such records should include -

A. The aura, its nature and duration.

B. The order of invasion, the part of the body in which the convulsion began, and the order of extension, giving the groups of muscles affected.

C. The stage of the attack at which consciousness was lost or impaired.

D. The condition of the pupils with reference to anaesthesia and the pupillary reflex.

E. The duration of tonic contraction and of clonic contraction.
F. After effects - e.g.
   Psychical - such as temporary insanity.
   Physical - partial paralysis.
   Moral - persistent lying and stealing.

should all be noted.

G. The test of Beirnacki, viz:– anaesthesia of
   the epitrochlear space should be applied at
   all times.
ACCESSORY SYMPTOMS.

1. The pulse immediately after the seizure is dicrotic or polycrotic with rounding or flattening of the apex, the same as is obtained from healthy subjects after violent muscular exertion. It is consequently due to the muscular effort. On that account true and false epilepsy cannot be differentiated by the sphygmograph (78). In the inter-paroxysmal period, no constant phenomenon is to be noted in the pulse rate. In the cases I have examined it is generally more rapid than in normal individuals, frequently being over a hundred. Less often it is below normal.

2. In the paroxysm, during the tonic stage the cardiac action is slower and the arterial tension is greater, while in the clonic period the heart acts more slowly (79). I have examined the blood pressure in a number of cases, using a Riva Rocci instrument and appended are some of the results. There is nothing uniform to be found. In most cases previous to the onset of a paroxysm or a series of paroxysms, the pressure is relatively high, in others it is relatively low. In the appendix p.166 is a table shewing the Blood Pressure in 20 cases in which variations were noted on the day of the/
the attack. In one case under observation, a patient who for weeks will not have a paroxysm, and then will suddenly have a fit and for a week or so will have attacks each day, it was found that during the inter-paroxysmal period when fits were absent, the blood pressure was 115, but during the period when fits were being experienced it was low, sometimes as low as 95. In fact a fit could be predicted by the fall of blood pressure. Dr. Fraser of Paisley, has published a case where he noticed a similar phenomenon in a melancholic. When her blood pressure was high she was normal. If it fell, she immediately became insane.

Gibson, Good and Penney (80) made tracings of the movements of the circulatory organs immediately preceding and up to the onset of the fit in 5 major attacks. The records show that there is no alteration of the pulse sufficiently definite to affect the amplitude of the wave up to the point when clonic convulsions prevent its being properly recorded, and in more than one record a fit was in progress before the record was interfered with. These authors prefer to look from the mechanism of the fit to a local cause in the brain, such as vaso-motor spasms, rather than to a general lowering of blood pressure.
3. The Urine.

(1) In 50% of persons affected there is some albumen when the paroxysm is over. The amount is proportional to the severity, and is largest when cutaneous cyanosis and congestion are most demonstrated (81)

(2) Nitrogen and phosphates, alkaline and earthy, are increased. Urea is sometimes increased.

(3) The toxicity of urine is diminished and a hypotoxity of urine persists between the attacks even when suspended for a year or more (82)

Voisen and Perron have described a hypotoxic condition of the urine before, and a hypertoxic condition after the fits.

(4) Polyuria may follow the attack.

(5) Indican is increased and about the time of the fit, the specific gravity also is correspondingly higher.

(6) In the case of nocturnal epilepsy the urine is usually alkaline and phosphatic in the morning.

4. Ocular conditions in epilepsy.

One very striking condition, almost invariably found even in cases of a mild type is dilatation of the pupil. It is most marked in those cases where violent contractions are in evidence.

This/
This dilatation is due probably to the convulsion directly and not to interference with respiration, as it is present where there is no evidence of such a thing. The pupillary light reflex is usually lost during the attack. By some authorities this fact is considered pathognomonic of the condition, although in a few cases it is retained.

As a rule, too, the corneal reflex is abolished during the convulsive attack, especially when there is complete loss of consciousness. Subconjunctival haemorrhages are common as a result of the seizures, and may indicate a nocturnal attack. Ophthalmoscopic examination of the eyes show the discs to be first pale and then hyperaemic the retinal arteries are contracted. There is a venous pulse on the retina during the attack. There is also found following the attack a concentric narrowing of the fields of vision (83)

Some epileptic attacks consist of brief periods of complete blindness, termed by some writers, epileptic amaurosis.

5. The temperature in epilepsy has been closely studied by Spratling (84). He found that in seizures an increase ranging from 2-3.5 degrees occurred immediately after the fit, as a general/
general rule. A few cases showed a decrease. He, with Bournville and Lemoine have recorded cases of very marked hyperpyrexia during Status Epilepticus. Munson (85) reported a number of cases with an exceptionally low temperature as an agonial phenomenon in epilepsy. The lowest temperature recorded at death was 73°F.

6. The gastric juice of epileptics is slightly more toxic to guinea pigs, before and after the attacks, than is usually the case. This toxicity varies according to the duration and intensity of the attack (86).

7. Subcutaneous and facial as well as subconjunctival haemorrhages which may be very extensive (87) are common when there are many seizures or after Status Epilepticus (88).

8. The reflexes.
   The tendon reflexes are usually absent, but may be normal or increased (89).
   The Babinski planter reflex is generally present during and a short time after the attacks. The feed reflex is present and is important in the diagnosis of epileptic coma (90).

   Epilepsy tends markedly to mental deterioration. The/
The memory goes and the mind appears to become blank. It has been found that when paralysis accompanies epilepsy the intellectual change is greater (91). When the disease occurs in childhood, imbecility and idiocy frequently accrue. The "furor epilepticus" or maniacal excitement which follows epilepsy occurs not only in patients suffering from severe attacks but in those who are affected with a mild form, and even more frequently following the Petit Mal type. During this excitement, crimes of a heinous nature have been perpetrated with no malevolent intention and with no recollection. A plea of irresponsibility for criminal acts alleged to have been committed while an individual is suffering from epileptic mental alienation is sometimes tendered and must always be considered. Generally other irrefrangible evidences of the disease are present to confirm the statement and corroborate the diagnosis (92).

10. The blood.

(a) In 75 of the cases there is no change except an esinophilia.

(b) In 20% of the cases there is a leucocytosis supporting the toxic theory of the disease.

The co-agubility of the blood in 40% of the/
the cases is distinctly negative or neutral showing that there is no support for the thrombo-causative theory of the disease which is greatly emphasised by some writers.

II. Rarer accessory symptoms found are:

(a) Motor weakness.
(b) Aphasia or stuttering.
(c) Transitory paralysis is probably because of exhaustion of the cortex.
(d) Transitory hypotonia or loss of tendon reflexes.
(e) Transitory amaurosis.
(f) Amnesia or aphasia.
(g) Dysarthria and inco-ordination of all movement.

The more severe these symptoms are the more likely is it to be symptomatic and not true or idiopathic epilepsy.

Tremor       Conjugate deviation       Paresio of ocular muscles.
Blindness    Deafness                   Vomiting
Diarrhoea    Polyuria                   Salivation
Oedema       Cutaneous emphysaema

are the rare symptoms following epileptic attacks.
PERSONAL CONDITIONS.

The general condition of epileptics is very often normal.

As regards intelligence, it has been shown that many leaders of the race at different periods of the world's history were epileptics, and one of the greatest natural philosophers of our own times has been an epileptic for thirty years. The general rule, however, is for them to depart from the normal in that respect. Some statistics place this departure at one third of all cases. Often Epileptics are peculiarly exciteable, suspicious, irascible, with poor memories and weak intelligence.

In the Binet Simon test, we have a very simple and serviceable method of estimating the intellectual capacity of an individual. It is not so accurate as a measuring line in other spheres but for all practical purposes it is quite good and infinitely better than our commonsense judgment. Certainly it is the best system we have at present of arriving rapidly at a valuation of a person's mental calibre, and stating it in definite terms.

In this system there are 62 different tests, including those for children of one and two years of age. They vary in number from three to eight for each of the first thirteen years of a child's life.

The tests are such as children of average normal/
normal intellect are easily able to perform at the ages specified. For example, a child of one follows with his eye a lighted match held in front of his face, grasps a suspended cylinder, takes hold of a block if placed in his hand. A child of 4 can state whether he is a boy or a girl, knows common objects such as a penny, a key, or a knife, can repeat numbers after hearing them once, and is able to tell which of two lines, differing by 1 centimetre is the longer and so on.

By this means it is possible to measure the extent of mental arrest or retardation shown by subnormal individuals and to classify them according to their degree of intelligence.

It has been suggested that those with a mentality of one to two years be classed as Idiots; those from three to seven years as Imbeciles; and those of five to twelve years as Morons or weak-minded.

I have systematically examined a number of Epileptics under my care, and obtained some very interesting results, which I herewith tabulate. The revelations were in some cases astonishing, although in most we had in a manner really decided in our minds as to the mental state of the individual, and our decisions were merely confirmed by the tests. I found that the mentality was weak in proportion to two things - first, the age of onset, and second/
second, the period during which the disease had lasted.

Where the disease had begun below seven years of age, the mental retardation was most marked; and where the disease had lasted for a long period and especially was marked by frequent Petit Mal attacks, the mentality was weak.

For example, take a few cases at random:-

<table>
<thead>
<tr>
<th>Age</th>
<th>Mentality</th>
<th>Age</th>
<th>Mentality</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.G.</td>
<td>30</td>
<td>9</td>
<td>H.A.</td>
</tr>
<tr>
<td>G.G.</td>
<td>32</td>
<td>12</td>
<td>W.R.</td>
</tr>
<tr>
<td>M.N.</td>
<td>39</td>
<td>9</td>
<td>T.F.</td>
</tr>
<tr>
<td>G.C.</td>
<td>26</td>
<td>8</td>
<td>A.M'L.</td>
</tr>
<tr>
<td>J.L.</td>
<td>34</td>
<td>5</td>
<td>R.M'C.</td>
</tr>
<tr>
<td>D.I.</td>
<td>18</td>
<td>7</td>
<td>G.K.</td>
</tr>
</tbody>
</table>

Classifying all the case irrespective of real age, we found, that :-

- 4.9% were idiots with a mentality of 1-2 years.
- 32.7% were imbeciles with a mentality of 3-17 yrs.
- 56.2% were weak-minded with a mentality of 8-12 yrs.
- 6.2% only were normal.

The percentages according to the BINET SIMON ages were :-

| Idiots. | 1 |
| Id. | 1% |
| Imbeciles. | 3 | 4 | 5 | 6 | 7 |
| 3.5% | 6.1% | 4% | 11.8% | 5.3% |
| Weak-mind ed. | 8 | 9 | 10 | 11 | 12 |
| 15.7% | 19.2% | 6% | 10.8% | 4.5% |

These/
The figures cannot be taken regarding the mentality of Epileptics as a whole. For that purpose a much more extensive work must be done. Epileptics in every sphere and in every station of life must be examined, not only in institutions but in ordinary life as well. It is quite likely that they would be found to approximate pretty nearly to our findings, although, as a rule, we do not admit any but those who are sane and capable of looking after themselves.

As regards their physical condition, evidences of essential degeneration are often present, such as Malformation of the skull, undue elevation of the Palatal Gothic Arch, Polydactyly or Syndactyly, undue elongation or eversion of the Coccyx, premature and excessive development of the generative organs as recorded by Openheim, in a boy of ten years, where it had been present for five years, the rudimentary tail of Fere, Melanodermia on the thorax as in a case recorded by Lanois, and Fere.

Under this section various interesting facts relating to age, sex, percentage of Epileptics to the general population, and frequency of attacks, fall to be mentioned and discussed.

**AGE.** Epilepsy, especially the idiopathic variety, is peculiarly a disease of childhood and early life. Fifty per cent of all the cases/
**Ages of 156 Epileptics at Onset of Seizure.**

<table>
<thead>
<tr>
<th>No. of Cases</th>
<th>Percentage of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>16.9%</td>
</tr>
<tr>
<td>24</td>
<td>15.6%</td>
</tr>
<tr>
<td>22</td>
<td>14.3%</td>
</tr>
<tr>
<td>20</td>
<td>13.0%</td>
</tr>
<tr>
<td>18</td>
<td>11.7%</td>
</tr>
<tr>
<td>16</td>
<td>10.4%</td>
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<tr>
<td>14</td>
<td>9.1%</td>
</tr>
<tr>
<td>12</td>
<td>7.8%</td>
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<tr>
<td>10</td>
<td>6.5%</td>
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<tr>
<td>8</td>
<td>5.3%</td>
</tr>
<tr>
<td>6</td>
<td>3.9%</td>
</tr>
<tr>
<td>4</td>
<td>2.6%</td>
</tr>
<tr>
<td>2</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

The graph shows the distribution of ages at onset of seizure for 156 epileptics, with the x-axis representing age groups (1-30 years) and the y-axis representing the number of cases. The percentage of cases for each age group is also indicated.
cases I have treated began between the ages of 1 and 7, 17.5% of them before the end of the 2nd year, 75% of them before the end of the 14th year. On the back of the preceding page is a diagram illustrating the distribution relative to age at beginning.

The liability to Epilepsy diminishes as age advances. It is uncommon for it to begin after middle life, and is very rare after 60 years of age. Out of 485 persons admitted to the Craig Colony, 83% developed the disease before 20 years of age, and 20 out of 145 gave manifestations of it as early as the 6th month of life (93). Of Gowers' cases 422 occurred under the age of ten and 1,087 under the age of 19.

SEX. The sexes are said to be about equally affected when all ages are included, but after 30 its incidence markedly increases among males. Althus (94) collected in all 54,000 cases, 28,690 of these were among men, 25,482 were among women. Gowers found that 1,450 cases had 55.90% of males, and 44.1% of females.

I have found it difficult to fix upon the distribution among the sexes in cases, as the numbers depend not on patients available for treatment, but on the hospital accommodation.
tion. The disease begins with many women at the menarche and continues at each period. For males and at all ages, the most common form of insanity, apart from general paralysis, is that associated with Epilepsy. (95)

PERCENTAGE OF EPILEPSY TO THE GENERAL POPULATION.

It is very difficult to give figures that can be regarded as accurate in regard to a disease like epilepsy, that in some of its milder forms may go unrecognised, and which, on account of pride and other motives, may be successfully concealed for long period. It is one of those sorrowful afflictions of mankind that both the sufferer and friends try to hide. Estimates given for various countries indicate that epileptics are present in the ratio of 1-3 per 1,000 of the population. Paterson estimates those in the United States at 2 per 1,000, Kolle, those in Switzerland at 1-750; Binswanger those in Prussia at 2.9 per 1,000, Burlureaux, those in France, at 2.5 per 1,000; Pelman estimates the number in Scotland at 1 in 750, and Urquhart (96) states that epilepsy is comparatively infrequent in Scotland. Great reliability cannot be placed on such figures. In Germany and France, where there is conscription, they can arrive at an approximate estimate of those affected/
affected among the males, by calculating the rejections, but in a country like Scotland it is not so easy. I am of the opinion that epilepsy is by no means so infrequent in Scotland as Urquhart indicates. While working in private practice in Falkirk and district, with a population, roughly, of 40,000, I came into contact with over 40 epileptics, many of these among paupers, but there was bound to be a large number with whom I did not meet, as in that district there were other twelve medical practitioners. We are certainly within the mark in estimating epileptics at 3 per 1,000 in Scotland and probably 4.

**FREQUENCY OF ATTACKS.**

The attacks do not often occur with periodic regularity, never with the regularity of malarial attacks in the tropics. In fully 80% of my cases they occur more frequently than once a month. In many cases a patient will have no attacks for several weeks, when, suddenly, a seizure will come on and be followed by two or three at that time; then none for two or three weeks again, as if for a period toxins were accumulating in the system and nature by means of convulsive seizures endeavoured to clear the system of these/
those poisons. Some cases do not have
attacks except at night, when asleep, others
only once in many months or several years.
It is interesting to note the interval that
elapses between the first attack of epilepsy
and the second. In twenty cases there were
as follows:—

One day ............. 2 cases.
Three days .......... 2 "
A week ............. 1 case.
A fortnight .......... 6 cases.
A month ............. 4 "
Three months ....... 2 "
A year ............ 4 "
Two years ......... 1 case.
Over two years ...... 3 cases.

That is with more than half of these cases
the second attack occurred within a month
of the first attack.
The intervals between the seizures vary very
markedly. Of my 156 cases recorded:—

20 had fits every day.
45 every week, but not daily.
56 every month, but not weekly.
30 every three months, but not monthly.
5 about once a year only.

Recovery from Epilepsy is rather rare if one
implies by "recover" freedom from fits for 5 to 10
years at least. Turner and Habermaas
place the percentage of recoveries at ten. Others state 6%. At the colony at Bridge of Weir even these statistics are too high.
The number of attacks varies greatly in different individuals. We have in the colony patients who have not had fits for two years, and others who have from twenty to thirty in a day. When the larger number of attacks is present, the minor type of the fit predominates. In the majority of instances as the table in the appendix shows, the fits are under ten per month. The number of fits depends largely on the environment and circumstances of the patient. If the patient's physical tone is lowered, then the fits are more frequent and severe. We find, also, that excitement, physical exertion, indigestion, fright, all bring on attacks in certain cases. Sleep strangely seems to have a similar effect. It seems in some cases of nocturnal epilepsy to act as an exciting cause. It has also been found that febrile states, suppurations, injuries, and operations may act as inhibitive agents. This latter fact may for a time prevent one from putting a true value on any operation for the cure of the disease. One case I know of who had an operation in the inguinal region, was cured, and Turnowski has reported a case of recovery following high pyrexia.
As a rule, epileptics are a short lived people, but not because the disease itself endangers life. It is a rare thing for fits to cause death. Injury, suffocation, and burning through falling into a fire may happen; cerebral haemorrhage or rupture of the heart seldom does. An interesting table of ten deaths from two hundred thousand fits shows that the deaths were due to -

2 ........... choking after food;
1 ........... suffocation during the night;
1 ........... aortic and mitral disease;
2 ........... adherent pericardium;
1 ........... advanced fatty heart;
1 ........... cerebral tumour.

10 (Marchand, Lancet, Aug. 5th, 1911)

Status Epilepticus is a very fatal disease. Some authorities place the mortality as high as 50%, others (Clark and Prout) at 25%.

Prognosis is most favourable in cases of an alcoholic or syphilitic origin, or that have arisen from a reflex cause. In congenital or acquired mental cases as well as in cases of long standing and Petit Mal, the prognosis is bad. It is worst in case that have begun before ten years of age.
This phase of the problem of Epilepsy is a real one to every one who has to do with the disease. Till quite recently the numerous remedies prescribed for Epilepsy were so absurd that it seems strange they should have been resorted to by people of intelligence and influence. Every imaginable remedy including the most obnoxious and repulsive mixtures, seem to have been resorted to. For example, a popular remedy as late as the 18th century, was a prescription compounded of certain roots and the skull of a criminal who had suffered capital punishment. Dr. Culpepper, "who" Dr. Johnson said, "for his medical researches, undoubtedly merited the gratitude of posterity" and who died in 1654, says in a book I possess, "Elk's claws or hoofs are a sovereign remedy for the falling sickness, though it be but worn in a ring, but says Mizaldus, it must be the hoof of the right foot behind."

A physician of King William, prescribed a preparation of earth worms, and a human skull. Rum, in which snakes' heads had been steeped, wheat flour made into a cake with dew gathered on the morning of St. John's Day, a powder made of the remains of magpies, are other remedies at one time esteemed.
esteemed valuable. The last named has survived in a German nostrum called "Roller's Powder for Epilepsy." It is said to be made of magpies shot on twelve nights following Christmas. This old time superstitious treatment survives also in the treatment prescriptions of several physicians to-day, as in one sent me recently, where pilules of carbonate of lime made from the middle layer of oyster shells was prescribed.

As a preventative of Epilepsy it was a common custom to give coral powder mixed with nurse's milk to an infant soon after birth. The experience of the ancients, however, was, they -

"Could never cure her falling ill
Which takes her when she please."

The best general treatment for an Epileptic is undoubtedly an open-air life, with congenial and suitable occupation, in which he feels of some use, and where he can associate with others who do not "avoid" him because of his misfortune, or who do not treat him with that show of sympathy which galls on a person of independence and character, and emasculates and degrades those who are weak-minded. The association of fellows afflicted like himself is a real help.

This forms the basis of the various colony systems. Such colonies are invariably situated in open country districts, and provide occupation in/
in the form of gardening, farming, various trades, such as shoe, mat, and basket-making for those able for it, and easy domestic work for those unfit for the other labour. The women work in the sewing room, the laundry, and the kitchen. One invariably finds that Epileptics, who, prior to admission to a colony, were pampered by over-anxious friends or debased by being allowed to roam at will, anywhere, with no occupation, begin to improve physically and mentally. The work acts as a tonic to their condition, and they feel more fit. Further, in a colony, the fits often marvellously diminish in number. It is only in a colony that the aura can be studied and investigations taken to detect the presence of toxic substances in the blood, the urine or other secretions, and a possible causal relationship traced accordingly. Further, only in a colony can the habits of the individual epileptic be changed and an endeavour made to throw their energies into new channels. The regular habits of diet, work, and sleep, the maintenance of a well-ordered life, with no excitement, and avoidance of alcoholic and other stimulants, the application of the various useful adjuncts of hydrotherapy and gymnastics, the constant medical supervision with the careful watch that is essential in the treatment of an epileptic, all of which are so vital to the well-being of such a patient, can only be thoroughly attended/
attended to in a colony. It has been the experience of several colonies that the younger the epileptic and the sooner he was admitted after the seizures, the more satisfactory was the result.

In treating Epileptics, one has to follow certain well-defined rules based on the etiology of the disease.

1. Every system has to be searched for disease, and where found, treated. If syphilis be found, congenital or acquired, mercury, the iodides, or salvarsan ought to be given; although anti-syphilitic treatment is not well borne by epileptics.

2. A Search for injuries and old scars should be made. If a cicatrix be found it ought to be removed, although frequently disappointment follows. If a cranial injury suggests a possible involvement of the meninges an operation might be useful.

3. Various toxic agencies and conditions of visceral disease which stand presumably in a causative relationship should be treated, although cure of the toxemia or visceral disease very rarely results in cure of the epilepsy.

4. We have also to interrogate the entire organism in our search for irritations which could cause/
cause or aggravate epilepsy, or intensify its convulsions by acting on a pre-disposed brain. Refractive errors, nasal deformities and growths, throat abnormalities, and various pathological conditions of the bowel if present ought to be corrected.

The actual treatment of the epileptic condition may be considered from the points of view of the various periods:

1. The pre-paroxysmal period.
2. The paroxysmal and post paroxysmal periods.
3. The inter-paroxysmal period.
PRE-PAROXYSMAL TREATMENT.

In cases where there are well-marked prodromata such as have been described, much can be done. The majority of patients suffer from intestinal stasis, if they be given a violent catharsis and large doses of the bromides and put to bed when indications of a seizure present themselves, the fit may be averted. I have tried that repeatedly with excellent results. In 76 cases reported by Dr. Muskins (98) so treated, 17 had their fits arrested - a very large percentage - and 24 were very markedly improved. They were selected cases and none showed marked mental symptoms; nevertheless, the results were very good. In cases where a warning is present, the afflicted person ought to lie down in a comfortable position. An old familiar expedient, is to constrict a limb in which an aura is felt, at the beginning of the aura. I have, on several occasions done this with patients; it was generally effectual in cutting short the attack, but the results were not good. One lad, if he has the attacks cut short in that way, is quite insane afterwards. Other complain of malaise, headache, and giddiness. Usually they prefer the fits to occur. Reynolds and Bazire have reported cases which were stopped by forcible extension of the limb or the parts affected. Oppenheim has reported a case of his/
his, where, by forcibly and suddenly over-extending
the hand in which the aura occurred, an attack was
prevented. In some cases, inhalations of amyl-
nitrite (99) are useful in staying the progress of
the attack. Dr. S. Weir Mitchell was the first to
introduce it. It is specially useful in cases with
an olfactory aura (Gowers) and if used as soon as
the deadly pallor occurs, its action is disputed.
Dr. Bartholew holds that the inaugurations of an
epileptic paroxysm are due to an anaemia of the
brain, and Gowers says that the amyl-nitrite acts by
flooding the brain with arterial blood. Prof. Hare,
on the other hand, says its action is due to the
shock it inflicts on the centre which "diverts" the
intended discharge, as an electrical shock also does.
Epileptics who can tell by prodromatal symptoms the
approach of a fit, especially if the fit be ushered
in by great pallor of the face, should carry capsules
of the drug with them. In its absence a simple
expedient may be resorted to - E.g. by taking a long
inhalation holding the nose and then forcibly con-
tracting the chest for a number of seconds. This
flushes the face, and in all probability the brain,
just as amyl-nitrite does.
PREPAROXYSMAL AND POST-PAROXYSMAL TREATMENT.

During the paroxysm, the treatment is simply that of preventing the patient from doing injury to himself. His clothing must be loosened at the neck and wherever it causes constriction. Something, preferably a piece of stout rubber tubing, or a cork, should be placed between the teeth to prevent injury to the tongue. His body ought to be straightened out so that it will not be injured by the violence of the clonic stage, the head should be slightly raised.

Some authorities, E.G. MacConaghey and Crocq state that if the patient be turned on the left side the fit will be cut short. Crocq goes so far as to say that he has found it successful in every case in which he has applied it (100) I have tried it repeatedly in cases under my care, but with no beneficial result at any time.

When the convulsions are violent and prolonged, inhalations of amyl-nitrite or of chloroform are useful. Hypodermic injections of morphia have also been used.

After the fit is over, and the patient is in the post-paroxysmal condition, it is advisable to let him sleep on undisturbed. It is necessary at this stage, also, to guard against possible contingencies already referred to, such as automatism.
INTER-PAROXYSMAL TREATMENT.

This is the chief consideration in the therapeutics of the disease, and the main object of treatment at this time is to prevent the occurrence or diminish the frequency of the convulsive seizures.

Much can be done by hygienic measures. Stimulating foods and alcoholic liquors should be banned. Abundance of sleep must be insisted upon, and the bedroom should be well ventilated. Constipation ought to be guarded against, and at a regular fixed hour the patient should endeavour to have a free evacuation of the bowels. Anaemia, Nerve exhaustion, Cardiac weakness, must receive attention and treatment. Marriage and all sexual relationships should be absolutely forbidden. A constant symptom of the disease is cold extremities; it is necessary therefore to attend to the circulation (101). When at work, dangerous situations require to be avoided. On no account should epileptics be on a scaffold, or near fire or water, in case of a fit occurring.

It is possible in treating some diseases, such as Phthisis, to stop entirely all medicines, and rely on hygienic methods. That is not so in Epilepsy. We must use medicines, and the medicinal treatment of Epilepsy is not all that might be desired. It is suggested, unfortunately from experience, rather than deduced/
deduced from a scientific knowledge of recognised fixed and measured processes (102).

There is but one kind of drug, Bromides, that has really any effect; it is the sheet anchor of most therapeutists, but in few cases is it ever a real cure. Bromides are really palliative and not curative. In some cases they lose their power after a time, and in others they have no effect at all, even in very large doses. In Petit Mal and Nocturnal epilepsy they are seldom of any use. The extent, of the use of the Bromides, however, is indicated by the fact that the National Hospital for the Paralysed and Epileptic use over one and a half tons of alkaline Bromides every year, and the Bethel Colony at Westphalia uses half a ton every month.

Potassium Bromide, Sodium Bromide, and Ammonium Bromide are the three in most common use. Potassium Bromide is rather depressing. Sodium Bromide is less toxic but more hypnotic and less irritating to the stomach. Ammonium Bromide is very irritating to the stomach. The Bromides are probably best used in the proportion of two of Potassium and Sodium, to one of Ammonium. The salt taste can be disguised by giving it in milk. The dose given varies according to age, the condition of the disease, and the usual period of attack - from 15 grs. to 6 drams per day being used.

Gowers is of the opinion that if 30 grs. three times/
times a day does not produce arrest, nothing will. Children bear relatively large doses quite well, from 40 to 60 grs. per day often being given to a child of four years or upwards.

In giving the Bromides, the practice at Bridge of Weir is -

1. To begin with Potassium, Sodium, and Ammonium Bromide in the proportion of two of the first two to one of the last; or more often with Potassium Bromide alone in doses of grs. 5, ter in die. I doubt if the mixture of Bromides is of any special value.

2. To increase as required till a dose is found which arrests the fits, even to 3½ drams per day.

3. If the attacks are periodic in nature, the dose is given two or three hours before the fit is due.

4. The medicine is continued in full doses until twelve months after the last fit.

5. If the fits have ceased, the medicine is reduced grain by grain till two thirds of the dose is being taken at the end of three months: in that manner it is further gradually reduced till it is stopped by the end of the second year.
Digitalis, nux vomica, belladonna, chloral, iron, liquor arsenicalis, or cannabis indicasis combined with the Bromides, according as indications assert themselves - Digitalis being given in circulatory disturbances; Belladonna where the Petit Mal type is marked, and unaffected by Bromides alone; Cannabis Indicus when complicated with automatism; Liquor Arsenicalis when with acne Bromides and Chloral if maniacal or in Status Epilepticus; Iron or Zinc if hysteroid post convulsive effects be noted.

Other Bromides used are -

Lithium Bromide grs. V to XV. Weir Mitchell (103) is of the opinion that for rapid action and soothing purposes this salt of Bromide is the best. The smallest dose should be given to begin with and added to grain by grain as the fits recur.

Strontium Bromide \( \frac{1}{2} \) to 1 dram T.I.D. - is said to be less apt to produce acne, mental depression, and gastric disturbances, than potassium (104) I have not any personal experience of the drug.

Nickel Bromide - must be given in small doses, therefore it is really of no use.

Zinc Bromide - small doses must be given here also because of its emetic action.
Monobromate of Camphor is advocated by Hasle and Bournville, and is useful where sexual excitement and giddiness are present. It increases the inhibitive control of reflex movement.

Ethylene Bromide is highly spoken of by Oppenheim (105). He has found it of use in cases of long standing.

Bromipin is highly spoken of by some. It consists of Bromine and Sesame Oil. Dr. Rene Berkovics of Budapest recommends the double bromide of Rubidium and ammonium in the treatment of Epilepsy. He has seen better results with this salt than the others. The action is in the main, the same as the other bromides, since Rubidium does not exercise any specific effect on the disease. The daily dose is from 4 to 7 grammes.

Dercum strongly urges the addition to any Bromide that may be prescribed, one of the Glycerophosphate salts, on the ground that there is an increased waste of Phosphorus in Epileptic patients. He prefers Sodium Glycerophosphates.

The elimination of bromides is comparatively slow. Potassium Bromide has been found in the urine one month after it has been stopped (106), and Dr. J.B. Chapman of the Pennsylvanian Hospital for the Insane has demonstrated that bromides can produce/
produce a condition analogous to Dementia.
Bromism may show itself, and when it does so merely by an acne rash it should be counteracted by giving by giving strong coffee at meals (Echeverria).
Liquor arsenicalis has the same effect, and at Bridge of Weir we use it at the first indication, together with hot baths. If the more serious conditions, such as a state of anergia and exhaustion with mental dulness and motor weakness, ataxia, gastric disorders, and enfeebled action of the heart and absence of the corneal reflex show themselves, the drug should be stopped. Digitalis and stimulants should be administered frequently and there should follow a course of tonics, such as of iron nux vomica, and quinine.

The bromides act by greatly diminishing the excitability of the motor areas. Albertoni has demonstrated that when dogs are under the influence of Potassium Bromide, it is practically impossible to produce convulsions by any degree of cerebral irritation. According to Hughlings Jackson, they also act by causing more stable matter to be formed "Substitution Nutritive". They are of use in reflex epilepsy because of their action on the cerebral centres, and also on the sensory paths of the cord (Hare)

The action of bromides is greatly helped by salt starvation or semi-salt starvation, and should be thoroughly tried in all obstinate cases (107)

When/
When large doses of bromides are given, strychnine should be combined with them to counteract their depressing effects (108).

Cases which have been for a long time under treatment by bromides/generally followed by improvement, if the drug be stopped for a time. At times the gain is startling (109).

In Status Epilepticus, various measures may have to be adopted to save the life of the patient. Chloral hydrate grs. 45-60 per rectum may be given. If that be not retained, Chloroform may have to be resorted to. Hyoscine, hypodermically, is useful at times. Blood-letting is advocated as a last resource, and in some cases Lumbar puncture has proved effectual.

Borax was re-introduced as a remedy for Epilepsy by Folsam of Boston (110) and has been strongly advocated in this country by Gowers, who has found it useful in inveterate cases, where bromides fail to exert a satisfactory influence, or where they cannot be tolerated. It is also said to be of use where there is gross organic disease. It is given in doses of grs. 30-80 or 90 in the day. W. Alexander of Liverpool (110) gives it as a routine medicine in the colony at Maghull, in combination with Sodium Bromide.

Mairet (111A) tried it in 30 of his cases. In 5 it did no good, 4 showed toxic symptoms, 19 some improvement/
improvement and 3 had complete cessation of all fits.

Dr. Dejoud used it with 25 cases under his care; 18 were not benefitted, six seemed to be relieved and one was apparently cured in a few months.

I have used it alone and in combination with Sodium and Potassium Bromide and have been disappointed. It has not apparently had much effect either on the number or the severity of the fits. Any good that has resulted from the mixture of these two I have obtained by the use of the Bromides alone in the same patient.

Belladonna is a useful remedy, Trouseau warmly advocated it in his day. It is given in doses of one-fifth grain B.I.D. increasing to grs. 4 B.I.D. after several months. I have found it very useful to add 5 - 10minims of the tincture of belladonna to the bromides in order to re-inforce the action. It is most useful in the Petit Mal type which Bromides so often fail to influence. Oppenheim (112) advocates the use of atropine in doses of one-200th gr. to 1-125th gr. several times a day in cases where Bromides are ineffectual. He has given it for years at a time with occasional interruptions.

In cases complicated with cardiac weakness or to counteract the depressing effects of the bromides, Digitalis and Strophanthus are useful. Many cases in/
in which the attacks persist when the Bromides alone are used cease entirely when the Bromides are given combined with Digitalis or Strophanthus.

Gelineau's "Dragees" which are composed of Potassium Bromide, Picrotoxin, and Arsenate of Antimony, I have found very useful in many inveterate cases. One lad who had had Bromides and other drugs in very large doses for years, ceased to have fits except at rare intervals under the use of this compound.

Adonis Vernalis is used and may have some influence in alternating the attacks, but it may cause them to recur more frequently. (113)

Antipyrin combined with Ammonium Bromide in the proportion of gr. 6 of the former to gr. 20 of the latter has been recommended by Prof. H.C. Wood. It appears to have been effectual in some very hopeless cases.

Where insomnia, violent convulsions, or maniacal excitement, is present, Chloral, combined with Bromide, is very useful. It calms the disturbed cerebral centres, and allays mental excitement. It is also very useful in Status Epilepticus.

Thyroid extract appears to have a real, though limited, value in the treatment of epilepsy. Dercum (112) considers it specially applicable for epileptic children with marked stigmata of arrested development, and signs pointing to Thyroid deficiency. It is best given combined with the Bromides.
Flechsig treats the disease with Opium. He uses the solid extract and gives up to grs. 12 or 15 daily, taking from five to six weeks to reach that amount. Treatment by the bromides is then substituted. This is of benefit in long standing cases of idiopathic Epilepsy, which are not benefited by the Bromides. It is of little value in old cases, where Dementia has resulted to any extent (114) It is contra-indicated in recent epilepsy, and in organic cases.

De Fleury (115) in accordance with the autotoxication theory, advocates the prevention of intestinal toxins by a suitable diet. Hot water he gives freely, and by Massage, Cold Douches and Hot Baths, and Mountain Air, endeavours to free the system from accumulated toxic materials. He also gives a hypodermic injection of an artificial serum, composed of 1% Sodium Chloride, Sodium Sulphate, Sodium Phosphate and Carbonic Acid, giving 8 to 10 grammes daily. Along the lines of this autotoxic theory, to aid the excretion of toxic substances, I am at present trying the effect of various forms of Baths, Russian and Turkish, also Baths of running water, gradually cooled. The introduction of this method of treatment is too recent to speak freely about, but, so far, it has apparently been helpful in some cases. Galvanism and Faradisation of the abdominal wall is also being used with the same end in view.
Aperients, diuretics, Lithium carbonate, and intestinal antisepctis are all given to counteract the toxins.

One method of treatment lately advocated in America does not appeal to British Medical men, although "as usual", the results "appear" satisfactory. Dr. Lockie of Pontiac, (116) injected saliva from one patient into the buttocks of another epileptic patient, and found that the number of seizures was lessened. The period of observation, however, was very short. Another writer in the New York Medical Journal (117) tried the injection of normal saliva, and also obtained favourable results.

It must be admitted that almost everything has at one time or another been tried and praised by able and notable men. Castration, exorcism, and trephining, excision of the cervical sympathetic ganglia, ligation of the vertebral arteries, circumcision, ocular tentomy, removal of the ovaries, are a few that may merely be mentioned. No specific, however, has been found, and although occasionally curable, the most we can hope for is to mitigate its severity and retard its course.

A great deal might be done by preventative measures being taken with children born with a diathesis to the disease because of their heredity. Convulsions in such children should certainly be treated seriously, and not permitted to go on unchecked.
SURGICAL TREATMENT.

The mere performance of an operation is of itself sufficient to produce, at any rate for a time, great relief (118). It is therefore difficult in these cases where benefit does follow surgical interference, to decide what value to place on the operation. One man, whom I know, who had the operation of castration performed on himself, not for the cure of the disease, but for sexual reasons for a considerable period experienced no convulsive seizures.

In reflex epilepsies, operations are frequently called for and occasionally successful. The cicatrix should be excised if one form an epileptogenic zone. Foreign bodies or tumours should be removed if they be present. Nerves involved in callus ought to be freed. Sometimes, as in a case recorded by Oppenheim, if the nerve which supplies a part where there is an aura be stretched, a cure is effected.

Cases, the result of injury to the head, although the bone show no mark, are said to improve if the meninges, cyst and cortical centre be removed. The paralysis accruing tends to disappear (Horsley). Some workers merely massage the cortex (119).

Zimmerman (120) operated on 4 cases of what Horsley calls "Focalised Epilepsy", in which the attacks/
attacks began in the same part of a limb always, and subsequently became generalised. There resulted three recoveries and one improvement. In 30 cases operated on by Raymond there were 9 failures, 9 improvements, and 12 recoveries. The failures predominated and the successes were only temporary.

Records are accumulating that indicate that in idiopathic epilepsy the decompression operation is, in many cases, able to influence the attacks favourably. Weil, the Breslau Clinic from a study of 20 cases (121) concludes that surgical treatment is indicated -

1. In all of traumatic origin.
2. In all generalised cases of traumatic origin.
3. In cases of generalised epilepsy where there is cranial osseous cicatrix.
4. In non-traumatic Jacksonian Epilepsy.
5. In cases of generalised epilepsy complicated by paralytic phenomenon, particularly these cases where the convulsions were localised at the beginning.
**D I E T.**

Regarding the diet, this should be regulated to perhaps two meals per day, at 10 a.m. and 5 p.m., and the food should be plain, simple, wholesome, properly cooked and liberal in amount without being in excess. An over-loaded stomach has been known to bring on fits, all food should be eaten slowly and thoroughly masticated. Very little fluid should be allowed with the meals, but the patients should be encouraged to drink water freely - from four to five pints - between meals.

Regarding the nature of the food, there is no dietary that has a special influence on the fits for good or ill. Meat should be given in small quantities - not more than once a day (122)

At Bridge of Weir there are three colonies. One is on a purely vegetarian diet, and the other two on a mixed diet; but, the results of treatment in the former are no better than in the latter two.

Merson found a slight advantage in favour of a farinaceous diet in a number of Epileptics who were treated during a stated period on farinaceous and nitrogenous food, alternately (123)

Alts, (124) experimenting with various forms of dietary confirms the opinion that milk and vegetables together are better than milk alone.

Dr. Donath of Buda-Pesth lately placed groups of/
of Epileptics on a strict meat and milk diet respectively, and after six weeks he failed to detect any noteworthy effect of either regimen, upon the number of fits, or the general health of the subject.

Incidentally, he found that if the salt in the diet be suppressed the frequency of the attacks were reduced, but at the expense of general health, loss of weight and strength resulting. A too rich "albumoid" diet is not therefore detrimental to Epileptics as frequently asserted.

It has been found that with a fish diet at night in place of a meat diet, fits were less in number. As a general rule in Nocturnal Epilepsy it is wise to give a light meal in the evening a considerable time before going to bed.

Alcohol, strong tea and coffee should be prohibited.

Richet and Toulouse have advanced the view that the body is more susceptible to Bromides when Chlorin has been reduced in the diet, and it has been shown that the replacing of the Sodium Chloride with Sodium Bromide in the diet, even in the baking of bread, is beneficial. No symptoms of Bromism appear and the fits are markedly influenced for good (125)
CONCLUSION.
CONCLUSION.

In our study of Epilepsy a careful outlook for a solution to the problem, has but resulted in disappointment and failure. What can cause it we know, what really is the cause we do not know. The evidence in favour of a predisposing cause in a very large percentage of cases is overwhelming, and the fact that certain conditions contribute to it, is likewise incontrovertible; but "the something" that is at the bottom of the disease has eluded our grasp.

The pathology of the disease so far as at present understood, is likewise in a most unsatisfactory condition. Theories regarding it are innumerable, facts relating to the condition are daily increasing in number. The great fact, in my opinion, so far, has not been reached. Probably chemical pathology will some day, may it be soon, declare it.

The treatment consequent on an indefinite etiology and an undetermined pathology is accordingly palliative and not curative. We can alleviate most cases, we can cure very few. The problem must be left unsolved. The Epileptic, however, remains, and must needs have our attention.

Socially - he is an outcast.

Dr/
Dr James M'Pherson, President of the Royal College of Physicians, Dublin, said that when investigating the condition of the City of Dublin for the Royal Commission on the feeble-minded, he found that Epilepsy was regarded as more of a family disgrace than Insanity. (126.)

The Epileptic occupies a place, apart from the rest of the world, and he is left severely and cruelly alone.

Physically - he is often a wreck. In a large number of cases, injury at birth, a fall on the head, disease of the brain or its coverings, lies at the basis of the disease. Frequently paralysis accompanies the condition, and the Epileptic is a cripple in addition.

There is no doubt also the disease has an enervating effect on the individual affected. He becomes unavoidably lethargic, and unfit to cope with the affairs of life. Further, every time an Epileptic is seized with an attack he runs the risk of some serious injury to his frame. I have them at present under my care with dislocations, fractures, lacerations and burns, due to their falling in places fraught with danger, while in fits.

Commerially/
Commerically - the value of an Epileptic is nil. Let it be known that a man is an Epileptic, and he loses his work. No man wants him. This has become more emphasized through recent legislation. Insurance Societies will not take him, and the Workmen's Compensation Act makes it practically impossible for an employer to run the risk of having one.

Intellectually - he is unfit to cope with life and its problems. Testing Epileptics with the Binet Simon test has emphasized the fact recognized for many years. The large majority of Epileptics are mentally enfeebled. Practically all are mentally degenerate, and daily are becoming increasingly worse, some slowly, some rapidly, dementia being the ultimate future of most Epileptics.

Again, periods are experienced by almost all, when their mental condition is disturbed and they are really insane. They are irritable, quarrelsome, morose, and often violent without cause.

There are also periods of "automatism" during which features of the greatest importance are manifested when the central control of the mind is lost, and unconsciously and ignorantly the poor fellow performs acts of horrid and unreasoning violence or folly, of which he is heartily ashamed in his saner moments.

The/
The Epileptic needs care because of the baneful effects of the disease on his nature, physical, mental and social. He needs protection from the possibilities of accidents or sudden death while in a seizure. He needs provision for his physical needs which his own exertion cannot make on account of altered social conditions. He needs deliverance from the result of acts performed while confused, mentally disturbed or suffering from auto-matism.

Further, the public needs to be saved from the Epileptic. No one can witness a seizure without being filled with horror. The sight of an individual stricken from his normal state to the level of a grovelling inarticulate mass of flesh, few can witness with equanimity. The effect on those beside him, whether they be friends, fellow employees, customers or strangers, is the same. It is baneful and distressing.

Again, his irritable and unruly disposition, and his subsequent, inevitable mental deterioration makes him an unpleasant member of the family, and an undesirable member of society.

We also owe a debt to posterity, and ought as far as possible to keep it from being burdened as we are, with an excess of mental degenerates.
Every epileptic who marries is a possible progenitor of a breed of epileptics or insane. Heredity plays an obvious and undisputed predisposing part in the production of the disease. The only solution for the problem of Epilepsy that at the present time can be offered seems merely palliative. It may eventually prove more than that.

The Epileptic can be provided for, and protected. Society can be conserved from his baneful influence and posterity can be relieved from a large proportion of probable undesirables, by the establishment of adequate institutions, where he can be segregated and carefully treated, and where he can spend the remainder of his life in comfort and usefulness. At present, charity and private enterprise have established a number of these, but excellent though they be, they are obviously inadequate. Scotland has roughly 6000 Epileptics, but at the time of writing only one colony or institution accommodating from 90 to 100 patients.

The State has at last been awakened to a sense of its duty towards the consumptive, and at the present time, there are being built all over the country, Sanatoria, where he can be treated and if possible, cured.

It now requires to be awakened to the great need of the Epileptic. We should have Colonies adequate/
adequate to meet their need. The ideal institution is one where life can be approximated as much as possible to the conditions met with outside. There should be a large number of small houses with from 25 to 30 patients each, rather than one large building.

The Epileptic must realize that he will probably live and die such. There is not the hope for recovery, with our present knowledge, that we can even offer certain people among the insane or consumptives. An ideal institution or colony therefore, is one, where separated from all dependants, an Epileptic can feel perfectly at home and comfortable. There should be no suggestion of institutionalism and there must be abundant opportunity for work, for education, and in its season, amusement, and religious instruction. Farm colonies seem best for Epileptics. Outdoor work is most favourable for their disease, and the farm itself offers most chance of profit from their work. The small buildings which go with the farm or go to form an Epileptic village, and the extensive farm area, make it possible to classify the colonists into congenial groups, and according to their mental condition. This classificatory separation is an essential matter in dealing with the Epileptic, especially where both high grade and low grade types are admitted to a colony. It is a cruelty to those who are/
are able to do farm work and shop work and practically under wise management support themselves to be placed in close association with helpless low grade imbeciles. Parents with children so affected would not place them in our public institutions if they knew that they would constantly be in contact with others of a lower type than themselves.

The legal status of an Epileptic is an important and difficult question. It would be best for the Epileptic and for the populace, if he could be committed to a Colony, as an insane person can be committed to an Asylum, or an inebriate to a Home for such. It is better that he should be segregated for life, from the outer world. This should be no hardship for the individual, for in the Colony everything should be done to make life enjoyable.

Experience of Colony work in this country, in America, and on the Continent, has led to one common result, - the cures are few, not more than from 3 to 5%, but the general condition of the patient is much improved. The regular life, the carefully planned work, the regulated meal hours, and hours of rest, the selected diet, the avoidance of dissipation, lead to great improvements in the patients and lessen the number of the seizures.

The question of compulsory sterilisation of defectives is one that has been much discussed, especially/
especially on the other side of the Atlantic. It has much to commend it and would undoubtedly do not a little to prevent the propagation of large numbers of undesirables and dangerous individuals, heredity being the most potent factor in the production, not only of Epilepsy but also of certain forms of insanity and criminology. There are difficulties almost unsurmountable in the path towards such an ideal. The time is not ripe for a compulsory sterilisation act. Several States of America who have passed such a law have found it impossible to enforce it, and it lies a dead letter on their books.

Colony life is the solution of this problem to-day, and may provide the real solution in the future; for the study of large groups of cases such as Colonies provide, is bound sooner or later to throw more light on dark points relative to the disease, and to elucidate the problem of the underlying cause of the disease, and the scientific and effective means of counteracting it.
The work done by the inmates varies according to the individual capacity - House work, Laundry work, Sewing, Shoemaking, Baking, Matmaking, Joinerwork, Farming and Gardening - the majority are outside workers.

In addition to sleeping and dining accommodation there is provided in these houses recreation rooms and work rooms for sewing, etc.
These buildings are arranged to accommodate 30 patients. Probably the largest number of patients that should be in one house, if efficiency in treatment be aimed at.

There is a school for those below 14 years of age in one of the houses, in charge of a specially trained teacher.
Classified Synopsis of the History of 156 Patients.

A. Neuropathic heredity Father.
B. " " Mother.
C. " " Grandparents.
D. " " Other relatives.
E. Intemperance - Father.
F. " " Mother.
G. Phthisis in Parents.
H. Infantile Convulsions.
I. Age of onset of fits.
J. Cause ascertained.
K. Type of fit - Major.
L. " " Minor.
M. Aura present.
N. No. of fits per month.

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Further details regarding Cases classified.

A. - D. Neuropathic diathesis.

Indications of a disordered nervous system was found in 15 of the mothers, 41 fathers, 11 grandparents, and 19 other relatives, of the 150 patients giving a predisposition to the disease in 69 of the cases or nearly 45% of the total.

These are as follows -

3. The mother was weakminded, the father a rake.
6. The mother worried very much over trifles.
9. The mother was very nervous. She was married to a relative.
10. Mother's mother was an Epileptic.
12. Mother was very worried while carrying the child, due to separation from her husband.
13. Mother took fits till 14 years of age.
15. Mother subject to periodic headaches.
18. Both parents low type criminals.
21. The boy is illegitimate. There are five other illegitimate children, yet not a prostitute, said to be weakminded.
24. Mother was melancholic.
26. Paternal aunt was an Epileptic.
29. Mother was weak and nervous. Father was dissolute.
33. Grandmother took fits.
35/
35. Mother subject to nervous headaches. Aunt took "turns."
39. Father Epileptic; several brothers had convulsions from infancy and early life.
42. Mother and uncle took mild "turns."
43. Maternal aunt had Epilepsy.
46. Mother had Epilepsy.
51. Mother very nervous.
61. Mother subject to frequent headaches: nervous.
64. Mother subject to Petit Mal.
65. Mother subject to severe headaches.
66. Mother got severe fright when she was 7 month's pregnant. Grandmother took fits.
68. Mother subject to severe headaches.
69. Mother suffered from nervous trouble.
72. Mother weak: brother Epileptic.
73. Grandmother nervous: maternal aunt insane.
75. Father's aunt had epilepsy late in life.
78. Cousin an epileptic.
79. Mother subject to severe headaches: nervous.
83. Mother takes epileptic fits.
86. Mother very nervous when pregnant: cousin epileptic.
87. Paternal grandmother insane.
88. Brother epileptic.
89. Mother's brother epileptic.
91. Mother melancholic.
95. Mother took fits: mild type: cousin insane.
97. Mother took headaches periodically.
99. Father epileptic.
101. Grandfather took fits.
104. Mother subject to spasmodic asthma.
106. Mother frightened by dog while pregnant: very nervous.
108. Twin brother also epileptic: began same age 7.
110. Father epileptic.
112. Mother very nervous.
113. Four day after birth of child mother died maniacal.
114. Mother died in Hartwood Asylum.
117. Grandfather epileptic.
118. Mother had epileptiform seizures during pregnancy with last 3 children.
120. Father insane.
127. Mother hysterical.
129. Mother subject to epileptic seizures.
131. Father weakminded: grandfather insane.
132. Mother much troubled with neuralgia for 20 years - frightened by bull when carrying this child.
135. Mother epileptic.
137. Father epileptic: mother nervous.
138. Grandfather and brother subject to seizures.
140. Mother worries unnecessarily.
142. Father subject to Petit Mal.
144. Grandmother insane.
147. Mother weakminded.
149. Cousin epileptic.
152. Father subject to fits: mother nervous.
155. Grandfather epileptic.
156. Father epileptic.
E - F. Intemperance was a marked feature in the case of 28 Fathers and 13 mothers: or 36 of the parents that is in about 23%.

G. Phthisis was present in parents of 32 of the children.

In some of the cases, mental degeneration and intemperance or a phthisical condition was present in the same parent. It is difficult to estimate the just importance of anyone. The last named may have been accidental, or it may not.

H. 34 of the patients were subject to infantile convulsions. In some cases there was no interregnum between them and the fit. It is probable therefore that the so-called teething condition in these cases at least was epilepsy.

I. In the text (p.102) is to be found a diagramatic representation of the age of onset. The greatest number began in the first year.

J. The causes to which the fits were attributed are varied and interesting. Taking these seriatim they are -

1. Cause dentition at age of 1 year.
2. Cause excitement at Sabbath School Excursion when 15 years old.
3. Fall when infant of 1 month, after which he took twitchings which became severe.
4/
4. At 8 years of age, a fall in the playground, first seizure resulted.
5. Gastric disturbance.
7. Dentition caused convulsions which recurred at 5½ years.
8. A fall on the head.
9. A fall out of bed when 2 years of age.
10. At 14 months had a fall out of bed, after which for 3 years, he had nervous twitchings. When 5½ years old he had a fright; since then seizures have continued.
11. A blow on the head at 4 years of age.
13. A blow on the head.
16. Cerebral haemorrhage.
17. Mental excitement through mother being in drunken row, and police being called in.
19. Caused by eating unripe fruit.
23. Frightened by man murdering woman next door.
25. Dentition.
26. Influenza - first fit followed.
27. Whooping cough.
28. Excitement from burning contents of frying pan falling over neck and arm.
29. Anxiety during mother's illness.
30. A fall on the head.
31. Excited by man trying to frighten her coming home from school.
35. Anxiety over mother's death.
36. Fell down a stair, on her head.
38. Fell off steps on to her head.
43. Measles.
49. Frightened when out in a perambulator, by a dog.
51. Knocked down by a bicycle.
52. Injury to left side of head.
55. Fright.
56. Injury to left side of head.
58. Excitement.
61. Fright.
62. Injury to head.
63. Injury to head.
64. Excitement.
65. Dentition.
67. Fright.
69. Gastric disturbance and excitement.
70. Excitement.
75. Injury to head.
77. Thought it due to carrying weights on head.
79. A fall on the head.
81. Through having right fore arm scalded with hot water.
84. Dentition.
85. Due to eating indigestible material.
86. Head badly hurt by fall from car.
88. Attributed it to eating raw turnip.
89. Fright.
92. Fall over a bridge.
93. Excitement.
94. Excitement.
95. A fright.
96. A fall on ice.
97. Dentition.
98. Blames his work: 7 years in electrical workshop.
99. Gastric derangement.
100. A tube of iron falling on big toe of left foot.
101. Due to a fall.
104. A fright.
105. Had been re-vaccinated and pox was at its height.
106. Late sitting at night, and study.
110. Bolting his food.
112. Overwork and worry.
113. Dentition.
114. Gastric derangement.
115. Dentition.
116. A fright.
119. A fright.
120. Had 9 teeth extracted: shock caused fits.
121. Gastric derangement.
122. Dentition.
123. Over cycling and self indulgence.
126. A fright.
128. Excitement.
130. Dentition and rickets.
132. A fall on the head.
137. Cerebral haemorrhage.
139. Mental excitement.
142. Self indulgence.
143. A knock on head.
145. Dentition.
147. A fright by a dog.
150. Dentition and rickets.
154. A fall when sliding.

K.L. Out of the 156 cases 145 had major attacks.
62 of these had mixed fits - that is both Petit Mal and Grand Mal seizures. 6 only showed the Petit Mal type. These figures are not representative of the Epileptics as a whole as unless there be some severe postepileptic phenomena or some unfortunate accompaniment of the attack, such as marked irritability of temper, patients with the Petit Mal seizures only are not so often sent into an institution.

M. 72 of the 156 patients show an aura that is 46.3%. These aura taken seriatim are as follows: -
(In another place they are classified according to their kind visual auditory, etc.)
1. Feels shaky, a few minutes before onset of fit: always lies down.

4. Has headache previous to the onset of fit.

6. Patient says he "feels a fright" in his inside.

7. Becomes excited a few minutes before seizure, knows to lie down.

8. Patient generally quiet, becomes violent: usually clean in speech, irresistibly uses foul language before seizure.

10. An insane smile comes over his face a few minutes before seizure; lies down.

11. Patient's eyes "dazzle" before onset.

13. Severe twitchings of arms, lips and tongue, giving sufficient time for patient to make himself safe.

15. Headache.

18. Severe headache.

19. Sickness and headache.

20. Twitching in left arm.

23. A pain in gastric region.

25. Patient hears voices and has palpitation.

26. Has heavy feeling in left arm, creeping up to shoulder and head, and often feels as if a string were being tied round his heart.

27. Patient says a "silly feeling" comes into his head just before a fit.

28. Giddiness in head.

29/
29. Faint sensation comes over him.
30. Patient has feeling of something going over her a few minutes before fit.
31. Has strange feeling and pain in the side.
33. Patient hears strange sounds prior to fit.
36. Feels giddy, and blindness comes over the eyes.
37. Has a sensation beginning at right shoulder and coming down to finger tips when fingers begin to move.
39. Flash of light comes before the eyes.
41. Hears singing in ears.
42. Has cramp in the left hand.
45. Has noises in her head, and hears singing or sound of a trumpet blowing. (This patient is deaf).
49. Sometimes feels as if someone was chasing her before fit, at other times a "strange" feeling comes over her.
52. Slight giddiness.
54. Has a gastric sensation.
55. Patient has nervous feeling.
56. Confused thoughts come into the mind.
60. Occasionally feels weak and giddy before onset of fit.
61. Flashes of light before the eyes.
64. Heaviness comes over the whole body.
66. His eyes dazzle.
67. At first a strange feeling comes down left arm to the hand, hand twitches three times, then feeling goes to his head.

68. Acidity of the stomach.

69. Patient has feeling of nausea.

70. Left arm twitches.

73. He has a "peculiar feeling" about his stomach.

76. A feeling of nervousness and shaking of the hands.

77. Patient feels as if he were holding a galvanic battery before the fit.

79. Giddiness.

82. Patient has feeling of swelling in stomach, two or three minutes before fit.

83. Half an hour before fit, patient begins to feel nervous.

84. Has a feeling of discomfort in gastric region.

92. Patient has giddiness at times.

93. Patient had headache half an hour prior to attack.

97. Complains of strange feeling in the stomach before the onset.

100. Sharp pains in left foot.

102. Has feeling of sickness and nausea.

104. Epigastric pain.

107. He sees before him a tiger, with red white and blue stripes, before fit comes on.
113. Feeling of being gripped by the arms.
115. A heavy feeling over region of the stomach.
117. He feels as if an electric battery were working up from the right foot to the head. Sometimes he has a slight nervousness with stiffening of tongue.
121. General nervousness.
122. An "excited feeling" in the stomach which works up to the head.
123. Nervousness and giddiness with loss of power in both hands.
124. Dullness in the head.
125. A feeling of weakness in the legs.
127. Feels as if something were running from back of tongue to the head.
130. Has a blackness before his eyes.
134. Twitching in right leg and foot.
137. Pain in left side of head.
138. Sees flashes of light.
139. Becomes nauseated and sick.
141. A peculiar silence comes over everything. Voices, etc. cease.
144. Patient complains of feeling peculiar smell in the room.
147. Nervousness.
149. Patient becomes unable to walk, very weak before fit.
151. Patient has an indescribable feeling in the abdominal region.

155. Patient complains of sick headache some time before onset of seizure.
Blood Pressure in 20 cases of Epilepsy, taken on a day on which a seizure occurred.

<table>
<thead>
<tr>
<th>No. of Case</th>
<th>Age of Patient</th>
<th>Pulse Rate</th>
<th>Blood Pressure</th>
<th>Convulsive Seizures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>15</td>
<td>72</td>
<td>110</td>
<td>92</td>
</tr>
<tr>
<td>2.</td>
<td>10</td>
<td>80</td>
<td>100</td>
<td>116</td>
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<tr>
<td>3.</td>
<td>30</td>
<td>68</td>
<td>66</td>
<td>96</td>
</tr>
<tr>
<td>4.</td>
<td>18</td>
<td>76</td>
<td>118</td>
<td>96</td>
</tr>
<tr>
<td>5.</td>
<td>35</td>
<td>72</td>
<td>150</td>
<td>112</td>
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<td>6.</td>
<td>26</td>
<td>90</td>
<td>112</td>
<td>122</td>
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<td>7.</td>
<td>23</td>
<td>76</td>
<td>98</td>
<td>90</td>
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<td>9.</td>
<td>12</td>
<td>86</td>
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<td>10.</td>
<td>17</td>
<td>100</td>
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<td>25</td>
<td>88</td>
<td>146</td>
<td>130</td>
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<tr>
<td>12.</td>
<td>50</td>
<td>90</td>
<td>90</td>
<td>148</td>
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<td>13.</td>
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<td>14.</td>
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<td>135</td>
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<td>17.</td>
<td>38</td>
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<td>153</td>
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<td>102</td>
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<tr>
<td>20.</td>
<td>16</td>
<td>96</td>
<td>132</td>
<td>106</td>
</tr>
</tbody>
</table>

These records were taken in the ordinary course. The fits took place when recorded in the forenoon, or early afternoon following the taking of the record, and in the evening or during the night in the other instances. It will be observed that in 9 cases a lowering of the Pressure preceded the fit; in eleven of the twenty the Pressure was increased at the corresponding period. In 1 and 14 a fit was observed to be in progress while the Blood Pressure was being taken.
1. Echeverria on Epilepsy, 1870.
2. Gowers on Psycho Epilepsy.
3. Rev. of Neurology, 1907.
5. Sir W. Whita "Practice of Medicine."
9. Grondame, These de Lyon, 1905.
12. Epilepsy and other Convulsive Diseases, 1901, p. 3.
13. L'Epilepsy, 1897, p. 6.
14. Cyclopedia of the Practice of Medicine, Zeimessen, p. 201.
16. Echeverria "Epilepsy" 1871.
18. Spratling Epilepsy and its Treatment, 1904, p. 64.
22. Wildermuth, Die Atiol. d'Epilepsy.
23. Wartman, Archives fur Physiologic, XXIX.
24. (Neuman, "Dessert Strassburg" 1897.
25/
28. (Pugh, Brain. 1902, p.500.
(Mott & Halliburton, B.M.J., London, 1904, No. 11,1587.
32. Haig, Uric Acid in the Causation of Disease, p.295.
34. Epilepsy and other convulsive diseases, 1901, p. 25.
(Epilepsy & Linkshandig Kert at. P. Bd. XLIV.
40. Bratz & Luth, N.C., 1900.
41. Sir W. Whitala, Practice of Medicine, Vol. 1, p.387.
42. (Seeligmuller (Festschrift, Leipzeg) 1897.
(Urbantschetzch, W. Kl. W. 1905.
43. Frey & Fuchs, Obersteimer XIII, 1907.
44. Turner, Journal of Mental Science, 1907.
(Pierce Clark, American Journal of Medicine, Apr. 1900.
(Hill, The Cerebral Circulation, 1896.
46. Leser, Arch. Bohem, 1904.
47. Fore, Les Epilepsies et les Epileptiques.
50. Allen Starr, Medical Record, Jan. 30, 1904.
52. Lewis Bevan, Test-book of Mental Diseases, London, 1899.
62. Purves Stewart, Medical Annual, 1912.
64. Williams, British Medical Journal, Nov. 23, 1912.
68. Lannois & Carrie, Revue de Medicine, 1899.

71. Allen Starr, Familiar Forms of Nerve Diseases, p. 258.


74. Clark, Revue de Medicine, 1883.

75. W. Aldren Turner, Epilepsy, 1905.

76. Hughlings Jacksons, Brain, 1898, 1899.


78. Fere, Nouv. Icon. de Saltpetre, May, June, 1888.

79. Francois Frank, La Semaine, Med. Aug. 6, 1889.


81. J. Voisen & A. Perdu, Archives de Neurology, May, 1892.

82. Mairet and Vires, Bull. de l'Academie.


85. Munson, Archives Internat. Medicine Vol. 5, p. 120, 1912.


87. Pichlon & Byschowski, Medcyna, 1903.


89/
89. Sternberg Quichaux, These de Bordeaux, 1902.
90. Furnrohz, Zeitschrift fur Wissenschaft. XXVII.
93. Spratling, Medical Record, October 28, 1899.
95. R. Jones, Practitioner, p. 782, 1912.
97. (Aldren Turner, British Medical Journal, April 23, 1898.
   (Shanahan, Therapeutic Gazette, 1912, p. 165.
102. Da Costa, Therapeutics, p. 234.
106. Robert A. Hare, "Epilepsy; its Pathology & Treatment.
107. L. P. Clark, Medical Record, Jan. 12, 1901.
110. Folsam, Boston Medical & Surgical Journal, February 18th, 1886.
112/
115. Fleury, Journal de Medicine, May 10th, 1900.
119. Bircher, Revue Suisse de Medicine, 1911 p. 155.
120. Zimmermann, Centre of Chir. 1911, p. 45.
BIBLIOGRAPHY OF EPILEPSY.


Bourneville: "Recherches sur l'epilepsie," etc. Published annually. "Case of etat de mal, in 1892 and 1897."

----- "Progres med.," 1887, No. 35.
----- "Arch. de neurol.," 1887, XIII.
----- "De la thermometric dans les maladies cerebrales." "These de Paris," 1870.
----- "Recherches cliniques et therapeutiques sur l'epilepsie et l'hysterie," 1878.
----- "Progres med.," 1878, No. 8.
----- "Gaz. med. de Paris," 1874.
----- "Compt. rend. Soc. de Biol.," 1874.
----- "Mouvement med.," 1872.
----- "Deux nouveaux cas d'etat de mal epileptique." "Progres med.," 1899, IX, 161.

Browne, Crichton: "West Riding Lunatic Asylum Medical Reports," 1873, Vol. III.

----- "Journal of Medical Science," April, 1873.

Beau: "Arch. gen. de med.," 1836, Vol. XI.


"Ueber Epilepsia vasomotoria." "Berl. klin. Woch.," 1878, No. 27.


Herouguelle: "Contribution a l'étude du traitement de l'état de mal epileptique." "These de Paris,” 1895.


Kabisch, Erfahrungen mit Eleptin in der Praxis. Moderne Medizin 1911, Nr. 9.


Lapinski, T., (Behandlung der Epilepsie) Medycyna i Kron. lek. 1911, p. 821 ff.

Lepine, J., L'epilepsie psychasthenique . Rev. de med., Nr. 11, 1911.

Legrand Du Saulle, "Gaz. d. Hop.", 1885, No. 78

Lesieur, E., 'Contribution a l'etude de gui. These de Paris, 1910.

Leroy, "De l'etat de mal epileptique" These de Paris, 1880.


Levot, P., Dechloruration et bromuration dans le traitement de l'épilepsie. These de Lyon 1911.


Lorenz, "Inaugural Dissertation at Kiel", 1890.

Luczynski, B., (Kampf gegen die Epilepsie in Polen) Medycyna i kron. lek. 1911, 537 ff.

M., Dr. Hughlings Jackson. Epilepsia 1912, 2.

McBride, "Journal of Mental and Nervous Diseases", 1875


Maciewski, "Le cerveau d'un epileptique mort a l'etat epileptique". Revue neur., 1898, VI. No. 2.


Mairet, Contribution a l'etude iconographique des maladies mentales. These de Bordeaux, 1911.

------ Colere paroxystique et epilepsie psychique. Rev. de med. 1911, p. 508 ff.


Marinesco, Sur quelques résultats obtenus par le 606 dans le traitement des maladies nerveuses. Presse medicale, 28 Janvier, 1911.


Meier, Marg. Psychische Wirkungen von Brom und Chlor. Epilepsia 1912, 1 u. 2.


Mitchell, S.W. The medical treatment of epilepsy. The therap. gaz. No. 3., 1912.

Monkemoller, Die Praxis psychiatrica im 18 Jahrhundert. Psych. neurol Wchnschr. 1911/12.


Obersteiner. Wiän. med. Wochenschrift" 1873, No.23.


Pelissier, F. Des myoclonies epileptiques. These de Montpellier 1911.


Pesker, D.J. (Psychosen auf der Basis organischer Hirnleiden und Wassermannsche Reaction) Russk. Vrach. 1911, p. 1109.

Petit, Nouveau cas de mort par suffocation chez un epileptique dans la decubitus ventral Rev. de med. leg. 1911 p. 361 ff.

Pini, O., Ricerche sull "acido-glicuronico" negli epilettici. Manicomio 1911 p.239 ff.


Polk, C.G. Epilepsy in private practice especially that from reflex causes. Med.rec.Ed.74, p.186.
Porot, La situation des aliens français en Tunisie. Tunisie médicale, 15 février 1911.

Premond et Fontaine, Impulsions et délires conscients et mnesiques chez les épiléptiques. Arch. d'anthrop crim. 15.7.1911.


Rearson, Successful Treatment of Status Epilepticus by bleeding". Lancet 1894, II. 1489.


Rodiet, A. Troubles digestifs et crises d'epilepsie. Le progrés Medical 1910, No. 31.


Ross, L. Treatment of epilepsy. Yale med. journ. No. 6, 1912.
Roubinovitch, J. Role du medecin-praticien dans le traitement et l'internement des alienes. Potou med. 1911.

Rubino, A. La sindrome epilettica nel periodo secondario della sifilide. Gior.internaz. d.sc.med. 1911.


Russell, Reynolds "Epilepsie"


Salas y Vaca, J. de Psicosis epilepticas. Rev. de med. y cir. pract. 1911, p. 389 ff.

Sant. Arch. f. Psychiatrie, 1876 Bd. VI.


Searcy, The increase of insanity. South med.journ. 1911.

Sell, A. Uber die Fursorge fur die Epileptischen in Danemark. Epilepsia 1912, 2.

Serra, Casals F. Dos variedades de epilepsia en el niño y su tratamiento. Med. de los niños 1911, p. 302-304.

Shanahan, W.T., History of the establishment and development of the craig colony for epileptics located at Sonyea, N.Y. Epilepsia 1912, 2.

Diagnosis and treatment of some special conditions seen/
seen in epileptics. J. med. soc. N. Jersey 1911/12, p. 293 ff.

The medical treatment of epilepsy. The therap. gaz. No. 3, 1912.


Siemens. Neurol Centralbl. 1887.


Snell, Allg. Zeitsch f. Psychiatrie 1875 Bd. XXXII

Smith, W.R. Death in the Status Epilepticus.

Smith, S.A. A case of Status epilepticus with an unusually large number of convulsions. J. am. med. ass., No. 12, 1912.


Solbrig, Allg. Zeitsch f. Psychiatrie, 1867, XXIV.


Thery, De la psychiatrie d'urgence. These de Paris, 6 avril, 1911.


Trowbridge, Status Epilepticus. Journal of Mental and Nervous Disease, 1881 (18)


Verdier, A. Du traitement chirurgical et de ses resultats dans l'épilepsie jacksonienne traumatique anciennne. These de Montpellier, 1911


Werner, Uber die Fortschritte des Irrenwesens. Halle, C. Marhold, 1912.


Wilczek, Epilepsie mit folgender Amaurose Ztschr.f. Veterinarkunde, Nr. 4, 1912.

Wildermuth, Neurol, Centralbl, 1889.

Witkowski, Berl. Klin.Woch. 1886,Nos.43,44.


