When the Board appointed Dr. McBroom head of this institution, we knew very well what we were doing. We had had occasion to watch his work in connection with the School for Feeble-Minded for years, and we are glad to have Dr. McBroom here, and I know that he is happy to be here because he has a great opportunity to do constructive work.

This institution is going to expand from year to year. The School for Feeble-Minded has probably reached its maximum as far as inmates are concerned. It is an institution of more than 2,000, and we feel that that is as many as should be housed in one institution. Some day we shall have about 1,500 in this institution; then, in my opinion, the state will have to seek a new location.

I am very happy to introduce Dr. McBroom, although it is of course not necessary. Dr. McBroom is now going to speak to you on "Epilepsy."

31-EPI-DEM

EPILEPSY

D. E. McBroom, M. D.

Superintendent Colony for Epileptics

Attacks of unconsciousness or recurrent spasms have for many centuries been thought to constitute a disease entity known as the Sacred Disease or Epilepsy (a Greek word meaning seizure), but increased knowledge has demonstrated that many different pathological conditions may produce the same symptoms, so that it is now generally believed that fits or spasms are in reality only an outstanding symptom of some fundamental disorder.

Epilepsy is very common among adults, but it usually begins before the patient is twenty years of age, so that the condition is more closely related to the disorders of childhood than to those of adult life.

History. Epilepsy is the oldest disease of which there are any historical records. As stated by Talbot, even Hippocrates' description may be merely a repetition of facts which were known to physicians in the year 3500 B. C. The consensus of opinion as to the cause of this disease has undergone many marked changes. At different times in history it was thought to be a temporary loss of the soul from the body; again, that the body was in possession of some demon or malignant spirit. Later it was attributed to natural causes by Hippocrates. Throughout the Middle Ages it was thought that the condition was a contagious one. This was evidently an outgrowth of the idea that the body of the patient suffering with epilepsy was filled with demons. Then again we find the cause attributed to meteorological factors; as, different phases of the moon, etc. This idea persisted until the latter part of the 19th century, and even today there are some traces of these old theories in the methods of treatment. But in spite of the many theories as to the cause, we have handed down to us from the ancient physicians many very accurate descriptions of this disease. The present-day study of epilepsy dates back to a report published on the experimental work on this disorder by Brown-Sequard in 1869-70. And about the same time Hughlings Jackson made many clinical observations, and finally his name was given to one special type of epilepsy which we now know as Jacksonian. Since then heredity, alcoholism, lesions of the central nervous system and the endocrine glands, digestive disorders, and practically everything in the human anatomy, have been thought responsible for the disease. It is only in the last decade that investigations have shown that there is an intimate relation between the symptoms of the disease and the metabolic processes of the body.

As terrible as this disease is, and having a very gloomy prognosis, patients suffering from it must not be classed as incurable; neither must the presence of this condition make them absolute dependents, as many of the outstanding men in history have left shining records to the world in spite of this handicap. The condition seems to be associated with an ego-centricity and independence of thought and action—traits which can be of great value when properly used. The presence of the condition in certain great figures of history is very striking; such as Julius Caesar,

Germanicus Brittanicus, Marlborough, Napoleon Bonaparte, Duke of Wellington, Peter the Great, Charles V, Mohammed, St. Paul, Annie Lee *of the Shakers*, Balzac, Dumas, Lord Byron, Gustave Flaubert, Schiller, Pascal, Handel, Mendelssohn, Mozart. From these names it is easily seen that this disease of itself need not prevent great accomplishment. In fact, it was stated by Lombroso that genius is epileptoid. In general this, of course, is too sweeping a statement, as we know that the large percentage of epileptics whose attainments are below par is proof of this.

Incidence. The statistics on incidence of epilepsy are so unreliable that one can hardly form an opinion, due to the fact that the condition is considered to be a disgrace and is concealed and the difficulty in the recognition of its multiple and unusual forms. However, it seems to exist *almost throughout the world, and affects* practically all races. Davenport's statistics on incident rate of epilepsy in the United States during the World War draft showed that we had 5.15 per 1000 people. If the incidence among drafted men in the United States be accepted as applicable to the population, it would mean 500,000 epileptics in this country.

Although the vast majority of epileptic patients are adults, the disease itself most often begins during early years of life, and it is thought that about 70 per cent of the cases develop before the age of twenty. Sex incidence, like all other statistics regarding epilepsy, is somewhat unreliable, although males seem to be slightly more susceptible to the *condition* than females.

Etiology. As yet the fundamental cause of epilepsy has not been recognized. With the growing amount of research work and the increasing knowledge of the subject, the relative importance of the many factors which are thought to be responsible for the condition will undoubtedly be determined, so that those which are primarily responsible can be distinguished from those which merely exert a secondary effect. Some of the more important factors having a bearing on this are:

Heredity. This may be more accurately described as the transmission to the offspring of an unstable nervous system rather than the syndrome of epilepsy itself. Statistics vary a great deal on this subject, and from institutional records heredity plays a much more important part than in the records of cases outside of institutions.

Birth Injuries. This should, of course, include prenatal injuries as well as those at time of birth. This cause has undoubtedly been greatly exaggerated, chiefly due to the fact that epilepsy occurs in about 40 per cent of all cerebro-hemiplegias.

Trauma After Birth. Such as blows and wounds. This cause of epilepsy constitutes a distinct class, and the history of such injuries is easy to obtain. However, under this heading we find the figures somewhat exaggerated, and many cases of latent epilepsy are attributed to blows, falls or wounds.

Tumors. Epileptiform attacks are associated with brain tumors, particularly when the spasms begin in early adult life. In these cases localization and type of tumor determine in a great measure the character of the symptoms.

Cysts. As brain surgery has advanced, so has the belief grown among surgeons that there is some connection between a cyst in the brain and epilepsy, and this may have something to do with the condition known as wet-brain.

Infections. Infections have always been considered a cause of convulsions, whether located in the blood stream or in the intestinal tract. In 1916 Reed reported having found a specific Bacillus Epilepticus, a *statement which he withdrew the following year.* Syphilis has been somewhat deprived of its previously assured etiological influence by improved methods of diagnosis and treatment. Some infections, particularly those which attack the nerves primarily, such as encephalitis, meningitis, scarlet fever, mastoiditis and brain abscesses, do play an important part in the causation.

Intoxication. Intoxications as a causative factor seem to be declining—such as, alcoholism, uremia, etc.—and are being looked upon more as convulsions secondary to other conditions.

Diseases of the Gastro-Intestinal Tract. This plays an important part in influencing body metabolism, and undoubtedly precipitates convulsions in a predisposed individual. There is almost a universal opinion that epileptics are constipated. Actual studies of this condition show that they are no more affected by this trouble than the normal population.

Glands of Internal Secretion. Because of our limited knowledge regarding the glands of internal secretion, practically all of them are held responsible for this syndrome, especially the gonads and the pituitary, to *which must be added the thyroid, parathyroid, renals and pancreas. Most* of the research work that has been done along this line seems to indicate that in these cases the relation is secondary and not primary cause of the epileptic manifestations.

Psychology. It is difficult to state just what connection there is between the psychic and physical attributes, but they are undoubtedly quite closely related, particularly in certain cases of trauma and shock. Fright and mental strain have for many years been known to be harmful to epileptic patients. Also, as has been known for many years, epilepsy is oftentimes secondary to dementia praecox.

Change in Reaction of Body Fluids. This covers the theory that has been advanced in which the acid-base equilibrium of the body shifts toward the alkaline side.

Wet Brain. The theory that the accumulation of fluid in or on the surface of the brain is the latest and perhaps the greatest development that has been made in the study of the causes of this syndrome.

Reflex Irritations. Localized irritations may be productive of attacks in the predisposed individual.

Arteriosclerosis. In this condition I feel that the seizures are a *result of the condition and not causative.*

Pathology. Modern methods of diagnosis such as encephalography, ventriculography and stereoptic X-ray, have reduced the *number of so-*called idiopathic cases of epilepsy, and no constant definite lesion of the

brain or of any other organs has been found to account for the large group of patients with essential or non-organic epilepsy. This is particularly true of post mortem examinations, but with the advance of neurological surgery they have demonstrated lesions in the living brain which may throw considerable light upon the subject.

Diagnosis. No patient should be branded as epileptic until every doubt has been removed. An accurate diagnosis of epilepsy is at times very difficult for the medical man first in contact with the case, but we as institution people do not find much difficulty as the diagnosis has been made in most cases previous to the entrance. The patient should be given a thorough physical examination, including Wasserman, endocrine disorders, a complete neurological examination, and it is advisable to make X-ray examinations of the skull. Grand Mal epilepsy is most *easily recognized, although if attacks occur at night it is somewhat* difficult to obtain satisfactory evidence. Petit Mal is much more apt to be confused with other conditions. Symptomatic seizures, such as Jacksonian epilepsy, are best diagnosed by means of physical and laboratory tests. In making a differential diagnosis, we must eliminate cerebral hemorrhage, spasmophilia, tetany, tumor, fainting spells, paroxysmal, vasomotor attacks and hysteria.

Convulsions due to brain tumors, spasmophilia, arteriosclerosis, anaemia and syphilitic infections of the brain, should never be classified as epilepsy, as they are only symptoms of some other fundamental conditions.

Prognosis. The prognosis of epilepsy is rather dark, but seems more favorable with the advance in treatment than it has in the past. Dr. Shannahan, of Craig Colony, summed up the situation by stating "that the longer the period of freedom from seizures and the better the adjustment to environment, the better the prognosis." The ordinary seizure seldom proves fatal unless the patient has become exhausted by previous occurrences. The least favorable cases are those which develop between the ages of six and fourteen years. There is no doubt that epilepsy somewhat *reduces the length of life, but statistics are very misleading on this.* It is generally conceded that the number of seizures influences the prognosis, so that the aim of everyone has been to reduce the seizures to the minimum, and the earlier the treatment is established the greater hope for recovery. Enough cures have been obtained from the use of sedatives, different diets, etc., to convince us that epilepsy need not be considered an absolutely hopeless condition in cases where it has not resulted in mental deterioration.

Symptoms. There are hardly two cases of epilepsy in which symptoms are identical, although each different type seems to follow more or less a definite course.

Grand Mal. This is the most severe type of seizure. Between one-third and one-half of all epileptics have a warning of the onset of the seizure. In the balance the spasm begins suddenly, without any preliminary symptoms. This warning is known as the aura. The Grand Mal spasm starts with a tonic contraction of the muscles. This period is com-

paratively brief, about one-half minute, and is followed by a clonic stage, during which there is a spasmodic contraction of the muscles. This division of the attack may continue as long as from three to five minutes, following which is the stuporous period in which the patient completely relaxes. This period varies from a few minutes to several hours. Consciousness is completely lost, and frequently the patient does not remember anything that has occurred.

Petit Mal. Petit Mal attacks are sometimes very difficult to diagnose from other conditions, but the history of repeated occurrences will help in this matter. Petit Mal attacks consist of a momentary loss of consciousness. The patient seldom falls.

Jacksonian Epilepsy. Jacksonian epilepsy is the result of abnormalities of the cortex of the brain or brain tumor. In this condition the spasm is limited to some particular part of the body.

Status Epilepticus. This is a condition in which the seizures occur so frequently that the patient does not recover from one attack before another begins, and frequently ends with pulmonary oedema, cardiac dilatation and death.

Epileptic Equivalents. Quite often we see patients in which very peculiar mental conditions take the place of the seizure itself, usually manifested by fits of anger or destructive violence, which the patient does not remember after the attack has passed.

Atypical Attacks. In some instances we find certain stages of atypical attack appear in other directions; such as, turning, running, jumping or other unusual actions.

Nocturnal Epilepsy. Nocturnal epilepsy is that in which the seizures occur only during sleep. It is much more common than most observers suppose.

Epileptic Characteristics. Epileptic characteristics are perhaps the phase of epilepsy that has been most neglected, and at the same time one *that enters into institutional life as much as any other phase, as there* are certain personal traits that are almost invariably associated with this condition. The lack of social adaptability is perhaps the most outstanding. These patients also possess an overbearing conceit, and have a self-assurance that they are able to accomplish almost anything. Moodiness and ego-centricity are outstanding symptoms which seem to accompany this condition, and many of these patients are inconsiderate of anything or anybody in order to accomplish their own end. Moral degeneration, with lack of thought and judgment, is not uncommon. These characteristics, combined with the optimistic views they all have of their condition, oftentimes lead them into dangerous situations.

Treatment. The treatment of epilepsy involves the complete armamentarium of the entire medical profession.

About the only spasm that demands attention is the Grand Mal seizure. Here the treatment consists in the prevention of the patient injuring himself; such as, striking the head on the floor, etc. Clothing should be loosened, particularly around the neck, and if possible some-

thing placed between the teeth to prevent biting the tongue. Forcible restraint is not only of no benefit, but in most cases detrimental. The sleep which follows is beneficial and should remain undisturbed. This is about all the treatment necessary for the seizure itself.

In the treatment of the patient, the first thing necessary is an accurate diagnosis; then, if possible, remove the cause and other irritations; such as, intoxication, alcoholism, lead poisoning, infections, constipation and tobacco. Traumatic cases are best handled by surgery. Endocrine disorders should be studied and remedied if possible.

The personal hygiene of the patient must be studied, and he should be kept in as vigorous condition as possible, receiving the maximum amount of fresh air and sunlight, with regular periods for rest and exercise. Out-of-door life seems to be particularly beneficial. Regular exercise is of marked benefit, but it must be borne in mind that the epileptic is exceptionally prone to fatigue, which also necessitates that he obtain plenty of rest, especially sleep. If placed upon an ordinary diet, this should be supervised, as there is a great tendency to overeat among these patients. Another phase of treatment often neglected is that of mental hygiene. If possible remove all ideas that are irritating to the patient, study the patient's personalities, and correct those which are antagonistic to his welfare; such as, worry, fear, emotional shocks, and harmful features of social contacts. The younger the patient the more readily he responds advantageously to environmental changes. Education may be carried out along the same lines as with normal individuals, only taking care to avoid fatigue, both physical and nervous. The ability of the epileptic patient to absorb knowledge depends, of course, upon the age, mentality, etc. The vocation of the epileptic must be chosen with great care, taking into consideration the character and taste of the individual and the line of work in which the dangers are at a minimum. Another important feature in the treatment of these patients is to furnish them with recreation, which naturally must be pleasurable to the individual patient and at the same time some form that does not involve any great risk.

Medication. The use of drugs in epilepsy has been more to reduce the severity and number of seizures rather than an attempt to remove the basic cause. Grand Mal attacks are more affected by the use of sedatives than the Petit Mal. Calcium chloride, iodide mercury, ammonium chloride, zinc oxide, lactate zinc, nitroglycerine, asafetida, sodium potassium borotartrate, have all been used with varying results, but for many years the bromides were used as standard treatment of this condition and still occupy an important place in the therapy. The chief bromides in use are sodium, potassium, and ammonium. The bromide treatment must be carefully supervised, as there is danger of intoxication, bromidosis, etc., and when in use it is well to reduce the chloride intake of the body. In the last decade almost all of the old drugs have been supplanted by luminol which seems to be the chief anchor in controlling seizures today. It is more effective than any other medication, more easily given, and less risk involved. It is not a habit-forming drug but a brain irritant, and

occasionally patients become very much excited while using this. The chief danger connected with the use of luminol is the sudden withdrawal of same.

Dietary. In recent years the most outstanding point in the treatment of epilepsy has been different theories along the dietary line. One of these was the low protein diet. This, however, proved ineffective therapeutically. Another was the low salt diet. This has been discarded as a useless procedure with the possible exception in cases where bromides are apt to be employed. Another diet which was quite popular for a while was that of acidosis. This was the forerunner of the origination of the ketogenic diet, which theoretically was an attempt to change the body reaction from alkaline to acid. This diet was given considerable publicity. It is not only expensive, but very hard to control, and has proven more or less ineffective particularly with adult patients, although reports seem to indicate that it has been slightly more successful with children. The state of ketosis produced by this diet also leads to the rapid elimination of the fluids of the body, which is perhaps the forerunner of what the speaker considers the most important advance in the treatment of epilepsy in recent years; namely, the dehydration theory. This was brought out by Dr. Irvin McQuarrie and Temple Fay. It is based on the theory that there is an excess of fluid in the nervous system, and that the "water-logging" of the nervous tissue is productive of the seizure. This theory has been substantiated to some extent by observation of the brain and membranes on the operating table and through experimental work. For many years we have known that catharsis with salts is one of the best treatments for epilepsy and we know that this is an outstanding dehydrant. One of the things still to be determined about dehydration is why one person's nervous tissues should become water-logged and another's does not.

Selection of Epileptic Patients for Treatment. The selection of epileptic patients for treatment is perhaps the outstanding thing in the line of treatment, as experience has demonstrated that it is practically useless for a physician to spend much time on patients who have degenerated, also on those opposed to being treated. This limits us to only such patients as desire to submit to treatment and will cooperate in every way. All of these factors must be weighed before a decision is made which will justify the course of treatment which is necessarily long and extremely hard for all people concerned.

Mr. Swendsen: Thank you, Dr. McBroom, for your very instructive speech.

I hope we have learned something. I leave that to each one for himself. At any rate the speech will be printed in our next quarterly, and we will have time to sit down and study it.

We have so many doctors here we might discuss Dr. McBroom's paper.

Dr. Murdoch. I expected to hear from you.

J. M. Murdoch, M. D., School for Feeble-Minded: Doctor McBroom has given us a very complete summary of our knowledge concerning epilepsy and the convulsive state.

There is so much that is obscure that we often hear it said that little more is known of epilepsy than was recorded by Hippocrates, but Doctor McBroom has shown us that modern research has already accomplished much of value.

With increasing knowledge of the nervous system, chemical reactions within the body, and a careful clinical study of cases such as is being conducted here, we cannot look upon epilepsy, or the convulsive state, as an insurmountable problem.

In phenobarbital, introduced not many years ago, we have a drug of tremendous value in reducing the number and severity of seizures.

The dietary and dehydration treatments recently introduced hold promise of great value.

Occupational therapy as carried on here is most helpful.

The epileptic, from the very nature of his trouble, is denied the opportunity to enter many occupations in which, were it not for the hazard, he could find employment. In occupational therapy he can be developed along lines where the hazard is not great, the mind kept active, and mental deterioration lessened.

On your large farm your patients find employment out in the open in the various forms of farm work. You have an ideal institution which is bringing about great improvement in the care and treatment of epileptics.

Geo. H. Freeman, M. D., St. Peter State Hospital: I know the Doctor has given us only a resume of the subject, only hitting the high spots, but I would like to ask him what treatment he uses for status epilepticus and whether he believes spinal puncture is of any value.

Secondly, I think he glossed over the latest theory which comes from the psychoanalytic school, which would make epilepsy an unreality.

And, finally, I am not certain that everyone knows what the Doctor meant by "identical twins."

Dr. McBroom: I will answer the last question first.

Ordinary twins are not at all uncommon, but identical twins are rare. "Ordinary twins" means the fertilization of more than one ovum, and "identical twins" means one fertilized ovum divided by what we *medical men call "direct division." They are of the same origin all the* way through. Instead of having two-ovum twins we have only one.

Dr. Royal Gray, of the University of Minnesota, has been scanning the literature for almost a year on reports of identical twins with epilepsy. He has succeeded in finding several cases on record. About two months ago another case was reported in the American Journal of Psychiatry.

Dr. Freeman's second question I am going to dodge. I do not know anything about psychoanalysis.

The treatment we use for status is the old standard treatment: hot baths, hot immersion, to stimulate elimination through the skin, and occasionally spinal puncture. In the use of sedatives in status we resort

to everything, luminol, the bromides, the chlorides (calcium and ammonium), chloral hydrate, etc. We very seldom use chloroform.

Mr. Swendsen: Dr. Hedenstrom is here. I think we would enjoy hearing from the Doctor.

L. H. Hedenstrom, M. D., Cambridge: It has been a pleasure to be here today and to meet the folks from the different state institutions.

With regard to the treatment of epilepsy, especially status, Dr. Freeman asked if I had ever tried sodium amytal. I have, but I cannot say I have had very much success with it. As Dr. McBroom says, immersion to stimulate elimination through the skin is practically the only treatment.

Thank you.

W. L. Patterson, M. D., Fergus Falls State Hospital: Have you ever used luminol for status epilepticus?

Dr. McBroom: Used it about six times and got no results.

Dr. Patterson: We used it two dozen times. It was successful every time.

Judge Hall: What does it cost to treat an adult with luminol?

A man who was receiving poor relief came to our office recently and said he had had a quarrel with the authorities because they would not furnish him with luminol. They told him it was too expensive.

Dr. McBroom: Luminol is a trade name. The chemical name is phenobarbital. It was put out by the Winthrop Chemical Company under the trade name of "Luminol."

Dr. Kilbourne: I remember that at St. Peter a good many years ago we had a case of epilepsy which I prided myself on curing. He did not have a seizure for a year or more, but then he went into status and died. That was rather discouraging.

We get in many cases that have diurnal epilepsy, who give a history of having had nocturnal epilepsy. It might have existed for years without the patient's knowledge. The biting of the tongue is often an evidence of nocturnal epilepsy.

I was much interested in the treatment outlined by Dr. McBroom. *I think he is doing a wonderful work here;* he has a fine institution and great opportunities.

How many epileptics in your experience are really cured, Dr. McBroom?

Dr. McBroom: As long as Dr. Kilbourne did not qualify that, I will say four percent get well. However, we do not see many of that four percent in institutions, because we get only the confirmed dyed-in-the-wool epileptic.

Dr. Patterson: I want to know whether epilepsy is increasing, is decreasing, or is stationary, here in the United States. The contention is that it is not increasing.

Dr. Murdoch: I will answer that by asking Dr. Patterson whether insanity is increasing or decreasing.

We have no statistics from which we can give a definite answer to either question.

Dr. Kilbourne: Most epileptics are very religious, and many carry their Bible with them, perhaps with an ambition to become theologians.

Mr. Swendsen: What do you think about that, Dr. Henry?

Reverend Henry: I will just say that in the beginning of my work here almost every patient insisted on shaking hands at the close of the service. Now I leave first and go on my way.

Mr. Swendsen: We are highly honored here this afternoon by having with us Dr. Wheeler, of the Mayo Clinic. Dr. Wheeler will give us a "Report of Survey of Incidence of Seizures in Epileptics," with stereopticon views.

The Doctor has done some research work in this institution, and the superintendent, Dr. McBroom, is very well acquainted with Dr. Wheeler's work here. I wish he would tell us what she has done with regard to research work.

Dr. McBroom: Dr. Wheeler volunteered to do this work, and we have had the most enjoyable contact for almost three years. She has carried on this work on her own hook, has paid regular visits to the institution to study our records, and has made a survey of the incidence of the seizures of all patients in this institution covering a period of three years. Her results will speak for themselves, but I think it is a forerunner of a very important thing in epilepsy.

Up to the present time we have had kind of a haphazard classification of the epileptics. We have had the group which had daylight seizures, patients who had only nocturnal seizures, and the diffused type. The nocturnal case would run along for a time, then would have seizures in the daytime, and finally would come into the diffused group.

Dr. Wheeler has made graphs and is now working in Illinois and Wisconsin. The result is very, very striking, showing the incidence of seizures in the different patients. It also brings out the fact that it seems as though the great majority of epileptic patients have either an inherited or acquired predisposition to a rhythm of seizures. They sometimes have periods of quiescence and again periods of frequency.

I heard Dr. Wheeler read this paper at Toronto and it brought forth a great deal of favorable comment.

Mr. Swendsen: It gives me great pleasure to introduce Dr. Wheeler.

GRAPHIC REPRESENTATION OF INCIDENCE OF SEIZURES IN EPILEPTIC PATIENTS

Theodora Wheeler, M.D., Rochester, Minnesota

During the year 1928 the Minnesota State Board of Control sponsored, for a number of months, an experiment on the effect of a ketogenic diet on a small group of epileptic patients at the Cambridge State Colony. The Mayo Clinic cooperated in this work, Drs. R. M. Wilder, H. W. Woltman and C. J. Barborka being interested in various features of the investigation. A graduate student dietitian, Miss Dorothy Proud, presented a description of a number of technical dietary aspects of the problem as a thesis in partial fulfillment of the requirements for the degree of Master of Science at the University of Minnesota, in September, 1929. She had been in residence at Cambridge for six months, and at the University of Minnesota and at Rochester for a similar time. Dr. Kuhlmann's staff had already given mental tests to many of the patients. As a result of his continued interest, and through this the cooperation of the Minnesota Institutions' Division of Research, this initial testing was completed, and later retesting was carried out on both experimental and control groups of forty-eight patients.

In the course of this study I was requested to plan a critical background which would help in an evaluation of the findings. As it was hoped to continue the work over a long period, it was thought desirable to collect somewhat full clinical, neurologic, psychiatric and psychologic data. However, as the experiment as first planned was found too expensive for long continuation, a considerable part of the clinical and psychologic program was not completed.

From among a large number of record sheets gathered at that time, interest has developed in a calendar chart of proved usefulness. This consists of an ordinate-abscissa hour-day chart covering a year's time. I adapted this from a pre-existing business form so that it illustrates many characteristics of each patient's seizure for one year. This chart gave such visual assistance in the study of epilepsy that Dr. McBroom made available for record, by this method, the daily ward observations of 136 patients who were inmates of the Cambridge Colony during the years 1928, 1929, and 1930. As a result of the practical help obtained from these charts, in January 1931 Dr. McBroom incorporated their use as part of the recording system at the Cambridge Colony. This chart is 12x14 inches in size, and it is arranged with 365 fine perpendicular lines representing the days of the year. The lines indicating each fifth day of the first twenty-five days of each month are slightly heavier, and those at the end of each month are decidedly heavier. Horizontally the chart is ruled in twenty-four prominent lines, representing the hours of each day; finer lines represent each interval of fifteen minutes. To facilitate plotting and reading, more heavily drawn lines identify 6 a. m., noon, and 6 p. m. This chart with its many fine lines could not be satisfactorily reduced for representation in this Journal, but a simplified form is shown in Figure 1. To plot a record of a patient's seizures, the symbol x is used for a major seizure and a dot for a minor seizure. These are placed on