

INSULIN HYPOGLYCAEMIA
IN THE TREATMENT OF THE PSYCHOSES.

being

A Thesis for the Degree of
Doctor of Medicine in the University of Edinburgh.

by

WILLIAM MALCOLM MILLAR, M.B., Ch.B.

April 1939.



C O N T E N T S.

	<u>Page.</u>
Historical Introduction	1
Case Material	10
General Survey of Treatment	11
Treatment in Detail	13
Symptomatology	20
Sensitivity and Adaptation	30
Allergic Phenomena	31
Blood Sugar	32
Pulse Rate and Blood Pressure	37
Management of Hypoglycaemia	38
General Indications for Interruption	43
Modifications in Technique	49
Difficulties, Dangers and Complications .	52
Mortality	56
After Care	57
Mechanism of Hypoglycaemia	58
Mental Effects	64
Results	66
Consideration of Results	67
Table of Results	69
Evaluation of Results	70
Summary	81
Cases	84
References	184

HISTORICAL INTRODUCTION.

The history of mental disease and its treatment appears to be as old as the story of man himself. It is a universal law that the most highly developed functions are the first to suffer derangement. Trephining of the skull has been found in skeletons from the stone age (Neuburger, 1910), the indications for this measure being headaches, convulsions and mental disorders. The essentially animistic interpretation of all phenomena which was characteristic of the prehistoric period lent itself to ideas of magic and demon possession. The fact of insanity was no doubt recognised, but its understanding and treatment was of the most primitive order. The devouring of the organs of an animal, in the hope of warding off disease, gave place to the wearing of amulets. To quote Neuburger, "Where demonism constitutes the theory, and magic the practice, diagnosis and prognosis are derived only from visions and supernatural manifestations". This sums up the attitude towards illness generally and insanity in particular.

Witch-doctors prevailed and empiricism was their only ally. As we come down the centuries we find that healing power was taken out of the hands of the witch-doctors and sorcerers by priests and prophets.

In Mesopotamia, the cradle of culture, the physicians were incorporated in the priesthood. Illness was considered to be something foreign to the body and which had "possessed" the sick. Treatment consisted in exorcising the evil spirit which had for the moment possessed the patient. Prayers, ritual observances, magical formulae and symbolical manipulations were the physician's armamentaria in those times. The ancient Egyptians, as far back as 1700 B.C. had a particularly enlightened view of insanity. Their treatment was humane if the condition was considered to be due to a "good spirit", but heroic if the result of a "bad spirit".

In 1063 B.C. King Saul, who probably suffered from a form of manic depressive insanity, was soothed by the harp of David.

The beginnings of a mental hygiene movement were evident in Greek times, where insane persons were given special care, and where prophylaxis by healthy pursuits was encouraged. Hippocrates, in the fifth century B.C., completely broke from the tradition of the Aesculapian priests and developed his conception that insanity was the result of humoral pathology. He poured scorn on the sacerdotal beliefs that certain diseases were sacred and should be worshipped. His

methods, according to Kellog (1897), were "bleeding, purging, emetics, counter-irritants, mineral waters and baths, gymnastics and outdoor games, together with music, travel and change of climate" - a very comprehensive and satisfactory list. Such humane ideas were advanced for his age. This high standard was maintained by such men as Asclepiades (circa 100 B.C.), Aretaeus of Cappadocia (30-90 A.D.) and Coelius Aurelianus who, in 100 A.D., was the first defender of non-restraint and of the control of patients by nurses instead of manacles. He believed in an ample diet and in appropriate occupation as a means of therapy.

Drugs were the favourite means of cure used by Galen, who summarised the teachings of the great Greek school. His teachings and those of Hippocrates have been given greater prominence than those of any other physician. Throughout the Middle Ages nothing was done for mental patients in the way of treatment, except as prescribed in the writings of Galen. In those days contributions to the theory and practice of medicine were rarely advanced and never tolerated.

The Mediaeval period was marked by the treatment of insane persons as witches. All social evils were attributed to them, and burning at the stake was the

only cure. It is reckoned that, during the three hundred years from 1400 to 1700 no fewer than 100,000 witches were burned and of these about 30,000 were known to be insane.

With the Renaissance, a second scientific era in psychiatry dawned. In the early 16th century Platter made a systematic classification of mental diseases and thus laid the foundations for more enlightened treatment. The psychological and the somatic schools of Stahl and Nasse approached the problem from different angles. The former emphasised the value of faith, hope and forgiveness in the cure of the insane, while the latter insisted upon the development of hygienic measures. Towards the end of the 17th century, hospitals were erected for the insane.

The close of the 18th century was marked by the work of such able men as Tuke and Pinel, who advocated humane treatment in hospitals. Gardiner Hill and Conolly (1856), against much opposition and the public feeling of their age, abolished restraint in their hospitals. In the "Report on Madhouses" published in 1815, the alleged evils of the asylum system were investigated, including the famous case of James Norris, but the findings were inconclusive. This report said: "This Committee are of the opinion that it

cannot be satisfactorily established that any cruelties have ever been practised and that no foundation whatever exists for the imputation". Conolly did not agree to this and published in detail the cruelty which had been practised on the unfortunate Norris. Changes were made so that by 1823 "Sketches in Bedlam" tells that "the grand principle of this establishment (Bedlam) is mildness".

A revival of the theories of Mesmer awakened interest in psychotherapy. Barbaric practices such as the revolving chair, massive doses of tartar emetic, iron manacles, gave place to the "moral" treatment of such men as Griesinger. Hinsie (1931), quoting from "Mental Pathology and Therapeutics" (1882), writes: "Mental activity, constantly employed on account of its indirect action on the organic processes, is also used to call up ideas, images, feelings and efforts, for the purpose of directly modifying mental abnormalities". Such measures included "exhortations, encouragements, surprises, punishments, looks, etc."

Despite the undoubted contributions of these able men it cannot be said that their methods were more than general, non-specific and carried under the great handicap of the asylum system and the ignorance of causes and mechanism in mental illness. They thought

in terms of "cures" and "miracles" and were forever conscious that they were in touch with a great mystery which could probably be better understood by priests than physicians.

The contributions of Darwin and Herbert Spencer gave the impetus to the true scientific approach to all the phenomena of existence, by dispassionate scientific observation. Fresh foundations were laid in psychiatry and the nosological contributions of Kraepelin Kahlbaum, Bleuler and Meyer made their appearance. The discoveries of biochemistry in particular caused changes in the treatment of the psychoses. Drug cures flooded the literature; they included salicylates, sodium nucleinate, sulphosin, Manganese chloride, haemato-porphyrin, Ringer-Locke solution, Somnifaine, vitamins, endocrines and many others (Rudolph, 1931). Dramatic cures were claimed by all but none have survived as general methods of therapy.

Since its introduction to general medicine in 1922, insulin has been used as a therapeutic agent in an increasing number of diseases and disorders. In the treatment of the psychoses it has played its part mainly in an attempt to promote appetite and nutrition generally in cases of malnourishment. Only rarely was insulin reported to have a beneficial action upon

the psychosis itself. Since it was regarded as essentially a physical adjuvant, any mental improvement noted with its use was considered incidental.

In 1928 Manfred Sakel began treatment of certain mental states, with particular interest in drug addiction. He developed a new form of treatment in which insulin was administered in large doses in the absence of carbohydrates. Since 1930 a technique has been evolved in which insulin is given with the object of producing deliberately a state of hypoglycaemia of such depth as to bring about a state of coma. Hitherto this state had always been regarded as dangerous and as an undesirable complication which should be prevented by the administration of adequate carbohydrate. Sakel found that, if proper precautions were taken, these dangers could be avoided. Furthermore, he discovered that a protracted state of coma possessed a therapeutic value in combating mental illness, particularly schizophrenia. In 1933 he published a report in which he pointed out the beneficial effects of deep hypoglycaemia, particularly in the treatment of schizophrenia. Since 1933 he has worked out a method which, he claims, is both effective and safe and which has stood the test of several years' trial.

In Vienna, at the Potzl Clinic, 46 cases had been

treated at that time and it was claimed that 70.7% had responded with a full remission, and a further 17.3% with a good social remission. In November 1936 Max Muller of Munsingen reported on a series of 136 cases treated with the Sakel method, and confirmed the good results, especially in cases of less than six months duration.

Since then the so-called hypoglycaemic shock treatment of schizophrenia has been used extensively in all parts of the world. It was introduced into America by Glueck and has since been reported upon by Wortis (1936, 1937), Moersch (1938), Ross (1937, 1939), Katzenelbogen and others. Several hundred cases have undergone treatment, and opinions have been very conflicting both with regard to results obtained and to the method employed. Though there are at present many reputable advocates of the method, at the same time many authorities have opposed it on practical as well as on theoretical grounds.

In order to clarify the situation to some extent, at least in this country, Dr Isabel Wilson (1936) was asked to make an investigation of the matter and to deliver a report to the Board of Control of England and Wales. In a careful and unbiassed account Dr Wilson gave a description of her impressions of the

treatment as it was actually carried out in Vienna under Dr Sakel, together with a detailed account of the technique, its dangers and theoretical considerations. Certain recommendations were added, including one that the treatment should be started in a public Mental Hospital in this country. Previously, and independent of the above report, Dr Pullar Strecker, who had studied the Sakel method in Vienna, was invited to carry out the treatment in a number of cases in the Royal Edinburgh Hospital.

During 1937 a number of reports have been published in this country dealing with the results of treatment. On the whole, favourable reports were given by James, Larkin, Hamilton and others. Whereas the British Medical Journal, in a leading article, hailed the new form of treatment as an advance, the Lancet found various grounds for opposition.

After a period of twelve months, in which eleven cases were treated in the Royal Edinburgh Hospital, it was decided to continue the method as the results were promising. The writer was privileged to study the technique under the guidance of Dr Strecker and, since July 1937, has carried out the treatment personally in a series of 36 cases. An attempt will be made to assess its value as a therapeutic procedure.

CASE MATERIAL.

For the most part the treatment has been confined to those cases which have been diagnosed as Schizophrenic reaction types. Certain cases, however, are not of this group as it was considered advisable to include other types for experimental purposes. Glueck (1937), Bychowski (1937) and others consider that depressions are sometimes successfully treated. Other conditions in which the treatment has been used include acute manias, compulsion and anxiety neuroses, and exhaustive states.

The classification of the case material follows the principles of diagnosis as given by Henderson and Gillespie. In addition, however, to the formal sub-groups of Schizophrenia, I have included a group designated Acute Schizophrenia. It will be seen from the case material that such acute conditions are characterised by a relatively sudden onset, by the presence of bizarre delusions and hallucinations and by an increase of psychomotor activity. Many patients who have been treated are of the relatively chronic type or have shown throughout the period of their illness the features of two or more sub-groups. Rather than force such cases into the somewhat artificial groupings,

the writer has found it more convenient to name them Schizophrenic reaction types and leave it at that. It is of paramount importance, before making an assessment of the value of any treatment, that definition be clearly established. To facilitate this, a summary of each case treated is included, which gives the essential facts involved. At the end of each summary the relevant points, as they appear to the writer, are brought out and reasons given, when necessary, for the diagnosis which was made.

With the case material thus set out and classified, it is considered that criticism of the method of treatment is rendered more valuable. One cannot expect, especially in psychiatric practice, to work with constant entities. At the same time it is necessary to ensure as much constancy as possible. It is for this reason that accurate definitions are necessary.

GENERAL SURVEY OF TREATMENT.

The treatment consists in the daily administration of Insulin in gradually increasing doses, until a point is reached when coma is produced. Injections are given each morning, except Sundays, to the fasting patient. The effective part of the treatment is

considered to begin when coma appears, and for a period of one or two months thereafter coma is produced daily. So severe and at times alarming are the symptoms, and so dramatic are the effects in some cases, that the method has been designated "Insulin Shock Therapy". It is therefore sharply distinguished from any other form of insulin therapy.

Four phases of treatment are recognised.

1. Introductory Phase.

An initial dose of 10-20 units of insulin is given and this is increased daily until a dose is reached to which the patient reacts with a "shock". This "shock" dose varies between 15 and 400 units. The shock may be either a coma or an epileptiform seizure, the former being by far the most common. The injections are given early in the morning, the patients having fasted for 12-14 hours before. This phase usually lasts about a week to ten days, but may be more prolonged.

2. Shock Phase.

This is the effective period of treatment and consists of a daily repetition of the "coma dose" of insulin until improvement has been established, or alternatively after thirty such shocks have been given. Muller (1936) insists upon sixty days as a minimum

but it is found that the number of shocks - usually 20-30 - is a better criterion.

3. Resting Phase.

Originally the treatment was carried out intermittently with several days of rest at a time. This resting phase is now represented by one day in seven (usually Sunday). It has been found that such a day of rest is valuable both as a respite for the patient, and to act as a day of observation to judge improvement. After a severe reaction, such as an epileptiform seizure, a day of rest is also given.

4. Stabilisation Phase.

In certain cases the shock dose is gradually reduced over a period of a week or two until the patient leaves hospital.

TREATMENT IN DETAIL.

As there are great variations in the details of treatment, the methods adopted in this hospital will be described here, with occasional reference, in certain instances, to alternative methods.

A special ward, accommodating seven patients, has been secured for the purpose. The room is used not only for treatment, but also as a dormitory. All

meals are taken in this room as well. Muller recommends a separate sleeping room because the treatment room is usually associated with unhappy experiences of the hypoglycaemic period. This has not been found to be the case. The advantages of this system are that the same staff can attend to the feeding and sleeping arrangements as are present during the actual treatment. The patients live as a small family, under constant observation, and are thereby given every encouragement from day to day by the members of the staff, whose duty it is to act as companions and advisers, and to create an atmosphere of normality around them.

The beds are of the ordinary hospital type and have padding at the heads. The walls of the room are padded and the beds are so arranged that, with the use of two screens, each patient is shut off from the others and cannot see what is going on about him. It is worth the trouble of arranging and rearranging the beds until this effect is obtained with a minimum of screens, which have the disadvantage that they interfere with proper observation of the patient and prevent quick and easy access to the patient if required.

With seven patients undergoing treatment, two or three male nurses are required. One doctor must be

in attendance throughout the morning. A second doctor is always within reach if sudden, though fortunately infrequent, emergencies arise. This staff, however, must be considered as a minimum and is only possible where a single large room is used. Ross (1939) suggests that there should be one nurse for every two patients during the period of coma. Others insist on a larger staff, which is particularly necessary for the control of psycho-motor restlessness. Certain methods which will be mentioned later, have been adopted that make it possible for two nurses to control the most violent case, and it is believed that these methods account for the small staff required. A further advantage of the small staff is that it can be given tuition more readily - a fact of importance as all members of the staff who come in contact with the patient should be made thoroughly familiar with the signs and symptoms of hypoglycaemia and with the various methods of interruption. Notes should be made by the nurses of the physical and mental progress of the patient from day to day. It is advisable to furnish each member of the staff with some literature on the subject (such as James's article (1937), or Wilson's report (1937)) so as to promote an intelligent interest in the work.

Before treatment is started, certain preliminaries are necessary.

A physical examination should be carried out, to eliminate the possibility of organic disease. Certain conditions are considered to be contra-indications to treatment. These include valvular disease of the heart, coronary artery disease, nephritis - either acute or chronic, and respiratory diseases. Electrocardiograms are an asset in this matter although perhaps not a necessity (Feldhofen, 1937). The examination of the patient should also include a blood-sugar curve as this affords a clue as to the initial dose of insulin, and acts as a control for any blood-sugar tests carried out during treatment. It is rare to find evidence of physical disease sufficient to prevent treatment being carried out as the patients are usually young and comparatively healthy physically. Wasting from malnourishment is never an indication against treatment, and it is a uniform finding for the patient to gain weight and strength during the course.

The injections are given at 7.30 a.m., the patient having fasted since the evening meal at 5.30 the day before. The period of hypoglycaemia lasts for about five hours and the work of the day is thus finished by about one o'clock. The Danish brand of

insulin - "Leo" - has been used, with one exception in which Burroughs Wellcome's brand was used. For several months the strength used was 20 units per cc., but it was found that with a patient requiring over 200 units the large quantity (10 cc.s) was uncomfortable. Latterly the strength used has been 40 units per cc. and no appreciable variation has been observed. The injections are made deep into the gluteal region, the upper and outer quadrant of the buttock being selected as being most free from nerves and vessels. Ordinary record syringes are used - 1, 2, 5 and 10 cc. sizes. The dose can be regulated to the nearest two units.

Care must be observed with certain patients, who realise that food will antagonise the effects of insulin and will hide sweets and such like under their pillows or in their clothing, intending to eat them surreptitiously during the hypoglycaemic period.

1. Introductory Phase.

The dose of insulin is increased daily by 5-15 units, and during this phase it is common for the patient to overcome the hypoglycaemia spontaneously. This is one of the many indications of the very efficient "buffering" system of the body which tends to antagonise the action of insulin.

During hypoglycaemia in this stage the following symptoms may be observed: stickiness of the forehead with later sweating; drowsiness; lethargy; exhaustion; apathy; euphoria; talkativeness; whistling and singing; repeated requests for glucose. Apprehension and fear are uncommon symptoms and should they be present they are more an indication of the illness than the hypoglycaemia. Often psycho-motor restlessness is seen, and this may be very severe. At the end of four to five hours the patients either recover spontaneously or require glucose, which they are able to drink themselves: 200 gms. Dextrose B.P. are given dissolved in water, with lemon or orange for flavouring, and made up to one pint. After a rest of half an hour or so the patient is allowed to be up and dressed for lunch. At the end of this phase little effect is noticed in the majority of patients, except that there may be more co-operation and quietness. Noisy, excited, apprehensive or sleepless patients show some improvement and all but a few subject themselves to the morning injections with no evidence of discomfort or disapproval. In catatonic stupors, light hypoglycaemia, as seen in Phase 1, tends to cause an "awakening" bringing to light a loose system of paranoid ideas. Thus it is, as it were, brought

into line with the other types, and Phase 2 is thereafter proceeded with.

2. Shock Phase.

This is the vital period of treatment, and it is during this phase that signs of improvement are noted from day to day. Whereas in Phase 1 the patients require very little observation and are able to come out of hypoglycaemia by themselves, in Phase 2 constant attention is required and interruption has to be carried out by the doctor or staff.

Throughout the period an ever changing series of clinical pictures is seen and, in order to understand their precise significance it is desirable to study each separate manifestation as closely as possible.

In the first place it must be remembered that during treatment two separate processes are at work and running, as it were, parallel courses. There is a symptomatology of hypoglycaemia and there is a symptomatology of the altering psychosis. One must be careful to differentiate between these so that symptoms referable to the psychosis are not attributed to the hypoglycaemia, and vice versa. For instance, when the patient is restless this may be due either to the hypoglycaemia or to the psychosis. While undergoing treatment the mental picture of the patient will show

a cycle of changes in the course of twenty-four hours. In the early morning he shows his usual psychotic state; in early hypoglycaemia he is euphoric and talkative; later he is comatose; after interruption he may be excited for a few minutes to a few hours; finally, when he has recovered completely from the hypoglycaemia, he returns to his original state or shows some improvement, either temporary or permanent.

SYMPTOMATOLOGY.

Frostig (1938) has classified the symptoms of shock under four headings.-

1. Vegetative vaso-motor syndrome in Wet Shock.
2. Motor Syndrome.
3. Disturbances of consciousness.
4. Mental Syndrome.

At this point it may be necessary to define the terms "Wet Shock" and "Dry Shock". In the majority of instances a shock is characterised by coma, with loss of conjunctival, blink and even corneal reflexes, and the presence of pathological reflexes such as Babinski's sign. There is invariably associated with this state a profuse sweat, salivation and falling temperature. Hence it is known as "Wet Shock". In

"Dry Shock" there is little or no sweating, and little or no fall in temperature, and it is characterised by epileptiform convulsions.

1. Vegetative vaso-motor syndrome in Wet Shock.

- (a) Changes in pulse rate. Usually there is an acceleration in the presence of restlessness. A marked bradycardia, as low as 30/min. is not uncommon in the absence of restlessness.
- (b) Progressive drop in temperature. In one of the cases in this series the lowest reading was 94°F.
- (c) Perspiration and salivation. This is one of the most common features and occurs in about 90% of cases. The sweat stands out as large beads on the forehead, and may be so profuse over the whole body that the bed-clothes and night-clothes are soaked. Salivation may cause choking, spluttering and even aspiration with consequent pneumonia. A constant stream of saliva flowing from the mouth is common. These phenomena are no doubt the cause of the fall in temperature, which is rarely seen in their absence.
- (d) Pallor and flushing. Flushing is encountered more in the early stages; pallor is usually the sign of a very deep coma and often a danger signal before collapse.
- (e) Fluctuations of blood pressure. Most commonly there is an initial rise, but this is by no means constant and is of no value as to the progress of coma. Blood pressure readings are no longer taken as a routine procedure.

2. Motor Syndrome.

A. Convulsion Syndrome in Dry Shock.

- 1. Early Epileptic Seizure, before the end of

the third hour. This is characterised by dry skin and absence generally of the symptoms noted in (1) above. There is a warning cry, accompanied by pallor and rapid pulse. There is conjugate deviation of the eyes usually to the right; tonic spasms starting in the face and extending over the whole body; then tonic-clonic spasms of true epilepsy; cyanosis; spontaneous Babinski sign. The pupils show no characteristic reaction but are usually dilated. The corneal reflex may be absent for a few seconds.

2. Late Epileptic Seizure. This comes on after coma has appeared. The seizures are more tonic, and may be accompanied by pronation of the arms. These seizures tend to repeat themselves unless interruption is carried out forthwith.

Feldhofen (1937) makes clear that three separate states may be responsible for the production of fits.

- a. The initial rapid fall of the blood sugar level.
- b. Accumulated myoclonic spasm.
- c. Excessively prolonged comas in association with tonic cramp.

This view has been amply supported by the present series of cases. It will be seen that (a) plus (b) would give rise to "early" fits and (c) to late fits.

Epileptiform seizures are an uncommon form of shock and occurred only in 41 instances in contrast to 827 shocks observed in 46 cases.

B. Motor Syndrome in Wet Shock.

Motor restlessness and tremors are frequent.

These precede and may even continue during coma. The patient may be very violent and noisy, throwing himself

about the bed, kick, turn, shriek, squeal, shout, snort and pant, and contort himself into alarming positions. He may beat himself severely on the chest and face or bite and scratch himself. One patient had to be prevented on several occasions from trying to put his finger in his eye. Another patient (35) made a practice of leaping out of bed and running for the door. Aggressive acts are frequent and were noted particularly in one case (34) who would strike out at the attendants. As the coma deepens, the motor symptoms become more and more primitive, and less coordinated and purposeful. Sakel draws attention to the phenomenon and considers that there is a loss of inhibition of the higher centres "layer by layer". At the same time it would almost seem that the noises emitted regressed in a similarly striking fashion. At first one would hear moans and cries, with pleadings for help. The voice would then become more inarticulate, slurred and thick. Finally the noises heard can scarcely be recognised as human at all. As consciousness is gradually lost, perseverations in speech are common. For instance, one patient (23) would repeat such sounds as "Uhu, uhu, uhu" many times over until he became comatose. Two patients were often heard to cry "Oieeeee, oieeeee" continually for

many minutes. These phenomena seem to be very familiar in nature to the involuntary humming and moaning observed in cases of post-encephalitic parkinsonism and may, conceivably, indicate an involvement of the basal ganglia by the hypoglycaemia process.

Other motor symptoms notes are as follows:-

Clonic twitchings, either local or general - these may be very severe and frightening but are always transient and never dangerous; generalised torsion cramps; tetanic cramps; spasms of tremor; athetotic movements usually accompanied by abnormal reflexes such as Babinski's sign. Generalised hypotonus may be seen, with loss of all reflexes - both tendon and pathological. All the above are the usual accompaniments of a shock and are not to be looked upon as dangerous symptoms requiring immediate interference.

"Emotional Spasms" are described by Feldhofen (1937) and constitute an entity in themselves. They precede deep coma. Cramp-like movements are seen and resemble a baby mimicking emotional gestures of different sorts. In rapid succession are seen such changes as:- the face distorted tearfully; a sudden outburst of laughter; an angry expression; muttering; perseveration of words like "Aye, aye"; a brief period of quiescence and then a repetition of the

symptoms. Throughout the episode consciousness is restricted. This was observed in three patients in the present series.

In the later stages spasms of adduction or pronation of the extremities are to be seen and these usually accompany a gross variation of the pulse rate. During the spasm the pulse rate is about 140 per minute, and in the interval between spasms it drops suddenly to 70 per minute or less. If the pulse is counted every five seconds over a period of a minute, the readings would be as follows - 5,6,6,6,7,11,12,12,12,12,6. This phenomenon has not been recorded elsewhere but is worthy of note as a danger signal. Breathing may also be accelerated with the pulse rate. Inspiration may be very laboured, as the chest remains in a position of deep inspiration, and the accessory muscles of respiration and alae nasi are brought into play. So powerful may this inspiration be that a stridor is often heard, the alae nasi vibrate and are indrawn. The lower lip may also be sucked into the mouth, and the tongue incarcerated in the throat. As this state is an indication of a very deep coma it should be regarded as a complication rather than as a sign of hypoglycaemia.

3. Disturbances of Consciousness.

A. Syndrome of disturbances of consciousness in Dry Shock.

1. There is unconsciousness during and immediately after a seizure.
2. There is a clouding of consciousness for some time (about 5-30 minutes) after a seizure and before full consciousness is recovered.

B. Syndrome of disturbances of consciousness in Wet Shock.

The order of change of consciousness is as follows:-

- (a) Somnolence.
- (b) Sleep.
- (c) Incipient coma, in which the patient does not reply when called; that is to say, is not responsive but just rousable.
- (d) Sopor, or deep sleep, from which the patient can be roused by certain strong stimuli such as passing the nasal tube forcibly, pricking with a needle or testing for the Babinski sign with great force. We prefer to give this stage the name of light coma as the reaction to these strong stimuli is reflex in nature, consciousness having entirely disappeared.
- (e) Coma, or deep coma. The patient cannot be roused even with the strongest stimuli. The first indication of this state is the appearance of a Babinski sign. Then follow:- Loss of blink and conjunctival reflexes; loss of corneal reflex; loss of swallowing and coughing reflexes and sometimes of the organic reflexes. In the deepest coma of all the light reflex may be absent, and there may be complete hypotonus with disappearance of Babinski sign and loss of organic reflexes, with incontinence. Except in extreme cases the pupil, at this stage, is constricted and not, as one might expect, dilated.

Many different definitions of the word "Coma" have been used, and it is necessary to have an accurate definition. No single criterion must be used. The whole picture presented must be taken into account. Sakel's definition of a coma as appearing with loss of corneal reflex must not be the only guide, as many deep comas are present - with loss of conjunctival and blink reflexes and even disappearance of a Babinski sign previously noted - while it is still possible to obtain a true corneal reflex by brushing cotton wool over the centre of the cornea. Sometimes placing the finger in the eye will give no response when cotton wool will.

Many authorities differ, not only in their definition of the word coma, but in their opinions as to its effective depth and duration.

Porch'er and Leconte (1938) consider that light hypoglycaemia, without coma, is as effective as deep. Muller (1936) is of the opinion that if a patient has lost consciousness for longer than a few minutes - as estimated by the inability to drink glucose - he has been given a shock. At the end of the morning an assessment is made of the patient's reactions in an arbitrary manner, and it is then decided if the patient has been given a shock or not. The longest period of

coma should not be longer than one hour. Sakel lays emphasis upon the time of interruption of coma. A coma is said to occur when the corneal reflex is absent, and should not be prolonged beyond one and a half hours. James makes no clear definition of coma, but emphasises that hypoglycaemia should not extend longer than five hours.

It has been found in this series that it is advisable to adhere rigidly to the criteria which have been given earlier, as such observance is necessary for uniformity.

Formerly it was thought that the effective part of hypoglycaemia was the deep coma but, as will be seen from the tables, remissions may occur as a result of any degree of hypoglycaemia, and even in the absence of coma. The method adopted, therefore, has been to proceed slowly with the early stages of treatment, in the hope of obtaining an improvement with a light hypoglycaemia. Should no such improvement result, then a full course, consisting of at least twenty and if possible thirty shocks is given.

A shock is said to have occurred if the patient has been at least one hour in light coma or, alternatively, half an hour in deep coma, or any combination of the two types of coma which would give the same

result. Thus 45 minutes of light coma and 15 minutes of deep coma would constitute a shock.

4. Mental Syndrome.

As was mentioned earlier, all the symptoms seen in hypoglycaemia must not be taken as due to hypoglycaemia. The converse also holds good. Some mental symptoms are directly due to the hypoglycaemic state itself. For instance, when the patient awakens he is more accessible, talkative, cheerful, amenable. This state only lasts for a few minutes and is soon lost when full consciousness is restored. The fact that these symptoms are of such short duration would suggest this. A comparison has been drawn between this state and any other intoxication. Patients describe their symptoms as very akin to drunkenness, and this may be very nearly the case. In some cases a phenomenon known as "reactivation" of the psychosis is seen, and is believed to be due directly to the hypoglycaemia, independent of the disease process itself.

These mental symptoms of hypoglycaemia are described by Moersch (1938), Fraser (1938) and other writers, in their observations of hypoglycaemia in mentally normal patients. Fugue states have even been described. The so-called "Insulin Psychosis" of diabetics is also allied to this state.

SENSITIVITY and ADAPTATION.

Two phenomena are observed in relation to the dosage of insulin from day to day. It is a common occurrence to require to reduce the dose of insulin injected as the treatment progresses, in order to obtain the same depth and duration of coma. In one patient, for instance, 110 units were required to produce coma on the nineteenth day of treatment, whereas on the fifty-third day 20 units gave the same effect. This has been termed "sensitization" and it is important to keep it in mind when regulating the dose each day. A reduction of as much as 8-10 units daily is sometimes necessary in order to prevent dangerous symptoms arising.

In the early stages of the treatment physical reactions such as violent psycho-motor restlessness, intermittent pulse and respiration are more common than in the later weeks. Although the mechanism is obscure it is evident that there is a gradual "adaptation" on the part of the body generally to the daily insulin hypoglycaemia. This occurrence should also be borne in mind when a "rest phase" is given lasting longer than 24 hours, as the power of adaptation is soon lost. Thus, if no treatment is given for two days or more - the patient having been previously

subjected to deep coma daily - a repetition of the coma dose will call forth a strong physical reaction which may be dangerous. At the same time most of the sensitization has been lost, and the misleading picture of light hypoglycaemia with severe physical symptoms is seen. It is advisable therefore to avoid long breaks in treatment, and to make the Monday dose the same as the Saturday dose in the ordinary course of events - as recommended by Parfitt (1937).

So far as the individual dose is concerned we have found 260 units as the maximum and 24 units the minimum. Langfeldt (1937) reports a case of coma produced with 7.2 units injected intravenously. At the other extreme 400-500 units are sometimes necessary to produce the same effect.

ALLERGIC PHENOMENA.

The literature has been very scanty on the subject of allergic reactions to Insulin. One case was encountered in this series (35) which is of interest to record. There is little doubt that this reaction was a true protein hypersensitiveness. No previous history of allergic reactions could be elicited. The symptoms occurred after eight days of treatment -

about ten days after the first injection. Characteristic symptoms such as oedema of face, urticarial rashes, coughing and sneezing, and slight rise of temperature with acceleration of the pulse were found. Treatment consisted of a change of brand from Danish "Leo" to the crystalline product of Burroughs Wellcome. It is significant, however, that, after a period of treatment with this brand, symptoms recurred.

BLOOD SUGAR.

A series of eighteen blood-sugar curves was carried out during the hypoglycaemic period and for some hours after. The results obtained are recorded in Table I. In this table the insulin dose is given in column A. Columns B, C, D and E indicate the length of time that the blood sugar remained below the stated levels, which are calculated, not in mgms%, but as percentages of the fasting level. Column F gives the injection-interruption interval, that is, the time between the injection of insulin and the administration of glucose. Column G (F-E) gives the discrepancy between the interval of time during which the blood sugar was below fasting level, and the injection-interruption interval. Column H indicates the duration of coma. Columns I and J show respectively the range of

blood sugar when in coma, and the minimum blood sugar attained. Columns K and L give respectively the time of the occurrence of the minimum blood sugar and the time of onset of coma. Column M gives the discrepancy between the time of the onset of the minimum and the time of onset of coma (L-K). Column N gives the maximum percentage blood sugar fall, while the final column (O) gives the percentage fall of blood sugar at the onset of coma.

The interpretation of results is necessarily difficult in these cases, although certain points are of importance in throwing light upon the mechanism of coma.

Firstly, it may be said that, in general, the interval in which the blood sugar level is below the fasting level is longer than the injection-interruption interval by about one and a quarter hours. This interval varies between quarter of an hour and two and a half hours. Thus the hypoglycaemic period is of greater duration than is the injection-interruption period.

Secondly, reckoning in percentages of the fasting level, the mean maximum fall is to 22%. The actual mean lowest level is 22 mgms%. The lowest actual levels recorded were 10-15 mgms%, which suggests a

complete absence of blood sugar, and may represent the non-glucose reducing substances alone. Such low levels are not uncommon and occurred in seven of the cases recorded.

Thirdly, it would seem that the patient does not go into coma at the lowest blood sugar level obtained, but on a rising blood sugar. Usually coma supervenes one hour after reaching his lowest blood sugar level, and at a mean blood sugar level 6 mgms% higher than his minimum. During coma the blood sugar tends to rise, the average rise being 25 mgms%. In one case only the patient went into coma on a falling blood sugar, and one other showed an irregular curve.

Fourthly, there seems to be some correlation between the length of coma, the time of the onset and the time of the minimum blood sugar level. For instance, when the minimum blood sugar level is reached late, the coma will also be late, and consequently of short duration. A rapid fall in the level to the minimum will bring about a rapid onset of coma, which quickly becomes deep and prolonged. This observation has an important bearing upon the management of coma, and bears out the fact that, when a coma supervenes before three hours have elapsed, it should be interrupted immediately, as it is likely to deepen in an

alarming manner.

Fifthly, it will be seen from the table that there is an almost constant reading for the percentage fall of the blood sugar from fasting to the minimum. The mean percentage fall is 80. This figure seems to be a necessary condition of coma, and would appear to be the only constant finding. This finding is being used at present in an attempt to prognosticate the probable coma dose of a patient before treatment is started. By giving small sub-coma doses to a patient and plotting a graph of the blood sugar levels, it is thought that a rough indication of the dose necessary to bring about the minimum percentage fall may be obtained. At present no definite conclusions have been reached. Should it be possible to predict the coma dose for any one patient after such tests, then Phase I could be dispensed with and the total duration of treatment shortened thereby.

In several cases it was noticed that, after interruption by intranasal glucose, the blood sugar level tended to fall. This was attributed to a pancreatic reaction, with outpourings of insulin, to the presence of glucose in the stomach. This phenomenon might account for the deepening of coma for some time after interruption in some cases. Intravenous glucose is,

of course, of great value in combating this effect.

To summarise, it may be said that:-

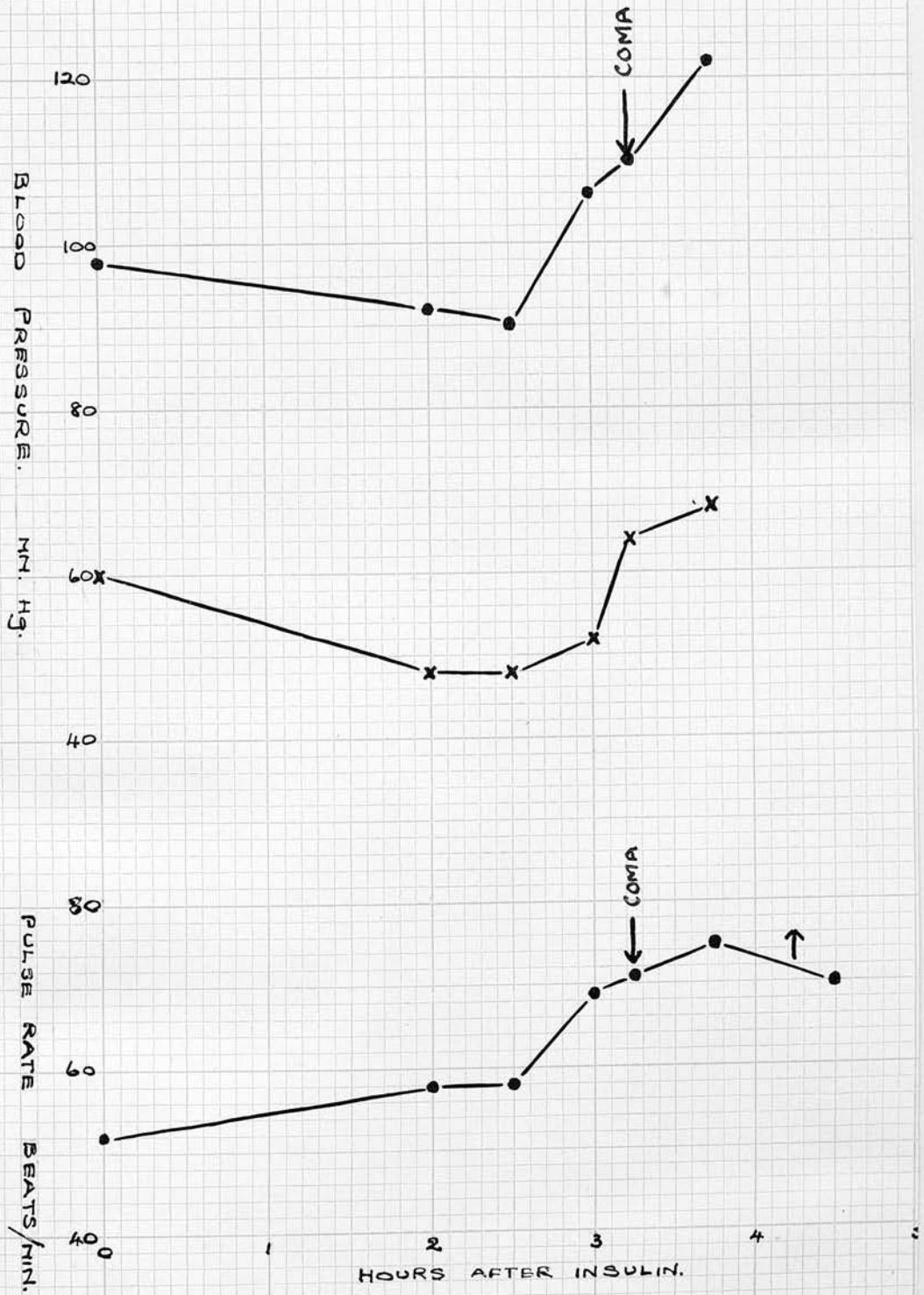
There does not seem to be a straightforward relationship between the blood sugar level and the coma. The deepest coma does not coincide with the lowest level. One must therefore assume either that there is a time lag in the cerebral circulation in relation to the peripheral circulation, or that a state other than the hypoglycaemic state is responsible for the symptoms. Coma supervenes on a rising blood sugar, and this rise may continue in certain cases and result in spontaneous awakening. The outpouring of adrenaline, usually in association with psycho-motor restlessness and rapid pulse is probably responsible for this spontaneous rise. This fact is of importance in that it is found necessary to keep the patient as quiet as possible during hypoglycaemia, and to avoid excitement.

No correlation with the blood sugar could be found in the blood pressure, pulse rate, temperature or the depth of coma, and it is therefore of little value in this direction. Cameron (1937), working on the electroencephalogram, attempts to draw some parallel between depth of coma and blood-sugar levels and brain-waves. With readings as low as 40 mgms% no

TABLE I.

	Units Insulin	Length of Time below:-				Time of Injection to Interr.	E - F	Duration of Coma (Mins.)	Blood Sugar in Coma. (mgms.%)	Minimum Bl.sugar attained (mgms.%)	Time of min.bl. Sugar (Mins.)	Time of onset of Coma (Mins.)	L - K	Maxi- mum %age Bl. sugar fall	%age fall of Bl. sugar at onset of Coma
		25% of Fasting (Mins.)	50% of Fasting (Mins.)	75% of Fasting (Mins.)	Fasting (Mins.)										
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
I	60	330	300	186	366	240	+126	60	17-20	16	180	200	+20	82	81
II	90	291	228	48	342	300	+42	90	35-60	20	120	210	+90	76	64
III	10	270	216	0	306	285	+21	0	-	28	60	-	-	63	-
IV	150	340	80	0	420	270	+150	0	-	33	60	-	-	59	-
V	100	342	162	0	430	300	+130	0	-	23	60	-	-	68	-
VI	100	372	306	36	414	300	+114	0	-	16	180	-	-	87	-
VII	100	294	258	0	390	240	+150	60	38,44,38	31	120	195	+75	68	60
VIII	60	345	285	30	408	270	+138	15	20-25	20	270	270	0	76	76
IX	160	360	258	12	410	270	+140	15	20-33	20	270	270	0	77	77
X	90	354	228	90	462	240	+222	90	23-65	17	120	180	+60	82	75
XI	100	285	234	66	330	240	+90	30	25-23	22	150	210	+60	77	74
XII	100	246	210	63	270	285	-15	45	24-102	17	90	240	+150	81	73
XIII	100	282	240	50	315	270	+45	90	17-47	17	150	180	+30	81	81
XIV	84	258	216	6	280	270	+10	45	30-60	22	90	225	+135	75	66
XV	90	250	215	18	280	285	-5	75	39-100	22	120	210	+90	79	59
XVI	84	192	168	40	210	210	0	60	24-87	17	90	150	+60	81	73
XVII	64	300	270	220	330	285	+45	60	15,24,15	15	225	225	0	86	86

BLOOD PRESSURE AND PULSE
RATE CURVES IN HYPOGLYCAEMIA



MANAGEMENT OF HYPOGLYCAEMIA.

Before injection each morning a note should be taken of the pulse, respiration rate, temperature and blood pressure. The urine should be tested for sugar and albumin. A rise of temperature is a contra-indication to the treatment for as long as it is maintained.

During the first hour or two no signs are apparent, and only routine pulse readings are taken. The patient, during this period, is usually quiet, and attempts to go off to sleep. To avoid over-production of adrenaline he should be kept as quiet as possible, but should he wish to read, play patience, chess and such games, every encouragement should be given him. He may be allowed to smoke, and may have drinks of water if required.

At the end of two hours there is usually some restlessness and care should be taken that the patient does himself no harm. The management of this period is important, as prolongation will result in an over-production of adrenaline sufficient to neutralise the effect of insulin. The pads at the end of the bed and on the walls are provided to prevent the patient from harming himself. It must be impressed upon the staff that any attempt to "hold down" the patient only

results in the redoubling of his efforts. All that is necessary is to control the movements so that the patient does not hurt himself, particularly by falling out of bed. Two nurses are sufficient, sitting with their backs to the patient, to act as further pads. A patient who required at least three, if not four, persons to hold him down, when he was released and allowed to kick unrestrictedly, soon quietened down altogether.

When the patient becomes comatose he should be propped up if hypotonic and quiet, or allowed to lie over on his side with a supporting pillow at his back if hypertonic. This avoids the danger of aspiration of saliva, which is often excessive and frequently causes spluttering. When this is done the nasal tube should be passed as a precaution. Great care must be observed in this manoeuvre, and the following method has been adopted as both safe and sure. A No. 12 (red rubber) catheter is used. This fits closely in the nostril and will not slip out. After lubricating with glycerine, the end is inserted into the nostril, care being taken to keep it close to the septum in the middle meatus, otherwise bleeding might take place and obstruction might be encountered. When the point of the tube reaches the epiglottis it should be gently

oscillated up and down until the patient swallows. A tap on the larynx may aid this. Swallowing invariably takes place at the end of expiration. The tube is then firmly slipped into the oesophagus, and one immediately knows that all is well if there is no coughing, and if gas and gastric contents are forced up the tube. This noise of gas escaping may be misleading, and taken for air coming from the trachea, but it has a character so different as to be diagnostic in itself. To make certain, the contents of the stomach should be drawn off with a syringe and tested with litmus. To prevent leaking of gastric contents up the tube, a small piece of wood is used as a plug. At the appropriate time glucose solution is introduced down the tube, which is connected to a large glass funnel. To enable only one person to carry out interruption when indicated, the funnel is fixed to a trolley at about two feet higher than the level of the patient. The funnel is filled up, connected to the tube, and glucose is allowed to run into the stomach. If the patient is reasonably still he can be left, while another patient is being attended to.

In the great majority of cases this method of interruption is used. While the patient is comatose he should be under close supervision and the colour,

the rate and character of pulse and respiration should be noted every quarter of an hour. A behaviour chart has recently been used for this purpose and has been found to be effective. Symptoms and signs are arranged in groups, with the more severe symptoms towards the end of each group. One is enabled, by this method, to tell at a glance how the hypoglycaemia is progressing. A specimen of this chart is included later. The time and onset of coma can be clearly seen; its duration and nature at once estimated; and the necessity for interruption gauged.

In agreement with Fraser (1939) 200 gms. glucose have been given as a standard amount regardless of the dose of insulin given. Any quantity less than this is likely to produce "after shock", particularly where the patient has been given more than 200 units insulin. Petrie suggests that the patient should be given 10 gms. glucose more than the number of units of insulin injected. This method of interruption should be used as standard.

After a few minutes, during which the coma may appear to deepen, and such alarming symptoms as choking, cyanosis, apnoea with pallor and violent psychomotor excitement may occur, consciousness returns and responsiveness is obtained: 10-15 minutes is the

average time taken for the patient to recover after interruption. During this period care must be observed that the glucose solution is not vomited up and subsequently aspirated. To avoid vomiting in those cases where it occurs frequently, it is necessary to run a few drops of atropine sulphate solution, with a little water, into the stomach about fifteen minutes before interruption. Danger also arises if the tube is withdrawn too slowly after interruption has been carried out. The tube must be nipped firmly between the fingers and withdrawn sharply. There is always a certain quantity of glucose solution in the tube when this is withdrawn, and it is apt to be dropped in the region of the larynx, causing choking. Should the patient choke he must be turned over on his side without delay, and if necessary artificial respiration should be performed. This latter is not actually necessary but cuts short the attack. In all but certain selected cases, therefore, the intranasal method of interruption should be employed. It is regarded as "therapeutic interruption".

When the patient awakens his clothes are usually soaking and he has a low temperature. The night-clothing should be changed after a rub down before the fire, and the wet sheets removed. For the next

half hour the patient should rest. Biscuits and tea, or more glucose solution, should be given. We find that most of the patients help themselves to glucose, especially when it is made up with lemons and oranges, which make it quite a pleasant drink. We have, for some time, kept a small "library" of books and magazines in the insulin room. Magazines, particularly picture magazines, are very popular and help to while away the time until lunch. Often a patient will return to a book he has been reading just before going into hypoglycaemia. It is not advisable to smoke as nicotine intensifies the action of insulin and may cause after-shock (Langfeldt, Strecker, 1937).

It has been emphasised by Larkin (1937) that the time immediately after awakening is a particularly impressionable one, and that every endeavour should be made to create an atmosphere of normality. Conversation should be carried out with the patient, newspapers are handed round, and the work of the day discussed. In every way the patient should be encouraged and "mothered".

GENERAL INDICATIONS FOR INTERRUPTION.

1. After the 5th hour.
2. With gross irregularities of the pulse - under

40 and over 140 per minute continuously. Slight irregularities are common in the stage preceding coma and should be disregarded. It has been noticed that the pulse given to irregularity on the first phase of treatment settles down later.

3. Hypertonus in extension and pronation. These spasms are not infrequent in light coma, and should be disregarded, but in the presence of deep coma, they are a sign of bulbar involvement, and hypoglycaemia should be terminated. They are easily recognised and easily differentiated from the other type by the pulse irregularity mentioned earlier.

4. Stridor, cyanosis and the use of accessory muscles of respiration. Alae nasi are usually vibrating.

5. In "hunger uproar". This is to be differentiated from ordinary psycho-motor restlessness, during which the patient may call for glucose. This state is very uncommon and we have, as yet, had no need to interrupt for this reason.

In all the above, intranasal glucose is sufficient to bring the patient to consciousness. After the first few minutes all will be well.

Indications for Intravenous Interruption.

According to Frostig (1938) about 7% of all

hypoglycaemias require intravenous or other emergency interruption. It has been the practice in this series to use the intravenous method rather more often than this. Some patients, particularly those who are apprehensive and depressed, find that the return to consciousness is a long and terrifying experience. It has been described by one of them as "an indescribable nightmare". This patient felt that he had returned to the dark ages, perhaps the Stone Age, and was struggling to learn some ritual dance to enable him to wend his way through a dreadful maze. This nightmare recurred each day after interruption with intranasal glucose. Others have attempted to describe their symptoms in a rather different way. In these cases interruption was carried out by the intravenous route and they had no more complaints. As this experience has been quite common, the use of the intravenous method has become more frequent.

The indications for intravenous interruption are these:-

1. Cessation of respiration and laryngeal spasm. This occurs in about 5% of hypoglycaemias.
2. Premature incidence of coma. If deep coma occurs before the third hour, interruption should be carried out almost immediately. In some instances

coma has been allowed to continue for as long as 15-30 minutes, but the patients have to be treated on their individual merits. There is a great danger that a premature coma may deepen and become irreversible (James, 1937).

3. Epileptiform Convulsions. In the early seizures intranasal glucose is recommended by Feldhofen (1937), and it is certainly the easier method where there is myoclonus.

4. Cardio-vascular Collapse. During this emergency there is an almost complete cessation of circulation. The pulse is impalpable and the veins cannot be distended, making it impossible to give an intravenous injection at times: 1 cc. of a 1:1000 solution of Adrenaline is therefore injected subcutaneously. In extremity, intracardiac injection of 2-4 cc.s of 33% glucose is recommended.

5. Vomiting. It may be impossible for glucose to be retained in the stomach because of this. Atropine sulphate may be injected as an adjuvant.

6. In all cases where the intranasal method has proved to be dangerous, difficult, or uncomfortable. This includes:-

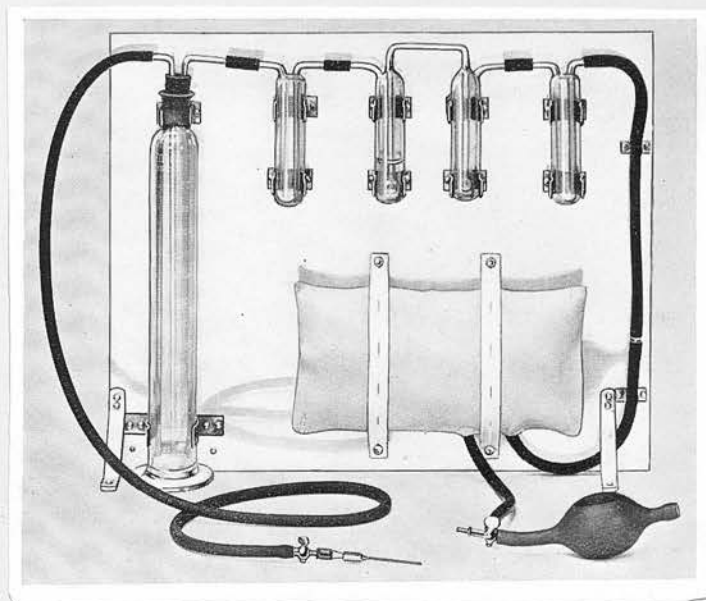
- (a) Repeated laryngeal spasm every time the tube is passed.
- (b) In patients with abnormally narrow nostrils.

- (c) Where it has been found that coma deepens after intranasal glucose.
- (d) Where return to consciousness is a terrifying experience.

Technique and Apparatus for Intravenous Injection.

As it was found that there were considerable demands made upon the intravenous method of interruption the use of 20 cc. syringes, requiring recharging several times in the course of one interruption, was clumsy and slow. There was also the objection that, with a restless patient, it was almost impossible to avoid damaging the vein or injecting some glucose into the tissues. To overcome these difficulties, an apparatus (see photograph) was devised which consisted of a 200 cc. graduated glass cylinder, which acted as a reservoir, containing 33% glucose. Glucose is pumped, under pressure, from this reservoir through a length of rubber tubing, to the needle. (This apparatus is fully described in a paper by Millar and Tod which is at present in Press with The Lancet.) The apparatus has been in use for several months and has proved to be efficient. It is possible by this means to inject, at one time, as much as 200 cc.s and no changing of syringes is required. It has the further advantage of being very simple to work, is light and easily handled. This enables one to deal

APPARATUS FOR INTRAVENOUS INJECTION.



with emergencies promptly, even in the presence of convulsions and restlessness. The apparatus is mounted on a trolley, and it can remain in the insulin room throughout the day and night, prepared for any emergencies such as after-shock.

When an intravenous injection is to be carried out, the trolley, with needle, forceps, cotton wool and spirit, is taken to the bedside. A pneumatic band, specially devised for the purpose, is applied to the upper arm of the patient, care being taken to inflate to the proper pressure (about 60 mm.). In the case of a dangerous emergency, a large bore needle is required (No. 2 intravenous), and one of the larger veins of the cubital fossa is selected. When routine interruption is indicated, a small, almost hypodermic needle is used (No. 16) and a small vein in the forearm is selected. We have not, as yet, had any difficulty with this method, and there is almost no possibility of "using up" the veins, even by a daily injection over a period of weeks. Sclerosis of veins is comparatively rare.

The awakening after intravenous interruption is most dramatic. Within 2-5 minutes the patient is fully conscious and recovers with none of the excitement seen with intranasal interruption.

Other methods of interruption include Adrenaline 1:1000 solution. This is not used except after a seizure. In order to combat the deepening of coma following intranasal interruption, 'Pituitrin' was tried. The hope was that it would inhibit the reaction on the part of the pancreas to secrete insulin when glucose was administered. No change was noticed and the method abandoned. The work of Cohen and Libman (1937) is of value in this connection.

MODIFICATIONS IN TECHNIQUE.

During the month of June 1938 I had an opportunity of studying methods in Switzerland. I found in Munsingen that there were certain important differences in technique, which impressed me as being improvements upon the technique just described. There seemed to be little or no disparity in the results obtained in each method, but Dr Müller's method seemed to be much simpler. In the first place every patient was given more or less the same length of treatment. Injections were given to all at 7 a.m. and interruption took place at 11.15. It will be seen here that the duration of treatment is much shorter. In addition, smaller doses of insulin were used, and averaged 10-15

units less than in the case of my own patients. Thus patients were given less severe and less lengthy hypoglycaemias, but with apparently no decrease in beneficial results. Coma was reckoned as starting when the patient could not be persuaded to drink glucose. No distinction was made between deep and light coma. A "shock" was an arbitrarily determined state; it seemed that any patient who had lost consciousness for any length of time at all was considered to have had a shock. Most of the work was done by attendants with the exception of injecting and interrupting.

In July, therefore, it was decided to allow the patients to have less severe shocks. This allowed the doctor in charge to be absent from the insulin room for the greater part of the hypoglycaemia, so that he might attend to his other duties. Attendants were trained to appreciate the various stages of hypoglycaemia, and a chart was drawn up, in which most of the important symptoms and signs were listed in groups and in increasing order of severity. These charts were entered up every quarter of an hour by the attendants in charge. The doctor was sent for only when the symptoms became more severe. This method has now been in use for about ten months, and has proved to be successful. The treatment is now carried out in a

Name:— H.C. (Case 12)

Date:— 16. 11. 38

Day:— 33

Dose:— 60.

Time	8. Am					4	5
	1	2	3	4	5		
Awake	x	x					
Drowsy	x	x					
Asleep	x						
Attentive	x	x					
Deep Sleep							
Incipient Coma			x				
Light Coma			x	x			
Deep Coma					x		
Apprehensive							
Euphoric							
Apathetic							
Agitated							
Emotional Spasm							
Quiet	x	x	x	x	x	x	x
Still	x	x	x	x	x	x	x
Restless—mild							
Restless—severe							
Talkative							
Moaning							
Laughing							
Crying							
Shouting							
Screeching							
Myoclonus							
Tetanic spasm							
Tonic Flexion	x						
Contortions							
Athetotic spasms							
Tonic extension							
Hypotonus							
Seizure							
Blink							
Conjunctival							
Babinski							
Corneal							
Organic							
Light							
Flushing							
Sweating							
Pallor							
Salivation							
Hypersecretion							
Stertor							
Dyspnoea							
Choking							
Laryngospasm							
Cyanosis							
Pulse Rate	72	87	108	96	87	96	72
B.P. Systolic	90	116	128	118	116	117	77
B.P. Diastolic	50	38	58	60	38	54	130
Respiration Rate	18	18	16	18	18	19	70
Temperature	96.4	97	97	96	97	97	18
Blood Sugar	x	x	x	x	x	x	97.6
Biochemical							x
B.M.R.							x

NOTES:—

NAME:— H.C. (Case 12)

Beginning of Treatment:— 30th September 1938.

Month September

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Day																															1
Dose																															10
Light Coma (mins.)																															
Deep Coma (mins.)																															
Fits, Spontaneous																															
Drink																															200
I.N. Glucose (gms.)																															
I.V. Glucose (ccs.)																															
Adrenaline																															
Time of awakening (mins.)																															
Cardiazol Fits																															
Shocks																															

Month October

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Day			2	3	4	5	6	7		8	9		10	11			12	13	14	15	16	17			18	19	20	21			
Dose			10	20	30	40	50	60		60	60		60	60			60	60	60	65	65	65			65	65	65	65			
Light Coma (mins.)										30				30			75	15	30	30	60	60			45		60	45			
Deep Coma (mins.)														15				15	15			10			45			45			
Fits, Spontaneous											1																				
Drink			200	200	200	200	200	200		200	200		200	200			200	200	200	200					200		200	200	200		
I.N. Glucose (gms.)																						200	200								
I.V. Glucose (ccs.)										60				100			100	60	60						100				60		
Adrenaline											1cc																				
Time of awakening (mins.)										10	10		10	10			15	10	10		15	15			10		10	15	10		
Cardiazol Fits																															
Shocks										1	1		1	2			3	4	5	5	6	7			8		8	9	10		

routine manner, the doctor giving the injections in the morning, and interrupting at a specific time, usually four and a half hours after injection. He is thus able to carry on his other ward work, and does not return to the insulin room until the time for interruption, except in emergency.

This method aims at simplicity and uniformity, and takes up less of the staff time than any other.

A further modification is at present in its experimental stages. It is designed to reduce the total length of treatment by about one to two weeks. At present the Introductory Phase is of no therapeutic value, and yet is a prolonged period. It is very seldom less than a week and may even be as long as a month. An attempt is being made to estimate the probable shock dose in each patient by making preliminary blood investigations, involving sugar and insulin tolerance. So far it is difficult to say whether this will be successful. Van der Veer (1939) has reported recently that he gives 60 units to every patient irrespective of age, weight, sex or type of illness. He claims no ill effects. Such a modification must constitute an advance, as it shortens the Introductory phase considerably, and thus makes the treatment more practicable as a routine procedure.



Time of Interruption.

Sakel (1935) lays great stress on interruption, its time and method. Thus, Katatonic types are interrupted early, long before coma supervenes, when they are talkative and approachable.

Excited patients should be interrupted when they are quiet, euphoric and dreamy.

Paranoid and hebephrenic types should be given deep coma and this coma should last for $1\frac{1}{2}$ -2 hours. So far as possible this rule has been observed, though two hours was never achieved by any patient in deep coma as defined earlier.

Too early interruption leads to persistence of the psychosis, whereas too late may end fatally. Bychowski (1937), Porch'er (1937) and others claim that the period of deep coma is not necessary, but this view is not common. Most agree that the effective part of the treatment lies in the production of shocks.

DIFFICULTIES, DANGERS and COMPLICATIONS.

Dussik (1938) describes three groups of complications.-

1. Those connected with other organs apart from central nervous system.
2. Those which are the result of excessive absorption of glucose.

3. Central Nervous conditions.

1. Complications connected with other organs.

These arise in the heart and the respiratory apparatus, and may occur either during or soon after hypoglycaemia. It is rather difficult to understand their mechanism, as the heart, for instance, can exist normally when the central nervous system shows alarming symptoms from sugar deprivation. Weak and irregular pulse with actual cardiovascular collapse, cyanosis or Adams-Stokes syndrome are described. Digitalis is of little use in a weak circulation. Coramine, 1 cc. by mouth, has been found to be effective to combat these dangers. It should be given three times a day. In the more acute phase Coramine and caffeine injections are advocated, together with a very slow injection of 20 cc.s 33% glucose and $\frac{1}{4}$ mgm. strophanthin. Adrenaline is dangerous in these states.

Pulmonary oedema is a severe complication but fortunately rare. This usually follows interruption of a prolonged shock with intranasal glucose.

2. Complications the result of excessive absorption of glucose.

In some cases interruption is followed by deepening of coma. This is explained by the fact that the greatly depleted liver makes up its deficiency

with the entire feed, causing no change in the blood sugar level. In most cases this deepening is transient, and within half an hour awakening should take place. In some it is necessary to inject 60-100 cc.s 33% glucose intravenously before consciousness is restored.

Too rapid absorption of glucose can also cause diarrhoea and vomiting, with rise of temperature. This may continue for several days and may even prove fatal, but usually lasts for 12-24 hours. Large amounts of very dilute glucose solution are recommended. Vomiting can be treated with Atropine.

3. Central Nervous Complications.

(a) Persistent Stupor. In spite of interruption, the patient remains in a condition resembling deep sleep. Pyramidal signs are present, and despite all efforts to awaken him he remains in this state, perhaps for several days (see Case 29). A hyperglycaemia is usually present. Other symptoms are rise of temperature, rigors, hot dry skin and headache when awakening. Easton describes a case which lasted for several days.

(b) Return of Epileptic Seizures. After interruption, cramps may continue, there is great psycho-motor restlessness of the contortionist type, tachycardia

and dyspnoea, flexibilitas cerea, all developing into an epileptic seizure.

The treatment for both conditions is the same. Several measures can be tried in succession if one proves to be ineffectual. As there is already a hyperglycaemia further injection of glucose is unnecessary. Absorption should be improved by an injection of an ampoule of Vitamin B₁ preparation (Benerva), by improving oxygenation with inhalation of 5% CO₂ and O₂, and by stimulants such as caffeine and strophanthin. If these fail then lumbar puncture might be carried out. Injections of sodium luminal may be necessary in status epilepticus.

"After Shock".

This is probably the commonest complication, and the most avoidable. It is due to rapid utilisation of glucose, with recurrence of hypoglycaemia symptoms later in the day - usually 3-4 hours after interruption. Those who have been given large doses of insulin are most prone. It is often found that patients who refuse food during the day are also subject to the attacks.

Feldhofen (1937) has found that 150 gms. of glucose is not sufficient for interruption, and recommends 200 gms. in every case. Parfitt (1937) insists

that all who have had more than 200 units should have a further 100 gms. of glucose when they awake, and every patient should have his meals supervised. In this series only three patients showed this form of reaction and on each occasion it was found to be due to insufficient glucose. The above recommendations are now carried out and no patient is allowed any exertion until after a good lunch - which is supervised.

Although there are many varieties of alarming symptoms, very few are immediately dangerous. It must be emphasised that it is essential to know which conditions to allow to continue and which to interrupt. In this way the treatment can be made safe, and at the same time effective shocks can be obtained. Only 7% of all shocks require immediate interruption.

MORTALITY.

The most common factor, according to Deussen (1937), associated with high mortality in this treatment is inexperience. If a patient is not interrupted at the end of five hours, protracted coma may become irreversible. Bad management of the coma period may give rise to aspiration of saliva or vomitus, with death from pneumonia. Ross (1939), reviewing results in 1356 cases treated with insulin, reports nineteen

deaths, representing a percentage of 1.4 of all cases treated. Information is meagre as to the cause of death, as very few come to autopsy. The more common causes of death were given as pneumonia - usually aspiration - cardiac respiratory collapse, and complicating diseases such as coronary thrombosis and endocrine dysfunctions. This would seem to indicate that, with due care, proper experience, and having excluded debilitating cases, the death rate should be negligible.

No deaths have occurred in the present series, though it is possible that the case, in which pulmonary tuberculosis (10) was found later, may have suffered an exacerbation of symptoms as a result of treatment.

AFTER CARE.

After the patient has fully recovered consciousness he is allowed to be up and dressed. Throughout the rest of the day he should be employed in some manner. Garden work, occupational therapy, ward work, recreations such as billiards, chess, bowls and cards. In the summer months the patient should be outside during the afternoons for walks, picnics and the like. It is of great value if the patients can be under the benevolent supervision of intelligent nurses. To

avoid after-shock and to combat drowsiness in the afternoons it is advisable for the patient to carry a stick of barley sugar in his pocket to eat if he feels in any way unwell.

No attempt is made to probe too deeply into the patient's symptoms during treatment, as this seems to stir up the psychosis.

In most cases where there has been a complete or incomplete remission, the patients are discharged as soon as possible after the cessation of treatment. All patients are asked to report at regular intervals after discharge.

MECHANISM OF HYPOGLYCAEMIA.

As schizophrenia itself is not wholly understood it is difficult to arrive at a satisfactory explanation of the mechanism of cure by insulin shock treatment - if, indeed, it is admitted in the first place that it is a cure at all. A few of the theories are here reviewed. It is, of course, assumed for the purpose of discussion that hypoglycaemic shock does actually have a beneficial effect upon schizophrenia.

Sakel (1935) put forward the suggestion, when the method was in its early stages of development, that

coma produced a blocking of nerve pathways which he called pathological. The disease process of schizophrenia had previously opened up abnormal association pathways so that stimuli were transmitted along these, giving rise to abnormal reactions. Normal pathways were closed. The production of coma temporarily arrested the transmission through pathological routes and encouraged the use of the neglected normal pathways. This theory suffers from being too simple and having no true pathological or physiological substantiation.

Freudenberg (1938) reviews the current opinions on the subject. Quoting Kronfeld and Sternberg, he indicates that hypoglycaemia brings about a beneficial effect in three ways.-

- (a) Its quietening effect on instinctive activities.
- (b) The induction of euphoria, with change in the habitual mood and decrease of psychotic trends.
- (c) A reappearance of normal somatic sensation. The contents of the individual somatic experiences lose their psychotic significance. From these internal changes a longing for contact with reality results, and is available to break through autistic behaviour.

Approaching the problem from the patho-physiological standpoint certain opinions are held. It is assumed in the first place that schizophrenia is

basically a metabolic disturbance, and that the function of insulin is to bring about a physiological equilibrium once more. Acute schizophrenics are held to have laevulose tolerance curves in which there is a rapid rise and a retarded fall. Chronic cases show a slow rise and an even more retarded fall. The explanation of this is that the ergotropically overstimulated organism of the acute schizophrenic attempts to retain large quantities of sugar in the blood stream ready for use. Thus there is present a "metabolic apathy" associated with deficient absorption of glucose from the intestine and a disturbed regulation of the vegetative nervous system, including the cerebral cortex. In the acute cases there is an increased stimulation of the apparatus, and in the chronic cases there is a diminution and finally a complete failure on the part of the autonomic nervous system to respond. Together with these reactions there is found an increased resistance, as measured by the response to injection of 1/15th of a unit of insulin per kilo of body weight. In normal subjects there should be a lowering of 20-30% of the blood sugar in thirty minutes. After a further thirty minutes normality should again be reached. A delayed return to the normal level indicated that the antagonistic action of adrenaline

has been disturbed, and this is taken to mean a diminished preparedness for reaction on the part of the autonomic nervous system generally. Other indications that this disturbance is present in schizophrenia are that, whereas normally there is a rise in blood pressure when posture is changed from sitting to standing, in schizophrenia the blood pressure is said to fall. The temperature does not fall to the same extent when a schizophrenic is in a cold bath as it does normally. It is postulated that this damping down of the activities of the vegetative nervous system inhibits the oxidation of the toxic products of metabolism. These products are believed to be responsible for the production of the schizophrenic reaction. Thus the action of insulin is to induce the oxybiotic process necessary for detoxication.

Rudolph (1938) suggests that the improvement following insulin hypoglycaemia is due to an increase in the alkali reserve of the acid-base ratio. Normal subjects can adjust the acid-base ratio in two ways - through the kidneys and through the lungs. In schizophrenics there is a diminished excitability on the part of the respiratory centre to change the acid-base equilibrium. The normal acidity that occurs during sleep is also found in the waking hours. Golla

pointed out in 1929 that an attack on this depression of the respiratory centre would perhaps be successful in combating the psychotic process. Thus, any means which would bring about an alteration in the acid-base ratio in the direction of alkalinity would have this effect. Ultra-violet light is said to have similar, though less intensive an influence in this direction. By this means the respiratory centre once more returns to its normal functioning, and cerebral respiration is enabled to remove the toxins accumulated in the brain cells. Insulin is believed to have, in addition to this action, a directly irritative action on the cell membrane itself, rendering it more permeable and facilitating the exchange between the cell and its surroundings. Thus, according to this hypothesis, improved brain oxidation and the alkalosis occurring during hypoglycaemia may be two factors in the recoveries seen in this method of treatment.

Pickworth (1938), reviewing the work of Himwich, pointed out that, in hypoglycaemia in dogs, the blood returning from the brain became progressively more arterial as the blood sugar fell, while that from muscle continued venous. He explained this observation by suggesting that insulin caused a dilatation of cerebral capillaries. The local pathological spasm

which is presumed to be present in schizophrenia was thus removed, and the normal capillary patterns were restored, along with the normal sequence of the mental and emotional states. In strychnine poisoning there has been demonstrated a disorganisation of the cerebral capillary patterns, with consequent convulsions. A similar disorganisation is postulated as taking place in the convulsions of hypoglycaemia. Insulin should have a more selective action on the capillaries of those areas of the mid-brain which are concerned with sugar metabolism, and the functional inhibitions of schizophrenia might be supposed to be related to those areas - at least anatomically.

It is an interesting observation that the intraventricular injection of acetyl choline and eserine in man produces very similar reactions to those produced in hypoglycaemia. W. R. Henderson and Wilson (1936) found such symptoms as sweating, salivation, cramps and coma common features of these states.

Gellhorn (1938), from observations carried out in humans and animals under hypoglycaemia, suggests that hypoglycaemia acts in a manner similar to that observed in a state of anoxia. A combination of anoxia and insulin was more potent in producing convulsions in animals than either of these means alone.

A rise of blood pressure indicated that the diminished oxidative processes in the brain had given rise to a secondary stimulation of the sympathetico-adrenal system. He maintains that all successful treatment of schizophrenia is "due to nothing other than strong and lasting stimulation of the sympathetic division of the autonomic system, involving profound alteration in the oxidative metabolism of the brain". He therefore recommends a combination of anoxia and insulin as the future method of treatment, and asserts that such treatment has strong physiological foundation.

MENTAL EFFECTS.

At present it is impossible to estimate the permanent value of the mental effects observed in this treatment. Many beneficial results which are seen are transient, and often present themselves only during hypoglycaemia itself, or immediately after interruption for a short time. The most striking change seen occurs during early hypoglycaemia, and is characterised by a period of lucidity. A hebephrenic patient, for instance, of some years duration, seemed suddenly to "wake up", look around him, ask where he was and how he came to be in hospital, and would even carry on a

seemingly rational conversation for some time. Very frequently, however, this state does not last any length of time - about half an hour or so - and often does not recur. In those patients who ultimately show a complete remission, this period of lucidity is daily prolonged during hypoglycaemia and later "overflows" into the rest of the day. There is therefore an ever-widening circle of normality as the treatment progresses. It is this daily improvement which, when observed in several patients, is apt to make one think that it is the treatment, and that alone, which is coming to grips, as it were, with the psychotic process. It is admittedly a remarkable experience to see an apprehensive, hallucinated, deluded patient daily improving and casting off his symptoms one by one.

At this point it may be advisable to mention that few patients object to the treatment being carried out once it has been started. Many writers have objected to this method as being terrifying to the patient. This is not the case. In most patients there is soon experienced a feeling of well-being, amounting to euphoria, and it is a much more common experience to find the patient objecting before than after treatment. In the series of 25 cases treated, involving some 900 hypoglycaemias, sedatives were

required, in all, about twenty times. The most consistent mental effect of insulin hypoglycaemia is sedation.

R E S U L T S.

Deussen (1937), Strecker (1938), Frostig (1938) and others have laid emphasis on the uniformity of the results which should be published. The following criteria are observed:-

Complete Remission (+++):

- (a) Fit for work, of a responsible nature.
- (b) Without subjective or objective recognisable symptoms of a psychotic nature.
- (c) No defects in the intelligence. The emotional and volitional sphere of the total personality normal.
- (d) Insight into the illness.

Incomplete Remission (++):

- (a) Fit for work of a responsible nature.
- (b) Schizophrenic symptoms not objectively recognisable.
- (c) Slight defects in the intelligence, emotional and volitional sphere recognisable when subjected to a psychiatric examination.
- (d) Insight into illness not complete.

TABLE II.

CASES TREATED BY DR. STRECKER.

GROUP I.

Case	Age	Duration of illness	Diagnosis	Treatment started	Treatment stopped	Days	Comas	Fits	Coma doses	Results	Mths. after	Present condtn.
H.McL. (10)	33	19 yrs	Schizo.-Reaction type	13.3.36	5.5.36	31	-	-	170	-	35	Dead
D.F.McG.(9)	25	1 yr.	Hebephrenia	17.3.36	18.6.36	61	27	1	200	-	34	-
J.H.S. (8)	26	1½ yrs	do.	17.3.36	15.6.36	64	18	1	100	+	34	-
W.H.H. (7)	23	1 yr.	Mental Depression	25.5.36	25.6.36	21	-	2	55	+	34	-
J.G. (6)	29	1½ yrs	Catatonia	22.6.36	17.12.36	58	-	-	270	-	28	-
D.M. (5)	18	3 yrs	Schiz.-Reaction type	7.7.36	16.10.36	104	61	1	100	+	30	Believed dead
D.J. (4)	26	6 mths	do.	10.9.36	7.1.37	62	-	-	135	+ + +	29	-
J.H. (3)	23	10 mths	Hebephrenia	2.10.36	7.1.37	73	7	-	170	-	29	-
R.R. (2)	29	6 yrs	Paranoid schiz.	3.11.36	7.1.37	22	-	-	95	-	29	-
F.B. (1)	33	8 yrs	Schiz.-Reaction type	7.12.36	7.1.37	10	-	1	70	+	29	-

TABLE III.

CASES TREATED BY DR. MILLAR.

GROUP II.

Case	Age	Duration of illness	Diagnosis	Treatment started	Treatment stopped	Days	Comas	Fits	Coma doses	Results	Mths. after	Present condtn.
J. B. (27)	19	1 yr.	Catatonic stupor	10.7.37	7.9.37	31	4	0	100-85	++	18	-
J.C.B. (23)	27	5 yrs.	Paranoid schiz.	10.7.37	7.9.37	42	18	0	250-90	++	18	-
J.B. (24)	35	2 mths	Stupor	10.7.37	7.9.37	42	17	0	200-85	+	18	+++ (Car-diazol)
H.McG. (17)	40	7 yrs.	Depression	10.7.37	31.8.37	35	5	0	150-100	+	18	+++
W.M.B. (15)	24	5½ yrs	Hebephrenia	23.8.37	28.10.37	46	20	0	60-50	-	17	-
J.D. (22)	28	2 yrs.	Catatonic stupor	8.9.37	9.11.37	44	15	0	100-50	-	16	-
J.B. (38)	28	9 yrs	Hebephrenia	8.9.37	12.2.38	41	12	1	170-210-180	-	13	-
R.A. (21)	38	3 yrs	Paranoid schiz.	8.9.37	9.11.37	41	23	1	50-55	-	16	-
R.M. (30)	17	6 mths	Paranoid schiz.	27.9.37	5.1.38	62	22	0	100-45	++	14	++
C.McI. (19)	19	3 wks.	Acute schiz.-react. type.	27.9.37	19.3.38	93	20	6	250	++	12	++
I.R. (29)	24	2 yrs.	Paranoid schiz.	1.11.37	18.2.38	64	14	1	215	++	12	++
J.D.S. (43)	40	9 yrs.	Schizo.-reaction type	5.11.37 30.9.38	29.2.38 3.12.38	66 43	15 30	0 0	100-25 60-65	+	13 5	- -
H.M. (34)	20	2½ yrs	do.	16.11.37	28.1.38	35	7	1	150	+++	14	++
J.McL. (20)	25	1½ yrs	Schizo.Simplex	20.1.38	14.3.38	34	16	2	110-62	++	12	++
W.T. (40)	35	9 yrs	Paraphrenia	11.2.38	26.5.28	71	31	2	120-110	++	10	+
J.B.McG.(33)	24	2 yrs	Paranoid-schiz.	15.2.38	20.4.38	47	30	0	55-36	+	11	-
G.D.L.N.(26)	18	1½ yrs	do.	1.3.38	19.4.38	36	29	0	72-48	++	11	+++
B.H. (13)	24	2 yrs	Schizo.-reaction type	17.3.38	28.4.38	35	18	2	165	+++	11	+++
D.McL. (28)	31	2 mths (R)	do.	2.4.38	4.5.38	27	20	0	185-40	+++	10	+++
W.C. (16)	24	1 yr.	do.	4.4.38	16.5.38	58	23	1	105-36	+++	10	+++
R.B. (45)	31	-	Psychopathic personality	21.4.38	16.8.38	63	15	0	110-96	-	7	-
J.A. (46)	23	3 yrs	Schiz. Simplex	21.4.38	26.5.38	22	12	1	120-80	-	10	-
J.K. (35)	30	6 mths (R)	Paranoid-schiz.	27.4.38	26.8.38	82	2	6	80-88	-	7	-
I.MacK. (25)	20	2½ yrs	Schizo.-reaction type	2.5.38	20.8.38	61	22	0	110-82	-	7	-
J.W. (36)	27	4 yrs	do.	8.9.38	27.9.38	14	2	0	120	-	18	-
S.B. (18)	30	4 yrs	Hebephrenia (with dementia)	16.8.37	6.9.37	16	1	0	25-20	-	18	-
E.S. (42)	26	6 yrs	Hebephrenia	4.7.38	3.9.38	53	31	0	90-110	-	6	-
M.P. (41)	21	3 yrs	Anxiety state (̄ schiz.personality)	6.7.38	16.9.38	55	27	1	64	+	6	++
J.D. (31)	28	6 mths	Catatonic stupor	7.7.38	26.9.38	64	27	1	100	+	6	++
G.H. (32)	31	7 mths	Schizo.-reaction type	2.8.38	20.8.38	17	3	1	80	+++	7	+++
R.C. (14)	23	1½ yrs	Hebephrenia	17.8.38	24.11.38	71	27	1	160-190	+	5	-
L.P. (11)	35	1 yr.	Paranoid react.	23.8.38	20.11.38	62	31	2	45-60	-	5	-
D.T. (44)	20	2 yrs	Schiz.-react.type	30.8.38	12.11.38	52	27	3	110-130	-	5	-
W.D. (39)	31	1 wk.	Acute schiz.	5.9.38	7.10.38	22	7	2	40-30	-	6	-
H.C. (12)	33	1 mth.	Schiz.-react.type	30.9.38	5.12.38	43	31	1	60	+++	4	+++
M.McN. (37)	19	1 mth.	Acute schiz.	11.11.38	19.1.39	42	31	0	65	-	3	++

Partial Remission (+):

- (a) No longer fit for a more responsible or independent occupation.
- (b) Schizophrenic symptoms of a psychotic nature still proved objectively and subjectively admitted.
- (c) Defects in the intelligence or volitional sphere still recognisable (even by a layman).
- (d) Suspicion of dissimulation as regards insight into illness.

Unimproved (-):

No change observed except during the hypoglycaemic period.

CONSIDERATION OF RESULTS.

In a recent review of 2000 cases by Müller, a very high percentage of complete and partial remissions was claimed following treatment. Three groups of cases were taken: those under six months duration, those under two years and those over two years. In the first group (under six months) there were 57.2% complete and incomplete remissions. In the second group (under two years) there were 27.3% complete or incomplete remissions, while in those over two years duration only 11.3% showed such remissions. The average for all three groups is 40.4%.

Originally Sakel claimed much higher remission rates for these groups.

Ross (1939), is a recent review of results in 1356 cases treated with insulin in the hospitals of the New York State found that 14.2% were recovered, 20.6% were much improved and 26.3% were improved; 38.9% showed no change. Although there was a greater incidence of recovery in the cases of short duration, he pointed out that, even in cases where the illness had lasted for over six years, recoveries were possible. Cases of less than six months duration showed a recovery rate of 29.2%, while those of over six years showed a rate of 4.6%. He therefore concluded that treatment should be carried out in all cases, irrespective of duration of illness, and disagreed with the opinion of the superintendents of the State hospitals when they said "It has value in acute cases; the results, where the duration of illness has lasted for more than two years, do not justify the necessary expense of time and money". He makes a comparison between the cases treated with insulin and 1039 first admissions with schizophrenia to the Civil State hospitals. In this control series only 3.5% were recovered, 11.2% much improved, and 7.4% improved. Ross declares that these figures are significant, and

gives his opinion that insulin treatment should be continued.

TABLE OF RESULTS.

Certain points require explanation with regard to the tabulation of results.

Duration of illness is taken to include that period from the onset of the first schizophrenic symptom until the date of starting of treatment. Recurrent cases (R) are also dated from the onset of their first symptoms.

The column marked "Doses" indicated the amounts required to produce coma. Where two figures are marked, the first represents the initial coma dose and the second the final dose required.

The results are assessed, as far as possible, according to the standards mentioned above. No attempt was made to take into consideration the possibility of a relapse, and the cases were judged on their merits at the time.

EVALUATION OF RESULTS.

The results of treatment are divided into two groups. Group I cases were actually treated by Dr H. Pullar Strecker during 1936 and early 1937. It has been thought of value to publish a follow-up study in these cases, as the findings are of significance. Group II cases were all treated by the writer, and their progress has been followed closely since treatment was stopped. Forty-six cases comprise the two groups. Taking these as a whole it is found that the duration of illness varies from a few weeks to 19 years. The duration of illness is taken to include that period of time from the onset of the first symptoms until the date of starting treatment. Recurrent cases (R) are dated from the time of onset of their present illness. In this series it is indeed rare to find the duration of illness to be less than six months, which is reckoned to be the maximum duration of illness for treatment to be effective. Only nine patients were treated - one in Group I and eight in Group II - whose symptoms were of less than six months duration, and two of these were recurrent cases. Eleven patients had been ill for a period of six to eighteen months, while 26 had been ill for more than eighteen months.

Group I.

This group consists of 10 patients who were treated by Dr Strecker. It will be seen from the Table that nine were diagnosed as schizophrenic illnesses, while one was a case of depression with paranoid trends. On reading the case histories, it will be seen that many of them showed a temporary partial remission which, however, could not be recorded as this remission was not sufficient to allow the patients to return home. It is now over two years since these patients were treated. In the follow-up study, all patients could be traced except the case of depression, who showed an incomplete remission. For the rest, only three have left hospital and one has died. Of those who have left hospital, one left against medical advice and is still in the same condition as on discharge - a partial remission; one, who had shown no improvement from treatment, has recently been admitted to a mental hospital; the third patient had shown a partial remission which was maintained. He is now believed dead. The results in this group of cases are therefore poor. There are several reasons for this.

In the first place the case material was unfavourable in that the average duration of illness was four

and a quarter years. In the second place it will be seen from the tables that only three patients were given adequate treatment, in terms of shocks.

GROUP II.

This group consists of 36 patients. Of these, 31 were diagnosed as coming under the heading of the Schizophrenic type of psychosis. Four were catatonic, seven paranoid, five hebephrenic, two simple, three acute, while the remaining ten could not easily be placed in any of these headings and were therefore classed more vaguely as Schizophrenic reaction types. There was one case of paraphrenia, and one case each in the following groups:- Paranoid reaction, Depression with paranoid trends, Anxiety state in a schizoid personality, and psychopathic personality. In those cases other than the schizophrenics the numbers were small and results indifferent. Conclusions can thus not be made upon this group. With regard to the Schizophrenic cases it is found that six showed a complete remission, seven an incomplete remission, four a partial remission, while fourteen remained unimproved. Though percentages cannot be taken to mean much in such a small series, yet for the sake of clarity and comparison it may be said that the above figures represent percentages of approximately 20, 23, 13 and 44 respectively: 12 of these 31 - representing about 40% -

have been able to go home. Ten of them are working or were able to work for some months. Reference to the table will show the arrangement of the remitted and unremitted patients in respect of duration of illness.

Duration of illness	Under 6 Months	6-18 Months	Over 18 Months.	Total
Complete remission	2	2	2	20%
Incomplete remission	2	4	1	23%
Partial remission	2	0	2	13%
Unimproved	2	0	12	44%
Total	8	6	17	

Taking the six cases who have shown a complete remission, we find that they have certain features in common. In the first place we find that five of them showed depressive symptoms in addition to their schizophrenic symptoms. The affective response seemed to be rather well preserved in four of them. The prognosis without treatment would probably have been good in four out of the six.

A point of interest and importance is that five showed most of their improvement in the early stages of treatment. Case 34 returned from stupor after fourteen days of treatment with only two shocks. Case 13 was greatly improved after sixteen days with

five shocks. Case 28 was remitted by the twelfth day with six shocks; Case 16 with ten days and three shocks and Case 32 with eight days and no shocks. Case 12 alone showed no change until treatment had been continued for some considerable time - after thirty days with eighteen shocks. It would seem, therefore, that for a full remission to occur, some indication will have to be given within the first few shocks.

In the cases who showed an incomplete remission no significant observations can be made. They are a heterogeneous group and have little in common. In these cases it is of interest to note that improvement tended to occur relatively late in the course of treatment.

With the group of cases showing a partial remission it can be said that the improvement did not occur until late in the course of treatment. In the incomplete remissions the improvement was noted on the following day in eight cases - 4th, 30th, 48th, 93rd, 64th, 33rd, 14th, 36th. In the cases showing a partial remission, improvement was noted on the following days - 42nd, 42nd, 66th, 71st.

Thus it may be said that if no remission occurs before the 30th day of treatment, then a complete

remission is not probable. On the other hand, treatment should be continued, as slight improvements seem to be more common in the later stages.

Between two and fourteen months have elapsed since cessation of treatment in the completely remitted cases. All have been followed up since discharge from hospital. All but one are working and maintaining excellent health. The patient who has relapsed is Case 34 - the schizophrenic stupor. He is still at home, but unable now to continue with his work.

Among the incomplete remissions, two have relapsed completely and have returned to their former level and are in hospital. The remaining six are still out of hospital and are in much the same condition as at the time of discharge. As mentioned above, taking these two groups of patients, it will be seen that ten out of thirty-one, or nearly one third of the total, are able to leave hospital and to pursue some form of occupation.

Reference to the Table will show that, whereas many patients have slipped back who showed a partial remission, some have continued to improve after cessation of insulin treatment. It is thus difficult to assess the results of the follow-up. It can, however, be said that those who showed a complete or incomplete

remission have, in the majority of cases, maintained their improvement.

With regard to the group who have shown a partial, though usually temporary remission, six of the ten improved sufficiently to allow them to be transferred to quieter wards, and were able to do more useful work in the hospital. One such patient (Case 43), for instance, was for five years one of the worst behaved in the most acute ward. He was, after treatment, transferred to the quietest ward in the hospital and was persuaded to work in the gardens and even go to church. This is a typical example of a partial remission.

Two points must be considered in relation to the large group of patients who did not show any improvement. Seven of these did not complete the course for one reason or another. In the second place a large proportion of these were dementing, the average duration of illness being four and a half years. These patients were given treatment with little hope of success in the first place.

After reviewing these results, can it be said that Insulin Shock brings about more remissions than can be hoped for spontaneously in Schizophrenia? Before answering this question, several points must be

made clear. In the first place every endeavour has been made to arrive at a definite diagnosis in each case. A second opinion has invariably been given on the cases treated, thus reducing the possibility of personal error. In the second place the various criteria of cure have been rigidly adhered to. Where there has been the slightest doubt about a remission, the patient is placed in the next lowest category. The results, therefore, have been as conservative as possible. Thus an attempt has been made to answer two questions which are constantly being asked - "Was it really a case of Schizophrenia?" and "Did he really show a complete recovery?"

How can one, therefore, answer the first question, "Does Insulin shock bring about more remissions than can be hoped for spontaneously?" Some form of comparison is necessary. Let us consider four methods. Firstly, one can compile a large number of cases treated and compare the results in this with a similar number of untreated cases. Both series should be as nearly consecutive as possible. Secondly, one can take the individual cases in the series and classify them accurately as to age, previous personality, social position, type of breakdown and so on. A search should then be made in the records of the

hospital in order to find the most exact counterpart to each case. A comparison of each pair of cases would give an indication of the effect of treatment. This method was carried out in the Mayo Clinic by Moersch (1938) on some twenty patients, but with no conclusive results.

A third method is that adopted by Ewen Cameron (1938). A number of patients are treated with insulin in the ordinary way, and at the same time, under exactly similar conditions, the same number of patients are given injections of sterile water. Finally, one can take each individual case and endeavour to come to some prognostic conclusion about it. Treatment is then carried out. Should the result be consistently more favourable than was anticipated, then one could say that the treatment has been effective.

For the present, therefore, we are left with the last method - that of assessing the individual cases on their own merits. For instance, in the group of six complete remissions an attempt must be made to prognosticate upon each one. Can it be said that, taking into account the type of illness, its duration, the previous personality, the causes and mode of onset, these cases would have recovered in any case, or was Insulin shock responsible for the recovery, so rapid

and so complete?

The case of B.H. (13) is an example of a complete remission where the prognosis was not regarded as favourable.

One cannot help but be impressed, while treatment is progressing, by the day to day improvement in such a case and, setting aside the matter of the prognosis altogether, it is hard to believe that a patient should recover so completely in such a short space of time. That it should occur in a case in which the prognosis is not good is assuredly impressive.

This case can be said to be typical of the sort of improvement one sees during Insulin shock.

From this I think that one can say with no hesitation that Insulin shock does constitute an advance in the treatment of Schizophrenia. Can one add, however, that it is a practicable proposition from the economic and administrative point of view, when one considers the length of treatment in terms of hours, and the comparatively small number of remissions? One might say that any amount of time and expense is worth while if a few more recoveries could be guaranteed. Certain modifications might be made, however, which would tend to make the treatment more simple and effective.

In the first place, the cases should be selected; only recent admissions should be taken. There seems to be little prospect of improvement in long-standing cases. Among those recent admissions precedence should be given to the paranoid, the simplex, and the depressive types, regardless of prognosis as generally accepted.

In the second place, the modifications in technique, with the reduction in the Introductory Phase, use of charts, induction of less severe comas and such like, should be adopted so that the routine work of the hospital is little interfered with, and the course carried out with the utmost despatch.

Any special biochemical or other investigation is a matter of choice. No special investigations seem to be necessary as adjuvants to treatment.

Thus we have a more or less modified insulin treatment, which is carried out in selected cases. I am confident that this is both a beneficial and practicable method of treatment in Schizophrenia, and one which has come to stay, constituting as it does, a definite, though perhaps limited advance in the therapeutics of the psychoses.

Opinions generally are still inconclusive, but it is certain that the first wave of enthusiasm, which is

the accompaniment of all new forms of treatment, has died down. Nevertheless, further research into the nature of this most mystifying disease has been stimulated and this, in itself, is of undoubted value.

S U M M A R Y.

1. An historical introduction to the treatment of insanity is outlined. The development of the hypoglycaemic treatment is traced.
2. The case material reviewed in this thesis consists of 46 patients. Case summaries are included and are divided into two groups - Group I treated by Dr Strecker, and Group II treated by the writer. Of these, 40 were diagnosed as suffering from schizophrenia.
3. An account of the treatment is given in detail. The symptomatology is described at length, particular reference being made to the definition of coma. An account is given of the blood sugar changes, together with a table. A relationship between coma and blood sugar was found, namely, that for coma to be produced a mean fall of 80% was necessary and that the more rapid the fall

the deeper the coma. The onset of coma seemed to coincide with an acceleration of the pulse and a raised blood pressure. This is recorded graphically.

4. The management of hypoglycaemia has been discussed and certain points in technique have been emphasised. The difficulties and dangers have been enumerated, and their prophylaxis and treatment discussed. These undesirable phenomena are rare and usually avoidable.
5. The effects of hypoglycaemia upon the individual have been reviewed. It is considered that there is ample physiological foundation for this treatment in schizophrenia. The mental effects have been considered. Periods of lucidity are discussed and related to the fugue states of diabetics. The undoubted sedative effect of treatment in many cases is made clear.
6. Three types of remission are defined - complete, incomplete and partial. Two Tables of results are given.
7. In the evaluation of results the two groups of cases are dealt with separately. The poor

results in Group I are attributed to the unsatisfactory case material, and to the inadequate treatment in many of them. It is considered that the results of treatment in Group II, though perhaps not so satisfactory as might have been hoped, are undoubtedly better than in spontaneous remissions.

8. Insulin treatment is looked upon, not as a method of treatment in itself, but as an important psycho-biological factor which, used in conjunction with other methods of treatment such as psychotherapy and occupational therapy, seems to accelerate the process of recovery - and make this more complete - in essentially recoverable cases.
 9. With the modified technique described, it is maintained that treatment can be carried out in the normal hospital routine with no great difficulty or undue expenditure of time and money.
-

GROUP I.Case 1. (F.B.)

A single man aged 33, a lithographer, was admitted to West House on 2nd October, 1936.

A maternal grandmother and a maternal aunt had been in mental hospitals.

Until the age of 23 he was in good health. He was cheerful, affable and full of fun. He was clever at school and at evening classes. He was inclined to mix with the wrong type, and started drinking when quite young while in their company. Eight years before admission he started to complain of frontal headaches, he was unsettled at his work, could not make up his mind on simple things, and became wayward in his habits. He continued in this state until four years before admission when he started to drink fairly heavily, gambling, and losing a lot of money. He seemed to have no conscience about his behaviour. During the few months before admission he began to be unsettled and sleepless. He thought that he was being followed by the police, and misinterpreted every sound he heard. At times he became agitated, and incoherent in his speech. He felt that his personality had changed, and said that his name was no longer Barr but Middlemass.

On admission he was apathetic and at times almost euphoric, though protesting that he was depressed. He said that his eyes were swollen up, that his cigarettes were being poisoned by opium, that his name was McColl, and that he was a joiner. He admitted to hearing "whispering and music", especially at night. His answers to questions were often irrelevant. There was no sense of responsibility. He did not appreciate his position, and saw no reason why he should ever work again.

He was given a short course on Insulin treatment, but resented it so much that it had to be stopped. In all he had ten days of treatment with no comas. The highest dose reached was 70 units. No improvement of any kind was noted. The course lasted from 17th December till 1st January, 1937.

On 19th May, 1937, he was discharged, against

medical advice, having continued with his vaguely paranoid state, with occasional hallucinations and with persistence of his delusions that he was being chased by police and that he was being poisoned.

DIAGNOSIS: Schizophrenic Reaction Type.

RESULT: No improvement: inadequate treatment.

Case 2. (R.R.)

A single man, aged 26, was admitted to Jordanburn Nerve Hospital in November, 1933. There had been a previous admission to West House in 1931 for a fortnight.

There was a vague history of nervousness on the paternal side, but no obvious psychotic history. Patient was a healthy child and progressed normally at school. At the age of 16 he became an insurance clerk. He had always enjoyed good health, and was fond of sport. He was bright, lively and cheerful, sociable, seemed to like his work, was not shy, went to many dances and had numerous girl friends.

In 1931, at the age of 24, it was noticed that he was becoming more over-bearing and insolent to his parents. He would not mix with his family and insisted on eating alone. At work he had differences with his superiors and resented correction. He stopped playing golf, was lacking in sustained interest and enthusiasm; mannerisms became apparent, and on occasions he took up attitudes in which he seemed to be listening. He resented interference very much on these occasions. He was admitted to West House for a fortnight and then went home, but has not worked since. His insolent attitude continued, he complained of the way his family ate their food, grumbled about the dishes, was rude to his mother and sister. He spent

the day walking about alone or sitting in the house brooding and day-dreaming. He was admitted to Jordanburn in November 1933, and there showed no improvement. His habits were at times disgusting. He would spit in his handkerchief and then put it in his mouth, much to the annoyance of other patients who were looking on. He developed delusions about the other patients insulting him. He was auditorily hallucinated. Intellectually he was well preserved. He returned home and there was certified and admitted to Craig House in 1938. While at home he had become shameless in his behaviour, going about the house wearing his pyjamas and handling his genitalia in front of his mother and sister. He continued to be very insolent and over-bearing in his attitude.

While in Craig House his behaviour remained very much the same. He developed, in addition, various bodily delusions. He felt that his body was blown out, and that his mind was "jammed". The predominant mood was apathy. Mannerisms and hallucinations were features of the illness throughout. His paranoid reaction to his family was transferred to the medical and nursing staff, whom he accused of various offences from time to time.

Insulin treatment was started on 3rd November, 1936, and stopped after twenty-two days of treatment on 4th January 1937. The patient strongly objected to the treatment, and refused to continue with it. No improvement was noticed. He had no comas at all.

Since that date the patient has adapted himself rather better. He is now working in the cashier's office and does his work with some efficiency. He is apathetic and inclined to lack sustained interest, quickly giving up when his enthusiasm flags. He has no sense of responsibility, and is still resentful and suspicious in his attitude.

DIAGNOSIS: Paranoid Schizophrenic.

RESULT: No improvement but with inadequate treatment.

Case 3. (J.H.)

A single man, aged 23, a clerk, was admitted on 9th March 1936.

He was the second youngest in a working-class family of six. His early life was marked by no important event. His school career was average, though he was particularly good at mathematics. At home he did not seem to fit in with the other members of the family, and looked forward to the time that he should be away on his own. He tended to be shy and secretive, lacking in enthusiasm and interest in life. He felt that he could never get on with his fellows. In company he was sensitive, often thinking that other people talked about him. He was never practical, preferring to day-dream rather than to apply himself to the situation in hand. This made him changeable in his thoughts and feelings. He took little or no interest in girls, though he did not go about with many boy friends either.

The onset of his illness was characterised by worries over masturbation, for which he sought the advice of his doctor. By this time he had left school and was employed in a shipyard as a clerk. He could not concentrate and started to worry over his duties. His work began to deteriorate, and he paid little attention to what he was doing. At home he was seen to talk to himself and perhaps laugh in a silly manner. His actions were foolish. He would suddenly stand up and walk about the house for no reason. Often he used to say to himself that he was "daft". These changes were first noticed three months before admission.

On admission he presented a varying picture. At times he was cheerful, almost euphoric, with no complaints. At other times he was depressed and retarded. At all times he was withdrawn and preoccupied, standing in a corner for long periods. He would be seen to mutter to himself in answer to hallucinations. He resented interference at all times, and became upset when questioned too deeply. At times he was quite suspicious. After a brief period of apparent improvement he suddenly became more disturbed and one day impulsively pushed his head through a window-pane, giving no explanation for this.

Immediately after this he became stuporose, resistive, and inaccessible, trembling all over. He again improved, was able to converse rationally, to play games, and to display normal interest and effective tone. On 2nd September, 1936, insulin treatment was begun. He was still in fairly good health at that time. After seventy-three days of treatment, during which time he had seven comas, with a maximum dose of 170 units, treatment was stopped on 7th January 1937. The improvement noted at the beginning of treatment was maintained. He was accordingly discharged on the 9th January 1937. In April 1937 he was re-admitted in much the same condition as on the first admission. He had remained well for about two months. From that time until the present the course of the illness has been variable, with brief periods of remission. In June 1938 he was again discharged but was re-admitted after three weeks. His present condition is rather more disordered. He has developed various hypochondriacal and bizarre delusions. He feels that his body is being eaten up and that his bowels are "in a dreadful state". He has feelings of influence, is suspicious, and at times threatening, though never violent. He talks to himself, laughs and often cries to himself, but will immediately stop when someone approaches and then denies the whole incident. He is apathetic. It is of interest that this patient shows periodic remissions, when he can come up to a good enough level to be discharged for a time. Insulin treatment no doubt corresponded to one of his spontaneous remissions.

DIAGNOSIS: Hebephrenia.

RESULT: Temporary partial remission.

Case 4. (D.J.)

A single man aged 26, a farm labourer, was admitted in June 1936. His father had been in West House three years before with an attack of depression, but had recovered. His mother has been in a Mental Home for twelve years. A grandfather died in a Mental Hospital. An uncle had periodic attacks of mental illness.

His early life was not healthy, as father and mother were both abnormal. At the age of 14 his mother, after trying to strangle her youngest child, was taken to a mental hospital. At school he was moderately clever, and was fond of the company of both boys and girls. When he left school he became a farm labourer near his own home. He did not take his work seriously, though he was never lazy. He went to dances and had many affairs with girls, but not becoming serious with any of them. He did not seem to have any worries as a young man, nor was he upset by the thought that his mother was in a mental hospital. Normally he was very cheerful and full of life, though rather quiet. He was always polite.

For about a year before admission a change had been noticed in the patient. He became duller and careless about his clothes. He complained of feeling easily tired. He began to worry over things, such as his work, and the fact that his mother and father were mentally ill, and his love affairs. A month before admission he was rejected by a girl of whom he was very fond. Soon after this, while cleaning the byre one morning, he felt "queer", as though everything were swimming around him. The farmer found him leaning against a wall, holding his stomach, as though in pain. He went to lie down in his room, but could not settle because he thought he heard a gun going off outside his door. He went out to see, and found a gun lying in a corner. It seemed to have a continuous stream of clear steel rods, like needles, rushing out of it. He hung a white sheet over it. The next day he felt sick and could not walk. He staggered against furniture like a drunk man. He felt that the colours had left the walls and were coming towards him. He went off his food and could not sleep at nights. Often he would smile to himself, but would scarcely answer questions and could give no

clear account of himself. He would often roll on the floor, explaining that everything was going round, and that he had crackling in his ears. After this he went into a stupor, taking no interest in anything. He could not understand simple questions; for long periods he would sleep and dose.

At the age of 5 he is believed to have taken fits. At 14 he took a "fainting turn", when he lost consciousness for a few minutes. He had two other such attacks at the age of 20 and 21. He was threatened with appendicitis at 25.

On admission he was dull, apathetic and unresponsive. He could not be persuaded to take his meals. Shortly after this he became restless and uncontrollable. He would not remain in bed. He lacked interest in his surroundings, and would do nothing for himself. His talk was slow and sometimes irrelevant. He would often smile to himself, and was preoccupied.

Insulin treatment was begun on 10th September. At that time he was in a state of stupor. There was no great resistiveness, though at times he refused food. He seemed to be preoccupied and would often behave in an unpredictable manner, laughing and muttering to himself. After sixty-two injections, treatment was stopped on 7th January 1937. During treatment he showed a marked improvement. He could converse freely, and gave an excellent summary of his illness, though lacking somewhat in insight. He was able to work diligently, and well. He said that he felt clearer in the head, and had no strange ideas at all. Occasionally he felt dull. Throughout treatment he was given sub-shock doses.

Within a month his condition had returned to one of apathy and preoccupation with dreams. He is untidy, takes no interest in the outside world, must be persuaded to work and appears, in spite of his position, to be happy and contented. A few months ago he made a spontaneous improvement which lasted for three weeks. At this time he came up to a similar level to that obtained through the insulin treatment.

The diagnosis is one of schizophrenic stupor, though there are undoubtedly manic-depressive elements in the case, both in the pre-psychotic personality and

in the content of the psychosis.

DIAGNOSIS: Schizophrenic, Reaction type.

RESULT: Temporary partial remission.

Case 5. (J.D.M.)

A school boy aged 17, admitted in February 1935. He was the youngest in a family of three brothers. Shortly after his admission the middle brother developed a similar illness.

His early life was normal. At school he was clever, being best at arithmetic. He differed from his other brothers in being more reserved, refused to be pampered and did not speak out his mind. In company he was sociable and was a favourite with many people because of his quiet politeness. He was his father's favourite. His interest in girls was healthy. He was keen on sport and got his colours for both Rugby and Cricket. In infancy he had whooping-cough with fits. Later he had measles. At the age of four his head was split, requiring many stitches.

In September 1933, while training for the school sports, he had a severe injury to his foot. He was thought to be depressed on this account. Six weeks later he went with his mother to the cinema, where they saw what she described as a "fiendish war picture". While at tea afterwards he seemed to crumple up in a faint and almost fell under the table. He recovered quickly and was better for a week or so. Then he was brought home from school, having had a fit of terrible shivering and with collapse. He was in bed for a fortnight and was depressed. He would not read at all, he ate very little and slept only with the aid of drugs. For four months he was off school. His mother nursed him at home until he went to the country

to convalesce. He returned to school, but was discontented. He was anxious to leave and follow his father's profession as an engineer. His father would not allow this. The intention was that he should be a lawyer. For about a month he took part in all the school activities, and settled down to his work. Then he began to worry over his arithmetic, a subject that had never previously given him any difficulty. He spent many hours at home at night trying to work, but could not concentrate. His depression became worse until he went into a sort of stupor. He was kept off school. The doctor was brought in to see him, and while he (the doctor) was opening his bag the patient, who was sitting in a chair, kicked out his foot suddenly and hit the doctor. Thereafter he was sent to a private home, but did not improve. After three months he came home. By this time his manners were bad, he would only use a spoon at meal times; he could not dress himself tidily, and he had angry outbreaks when his mother reproved him for smoking too much. For the next six months his condition remained much the same. His mother tried to keep him at home, but eventually had to give up as he became too unruly, aggressive and irritable. During the week before admission he was quite inaccessible, answering no questions and resisting commands. He was at times incontinent of urine, and masturbated without any pretence at secrecy. According to his father, the patient had confided in him that he had worried over masturbation since September 1933.

On admission he was unpredictable in his behaviour. His movements were jerky and impulsive. Occasionally he was irritable and would strike out with no provocation. He laughed often with no apparent cause. His conversation was disjointed, consisting of short runs with long pauses. Answers were often irrelevant. He was disorientated for place and persons. He would not co-operate in any tests, and lacked power of attention. After a month he became more docile and adapted himself to hospital life. He worked in the handicraft class. Then he had another impulsive outburst, when he hit a nurse with a chair. During the next year he continued to show these changes in behaviour. At times he was quiet, amiable, contented, almost affectionate. At other times, he was aggressive, violent and resistive. At all times he was inaccessible. For a time he had to be tube fed. There was no deterioration, the patient returning to a

fairly good level after each attack.

In June 1936 Insulin treatment was started. After 104 days in which he had sixty-two shocks, including one fit, treatment was stopped on 16th October 1936. The highest dose was 100 units. During this period of treatment he became very much more accessible, but did not speak much of his illness, displaying little insight. He was able to work better, both in the gardens and in the occupational class. He went out with his relatives frequently. His emotional response was more harmonious; he laughed and talked naturally. On one occasion he had an "after-shock" and did not return to consciousness for twelve hours. After treatment stopped, however, he quickly reverted to his original level.

For a year he remained in hospital, showing no basic changes in his condition. At times he was subject to aggressive and impulsive behaviour. He became withdrawn, and preoccupied. At other times he was well enough to go out with his relatives. A slight change was noted a month or so before he was discharged. Seeing this, and in an endeavour to give him a further chance, his mother requested that he should leave hospital. He went to stay on a farm, where he was supervised by a private nurse.

No change at all has been noted since his discharge.

DIAGNOSIS: Schizophrenic, Reaction type.

RESULT: No improvement.

Case 6. (J.G.)

A single male aged 28, a painter, was admitted in May 1935. Family history was negative.

This man had lived in Langholm all his life except for six months in London a few years ago. His early life was uneventful. He went to school from the age of 5 till 14; then he became apprenticed to a painter. After this he went into his uncle's shop and had been working there until he was taken ill. He was always regarded as a quiet person, never ready with an answer. He was reticent and undemonstrative. He was a capable and energetic painter. His main interest, apart from work, was in horses. In the town he was a popular figure, although he never took up much with girls. A few years ago he was elected the Cornet for the town - a high honour. Physically he had been in good health except for blood-poisoning and double wrist drop, contracted through his work.

A few months before admission he was noticed to be careless in his work and difficult to deal with. He seemed to lack concentration, forgetting simple orders, and becoming preoccupied with day-dreams. A fortnight before he came in, he hit out at a barman for no reason; soon after this in a barber's shop he got up and slapped a customer. He himself was much puzzled by these impulsive outbursts. This was quite foreign to his personality. After this he had another violent outburst in his home, throwing the furniture about. He soon quietened down, but could give no reason for his behaviour; everything seemed to puzzle him. He felt strange and different. He believed that he was hypnotised, and that his thoughts were being intercepted by telepathy.

He was found, on admission, to be placid, quiet and well-behaved. His answers to questions were usually evasive and circumlocutory, with perseveration of such phrases as "I'm quite all right yes, yes, thank you". His thinking was disordered. Visual and auditory hallucinations were admitted to. The voices were usually obscene and had a sexual flavour. They insulted him, and he said he boiled up until he had to find an outlet. This was why he had a broken temper. He settled down complacently in hospital for

about three months. He then began to complain that his doctor had neglected him. He thought that he had syphilis, probably transmitted from his parents, and was abusive towards them. Soon after this he suddenly smashed one of the bed screens, giving no explanation for this. Again he settled down, was well-behaved, played golf and tennis and went out into the town. Once he tried to go home. He was brought back from the station, but showed no resentment at this. By June 1936 his condition was no better. He was for the most part quiet, almost secretive, preoccupied, and harbouring several delusions of persecution about people at his home. At times, with no warning, he was subject to impulsive outbreaks of violence; these died down quickly. He never showed remorse, nor could he give an explanation for them.

Insulin treatment was started on 22nd June 1936 and stopped on 17th December, 1936. He was given fifty-eight days of treatment and, although a dose of 270 units was reached, no comas resulted. No improvement occurred during the course. His condition showed the same cycle of changes until the 28th December, 1937, when he was discharged on his parents' request. He is now in Crichton Royal Mental Hospital.

DIAGNOSIS: CATATONIA.

RESULT: No improvement.

Case 7. (J.H.)

A single man aged 30, a bank clerk, was admitted to Royal Edinburgh Hospital in March 1936. There was no history of mental illness in the family, though his mother and siblings were described as highly-strung and excitable.

His early life was uneventful. He went through school as an average pupil. Though he played football and other games he was not interested in sport. He enjoyed his studies, which he took very seriously. Before examinations he used to become excited and fearful in case he should fail, though this fear was groundless. On leaving school he went to night classes and passed the entrance examinations for the bank. Here again he took his work seriously and would find he had to do all calculations twice over to make sure they were correct. Before any important event he used to be troubled with frequency of micturition. He served four years apprenticeship and then broke down. He felt that he had spent too much money on a holiday. After four and a half months leave, he returned to his work but was discontented. To overcome his extravagance he went to the other extreme and was miserly. He applied twice for a transfer to another bank, complaining that his colleagues were up against him and that the agent was a slave driver, which was not true. He was given to sulking and peevishness on slight provocation.

Six months before admission he complained of loss of concentration. He felt that work was too much for him and that other people were criticising him. He could not make friends at all and this made him depressed and unhappy. He lost sleep and went off his food; interest began to flag; masturbation was a constant worry to him; life had lost its appeal for him. He became hypochondriacal; at times he wished himself dead. As he could carry on no longer he left the bank altogether. He returned to his home but did not improve. At times, for little or no reason, he would become irritable, even striking out at his brother; any insult was unbearable to him. At times he was uncontrollable.

On admission he gave the appearance of a healthy man, well-built, and of ruddy complexion. He felt

that he should have more attention than the other patients and kept up a complaining attitude in regard to his treatment. He showed evidence of retardation of movement, being undecided about what to do next. His talk, though diffident, was rational and relevant. He was mildly depressed and felt that his case was hopeless, as he had already been given several chances to recover and had taken none of them. The mood, however, was harmonious with his hypochondriacal thoughts; with these he was much preoccupied. He complained of a strange sensation in his stomach, and a feeling of stiffness in his neck. Ideas of reference were also present. There were no hallucinations. His general attitude towards his illness was one of hopelessness, and towards other people he was peevish, irritable and complaining. He had little insight into his condition. His case was diagnosed as a depression, with paranoid trends appearing in a schizoid personality. Physical examination revealed no basis for his strange sensations.

At his own request insulin treatment was begun on 25th May 1936 and stopped on 25th June. He was given 21 days of treatment, with no shocks. The highest dose given was 55 units. Though his stomach sensations were undoubtedly diminished, there was no real improvement. He continued to have the feelings in his head, and was much preoccupied by his position. At his own desire he was discharged relieved, on 29th June, 1936.

DIAGNOSIS: Mental Depression with Paranoid Trends.

RESULT: Incomplete remission.

Case 8. (J.S.)

A single man, aged 25, was admitted to the Royal Edinburgh Hospital in June 1935.

Both the paternal and maternal side showed mental tainting. The maternal grandmother died in a mental hospital of senile dementia. The father broke down at the age of 64 over his business, and was incoherent and childish until he died six months later. One brother has recently developed a schizophrenic illness.

Patient was the youngest in a family of four. His home life was reasonably happy when he was young. At school he was a good average. By nature he was placid, even-tempered, shy and sensitive. He would take a long time to get to know people, but was tenacious in the friendships he made. His favourite hobby was wireless. He was so keen on this that he had to be dragged away from it to his meals. He took little interest in girls, preferred men's company and was not given to smoking or drinking. He preferred to lead a monastic and introspective life.

On leaving school he tried various jobs, particularly in wireless or farming. He did not make a success in either. He was not a good salesman. During the six months before admission, he was unemployed and lived at home with his mother. His father had died six years previously and had left the family in straitened circumstances. For this reason patient's education had never really been completed, as his mother would have liked. He had no special training.

A month before he came into hospital he refused to go out alone, was afraid to meet people and imagined that they were laughing at him for being at home with his mother. Three weeks later he started to talk incoherently, shaking his head from side to side continuously. Most of his talk referred to his dead father, of whom he had been very fond. He refused food, waving it away in a grandiose manner when it was given to him. He was sleepless and restless at night. On the morning of admission he leaped out of bed impulsively and hurled a basin through the window.

After admission he became stuporose, staring in

front of him, his limbs flaccid. He had retention of urine. He was mute and negativistic. During the next month he improved sufficiently to answer questions in monosyllables, though keeping the same fixed attitude for long periods. At times he was resistive. There was evidence of preoccupation. In January 1936 he was described as exhibiting two phases in his conduct - at times he sat with head bent and hands together completely withdrawn, apathetic and inaccessible; at other times he stood erect or marched up and down the ward with great energy. When interfered with he became impulsively violent. His active behaviour corresponded with auditory hallucinosis. On two occasions he fainted, and was kept in bed for a few weeks. Often he muttered to himself, and struck attitudes.

In March 1936 Insulin treatment was started. He was given sixty-four days of treatment, with nineteen shocks, including one epileptic seizure. The patient responded well to treatment as it progressed, and gradually became more in touch with reality and more responsive to anyone who talked to him. He took part in games and worked in the poultry farm for a fortnight. Treatment was stopped on 15th June 1936 but his improvement was not maintained. Within a week he had returned to his former state.

During the past two years he has steadily deteriorated. His dress is untidy, his habits are dirty, he has no interest in the outside world. He lives in a state of day-dreaming. He adopts statuesque attitudes, or walks about the ward in a robot-like manner. He draws imaginary pictures with his hands on an imaginary easel set in front of him. His talk is disconnected and erratic. He says that he is quite happy. Occasionally he is impulsive towards the other patients and the staff. He does not realise the nature of his actions. He has no feelings of remorse after these attacks, which die down as quickly as they appear. He is actively hallucinated.

DIAGNOSIS: Hebeephrenia.

RESULT: Partial temporary improvement.

Case 9. (F.McG.)

A single man, aged 24, a recent medical graduate, at the time of admission to Jordanburn in January 1933.

He had always been rather reserved, well-behaved, obedient. At school he was smart in his studies and took a keen interest in sport - golf, football and walking. He was particularly interested in oil painting, showing some proficiency in this. In 1927 he entered Edinburgh University to study medicine. Here he was conscientious, earnest and scrupulous in his work and took little advantage of the vacations except to pursue his studies. He graduated in 1932, thereafter taking resident posts in three hospitals in England. It was while in the Sick Children's Hospital in Birkenhead that he broke down, about six weeks before he was admitted to Jordanburn. He had been over-working to such an extent that he had little time or patience for any other interests. One day he rather suddenly became dazed and incoherent in his speech. He appeared to be utterly exhausted. He was taken home but while there he became restless, talkative, sometimes abusive, resistive and refusing food.

On admission he was restless and both exhausted and under-nourished. His conversation was confused, blasphemous and obscene, and he expressed fleeting delusions of a fantastic nature. When asked questions he would stare at the questioner in a bewildered and uncomprehending manner. After a month in hospital, during which time he seemed to improve, he became impulsive in his behaviour, noisy and abusive, striking out at the nurses and making sexual advances to them. He talked much about sexual neurasthenia and masturbation, which he declared was the cause of all his trouble. In May 1934 he was certified and admitted to the Royal Edinburgh Hospital. He continued to be impulsive and to talk in an obscene manner. When not excited and over-talkative he remained dull and apathetic. He was auditorily hallucinated, declaring repeatedly that he could hear his mother speaking to him. He did not show any insight into his condition, nor did he seem to be upset by the fact that he was now a patient in the very hospital where, three years previously, he had been an assistant. During the

next two years he showed a steady deterioration, becoming slovenly, disinterested, and faulty in his habits. He could not take any interest in the occupational class, or any of the other activities of hospital life. Periodically he was impulsive and on one occasion badly injured an attendant.

Insulin treatment was begun on 17th March 1936, and stopped on 15th June 1936. During that time he was given sixty-one days of treatment, with twenty-seven shocks. He had one epileptic fit. At the end of treatment he showed no change, apart from a slight improvement in his behaviour, becoming quieter and more co-operative.

Since that time he has steadily deteriorated. A course of Cardiazol treatment carried out recently has had no beneficial effect whatever.

DIAGNOSIS: Hebephrenia.

RESULT: No improvement.

Case 10. (H.McL.)

A single man, 30 years old at the time of admission in September 1933, having been transferred from Royal Mental Hospital, Glasgow, where he was admitted in August 1932.

A paternal grandmother was in Murthly Asylum for some time, but recovered.

Until the age of 14 he was in good physical health. He had always been quiet, studious, and lacking in "devil". He was clever at school and at 14 was dux of his class. Bed-wetting was present over a long period of his youth. At 15 he developed a "nervous breakdown". He suffered from palpitation, breathlessness, weakness and lethargy. At 17 he started in the

Art School. He did well and remained happy for the first part of his course. In his last year he felt the work too much for him and did not get on well with his teachers. He then went to a training college for teachers, but here again he felt the strain too much for him. He failed twice to secure his diploma. For some months after this he was unemployed and then he took a job selling brushes on commission. After a year at this he spent a year as a coach painter. By this time (1929) he was 26 years old. He remained more or less unemployed until, in January 1932, he obtained a teaching post, which he was able to keep for just six months. He could not keep the children in order, and following a bad report by his Headmaster, he was discharged in July 1932.

A week before admission to Glasgow Royal Mental Hospital he attempted suicide by drowning. Throughout the previous year he had been depressed, and had many sexual difficulties and worries. He had practised masturbation since he was 16, having intense feelings of guilt about it, imagining that others could see evidence of the habit. He had felt that he should engage the services of a prostitute. He thought that if he had normal sexual relations his troubles would be solved. He became preoccupied with these thoughts to the exclusion of ordinary interests. He was advised against this step, became very upset and attempted suicide by drowning. After this he was admitted to Glasgow Mental Hospital. At that time he was depressed and retarded, was auditorily hallucinated and felt that he was being influenced by electricity. His behaviour was at times impulsive. In April 1933 he escaped, but was brought back by his father. In July 1933 he injured himself by cutting his wrist with a razor. He remained in the same depressed condition, with hallucinations, and was transferred to West House in September 1933. In November he became disturbed, struck out at the attendants, and strongly resented any interference. He believed that the whole world was against him; that people were poisoning his brain and that ideas were being transmitted to him by wireless; that the devil was in possession of his mind. In January 1935 his condition had again changed. He was once more apathetic and felt the world was becoming more and more dead to him. From this time on a feature of his illness was his listlessness. He preferred to lie in bed all day. In March, 1936, Insulin treatment was begun. He was given 31 hypoglycaemias with five shocks. He hated

the treatment so much that it had to be stopped. The highest dose was 170 units. His main reactions during hypoglycaemia were psychomotor. No improvement was noted at any time throughout the course. Throughout 1937 there was a slight improvement mentally. He took a little interest in his surroundings, read innumerable books, went out in the town, played games. During the latter part of 1937 he began to lose weight, complained of fatigue on the least exertion, and was coughing frequently. Radiological examination in January, 1938, revealed an extensive T.B. involvement of both apices with cavitation. His heart was very small. The condition had been present in a quiescent state probably since the age of 15. It is possible that the Insulin treatment served to awaken the condition. In July 1938 he died, having shown no further change in his mental condition.

DIAGNOSIS: Schizophrenic Reaction Type.

RESULT: No improvement.

GROUP II.

Case 11. (L.P.)

A civil engineer, aged 36, was admitted to Jordanburn Nerve Hospital on 18th March 1938.

There was no history of mental illness or abnormality in the family.

The patient's early life was quite normal. He was a bright and intelligent child, and on leaving school he went to the University of Edinburgh to study engineering. He worked hard at his classes and did not have any other interests but his work. He was always quiet and reserved, having few friends and no intimates, even among his family. After graduating B.Sc., he went to Canada and later to New Zealand, as the prospects in this country were very poor. While abroad he contracted gonorrhoea on two occasions and was quite cured. He admitted to being "pretty desperate" about the fact that he had gonorrhoea.

While in New Zealand he used to drink fairly heavily. He felt that he was always up against difficulties, and had a constant struggle to obtain and maintain a situation. He was married in 1929 and now has three children. The marriage has not been a great success and he felt that he had merely made his problems greater. He admitted to being sensitive, easily hurt, excitable, and subject to fits of depression, perhaps reading insults where none were meant.

The illness started in January 1937, when he began to think that his colleagues were passing rude remarks about him. He developed a cough and later thought that everyone he met coughed at him in return. He had been under the impression at the time that he was to have had a rise in his salary. He maintained that he had been given a direct hint about it. He worked very hard for this and then he learned that no rise was ever intended. He became more depressed and imagined that almost everyone was against him, and making insinuations about his morals. He was admitted to a mental hospital in New Zealand for a month. While there, he admitted hearing voices speaking to him and said that his mind was being influenced by telepathy. He returned home to this country but, being no better, was admitted to Jordanburn.

On admission he gave the above history but appeared to be guarded and evasive about the details of his thought content. His behaviour was in every way normal while he was in hospital, though his brother said that while at home he had been irritable, and at times insulting in his remarks, accusing his brother of putting out his tongue at him. At a later date he revealed that he had been hearing voices almost continually, that they occurred mostly at night and that they were telepathic communications from New Zealand. They were mostly men's voices. Often he would speak back to them, and might laugh and joke with them because he realised that what they said was ridiculous. Occasionally the voices accused him of immoral conduct. In spite of this gross disorder he remained externally calm and polite, and appeared to be unimpressed with the gravity of his position. While he was in hospital his wife made arrangements to go back to New Zealand with the children, and he was heard to remark that "They will never leave the country if I can help it".

Insulin treatment was begun on 23rd August 1938. Throughout the course there was no apparent improvement.

After sixty-two days, during which he was given thirty-one shocks, treatment was stopped. At times the voices would become more faint and he might temporarily accept explanations that they were subjective phenomena. Then they would return, and he would take up his previous attitude to them. When they were most insistent he would be rather depressed. On one occasion after a severe shock he ran a slight temperature. Before the onset of the fever he was particularly troubled with the voices and was at the same time visually hallucinated. He had very vivid pictures of weird things - animals, distorted elephants, plants and ugly things.

This case demonstrates the fact that even in cases with a relatively good prognosis one cannot be certain that Insulin will have an effect.

DIAGNOSIS: Paranoid Reaction.

RESULT: No improvement.

Case 12. (H.C.)

A shop-keeper's agent, aged 25, was admitted to West House as a voluntary patient on 20th August 1938.

The patient was the fourth in a family of eight. The father had died after a short illness which "affected his brain" at the age of 37. Most of the family, including the father, were described as unusual, highly-strung, artistic rather than practical.

From an early age the patient was a quiet, serious, studious person, preferring to read books than go into company. He was ambitious and day-dreaming, not content with his rather humble position in life. He was not usually subject to mood swings. When he was aged five a woman made a sexual assault on him; this incident was given much prominence at home at the time and

much upset the patient. After his father died, when he was nine, the family were in straitened circumstances. He had to help to keep the home by becoming an errand boy. He was particularly fond of his mother and did not take any interest in girls all his life. He left school at the age of 15, having proved himself a good scholar though not fond of games or the company of other boys. He became a butcher's assistant. Later he started a small business of his own as a shopkeeper's agent. He was quite successful until the Depression in 1932, after which the business gradually failed. He got into debt and tried to redeem himself by borrowing money. Then he took up studies with the hope of becoming a lay preacher in the Church. He worked all day and studied until late at night. He was very fond of reading abstruse works on philosophy, theology and the like.

His illness was precipitated quite suddenly, about a month before admission. One of his brothers got married and left the patient to look after his mother and the home. This withdrawal of financial support from the home imposed a great strain upon the patient. He became depressed and could not stop thinking about a remark that was made that his family had an hereditary mental taint. He was sleepless and depressed, and worked harder and studied more in an attempt to ward it off. Then he became elated and very talkative, and imagined that he was an important personage. He said he was a genius or that he was the bastard son of Prince Albert. Later he began to suspect that he was being spied upon, and that there were plots afoot to assassinate him. Then he thought that he had Royal Syphilis, that his excreta were contaminating the drains of Edinburgh and that he should take steps at once to inform the Lord Provost. All this time he remained in a state of agitation and elation, and seemed to have lost his feelings of depression. His family could not stop him talking, and often he would deliver lectures to them on theology or philosophy, most of which were unintelligible.

On admission, he appeared to be outwardly calm and polite, perfectly orientated and in touch with his surroundings. Later, he became garrulous, but only if someone were present to hear him. He recounted many of the above experiences and went on to say that he was a great intellect and that the writings of all great men were originating in his mind. They were his mediums. He believed that he could speak to the

King and other great men by telepathy. He spoke in a stilted, sententious manner though at times he became quite unintelligible, even incoherent. At times he showed slight insight, became calmer, depressed and explained his present position on the basis of his various misfortunes.

Insulin treatment was begun on 30th September. He had shown no change in his condition, except that he became rather more quiet, expressing various ideas of influence, that other patients were hypnotising him and so on.

No change was noted until the thirty-first day of treatment (14th November), when he suddenly declared that he felt much better and that his previous thoughts were quite imaginary. He had full insight into his various delusionary ideas and could laugh heartily over the conviction he had that he was the bastard son of Albert. He accepted explanations and reassurances readily, and seemed to be able to take up a relatively detached attitude to his illness. A striking feature of the case was the return of a normal affective response. The elation had given place to a state of calmness and responsiveness. His interests and enthusiasm for work returned. After forty-three days of treatment, during which the patient was given thirty-one shocks, the course was terminated on 5th December 1938.

He was discharged recovered on 8th March 1939.

This case presents many features of the manic-depressive psychosis; of particular importance was the sudden onset of the illness, the appropriate mood, and the contact with reality. The previous personality was well enough integrated, although undoubtedly of the schizoid type. This seems to be the sort of case that most readily responds to treatment. The total duration of his illness was four months. It is unlikely that a spontaneous remission would have occurred so soon or so suddenly.

DIAGNOSIS: Schizophrenic Reaction type.

RESULT: Complete Remission.

Case 13. (B.H.)

A man of 24, was admitted to West House in March 1938. The duration of his illness before admission was about two years. He worked with his father in an ironmongery business. There was a history of insanity in a paternal uncle and a paternal cousin.

The patient's previous personality was an adequate one. He had been sociable, intelligent, an excellent athlete and was of an amiable disposition. He had never been keen to go into business with his father and was openly jealous of his younger brother, who had been given a more expensive education than he, and was later a student of architecture.

His illness began with a depression, but soon developed other symptoms of a more schizophrenic nature, such as day-dreaming, mannerisms and hypochondriacal preoccupations. Some months before admission he gave up work altogether, remaining at home most of the day. He spent most of his time shaving and dressing, looking at himself in the mirror or busying himself in rather futile enterprises. Frequently he could be heard to laugh to himself, and occasionally he would talk to himself. He lost interest in his surroundings, would obey no orders and lacked initiative. He took up an ambivalent attitude towards every situation with which he was confronted. He was admitted to Jordanburn but, showing no improvement in his condition during a month's stay there, he was admitted to West House as a Voluntary patient. It was with the greatest difficulty that he could be persuaded to stay in Hospital and undergo treatment. He gave in his notice to leave but returned a few days later. His ambivalent attitude, occurring in association with a state of perplexity, was a striking feature of the case at this time.

Treatment was begun on 17th March 1938. By the fourth day he had settled down and become co-operative. At the end of thirty-five days of treatment, during which time he had been given eighteen shocks, he had completely recovered, and had full insight into his condition. So far as could be judged, and according to the report of his parents, he had returned to his former normal state. His position was discussed with him, and he was advised to take a short holiday and

then resume work with his father. He was discharged at the beginning of May, 1938, and soon he was back at work. His father was at that time passing through severe financial strain and much of that strain fell upon the patient's shoulders. He has reported regularly since May, and continues to be in good health, despite the somewhat adverse home circumstances. He was recently accepted for the Royal Air Force, and is now employed in the food stores.

This case, again, cannot be said to be a typical case of Schizophrenia. The pre-psychotic personality, and the more or less harmonious nature of the affect might argue that there is an element of the manic-depressive. On the other hand, many of the symptoms seemed to indicate that there was a more gross disorder of the personality, as typified by the insidious onset, and the presence of great ambivalency and narcissistic behaviour. Thus we can say that this is a case of Schizophrenia, but occurring in a relatively well-adapted personality. The prognosis would have been fairly good in any case. The removal from home conditions and the investigation and reassurance which were given him would no doubt have some effect in bringing about a remission. The dramatic nature of this remission, however, seemed to indicate that the Insulin treatment accelerated the process.

DIAGNOSIS: Schizophrenic Reaction Type.

RESULT: Complete Remission.

Case 14. (R.C.)

A student of Divinity, aged 23, was admitted to Jordanburn Nerve Hospital on 6th June 1938.

The patient was the youngest of a family of nine. He came of working class stock and was the only child to receive a Higher Education. This was because he was the father's favourite and much spoiled as a child. Usually good-tempered and direct in his dealings, he was occasionally sulky, mischievous and self-seeking. At school he enjoyed his lessons and did not like games. In his later years at school he became intensely interested in religion and resolved to become a missionary after hearing a missionary address. This made him take up training for the Church. He felt, as he grew older, that he was different from the rest of the family, and had to watch what he said in case he might be thought to be putting on airs. He then left home and went to Glasgow to live with his sister while he attended classes at the University. Soon after, he was turned out of the house by his sister whom he found intolerable. This made him depressed and disillusioned. He felt that he had lost much of his faith in humanity as a result of this episode. He made friends with some of the other students and many of these friendships were emotionally toned. On several occasions he thought that he had been let down by these friends, and this made him even more depressed. He joined various student organisations, and his work suffered. He seemed to be trying to live two kinds of life - one in which he had high ideals and connected with his vocation as a minister, the other in which he indulged himself with women and alcohol. He became engaged to a girl and was very intimate with her. This merely served to increase his dissatisfaction with himself and with the world in general. He found in the end that he could not concentrate upon his work, lost interest in his family, and showed signs of a change of personality, becoming more and more withdrawn and resentful of interference.

On admission he presented the picture of a depression, with some apathy. He seemed to be rather bewildered, and wandered about the Hospital aimlessly. Then one day, quite suddenly, he attacked an attendant who, he said, had used foul language about his mother.

He then complained that a nurse, who was not on duty at all, had attacked him violently. At the same time he said that he had been hearing certain whisperings in the trees, which were in the nature of disparaging remarks. He said that he possessed certain psychic powers and that he could communicate with spirits. A month later he showed no improvement, continuing to be hallucinated, and occasionally becoming impulsive towards the nurses. He said that they were hypnotising him. He was certified and admitted to West House on 1st August 1938. For some time he remained restless, noisy and impulsive, refusing food because he thought it was poisoned, and impulsively attacking patients and attendants. He seemed euphoric and often broke out in uncontrollable laughter, speaking incoherently to himself. He said that his thoughts were leaving him, and it was evident that there was thought-blocking.

Insulin treatment was started on 17th August 1938. On the twenty-fifth day he was still hallucinated, particularly at night, but showed some insight. He was much quieter and able to sleep out of observation for the first time. On the twenty-eighth day he was given ground parole, and seemed to take more interest, playing games and reading a little. He said that the whisperings were more faint and that they did not disturb him at all. On the thirty-eighth day he showed no external evidence of abnormality, being able to discuss his position quite rationally. He was still depressed about his future. By the forty-ninth day he was still depressed and moody, not inclined for work and contenting himself with playing billiards. He seemed apathetic and discussed his symptoms in an apathetic, disinterested manner.

Treatment was stopped on November 25th, the patient having been given 71 days of therapy, with 27 shocks. The average shock dose was 185 units. There was no further improvement in his mental condition. During treatment his hallucinations had become fainter and had not disturbed his behaviour, though he continued to be depressed by their presence. Although his interest had partially returned, there was still some emotional blunting and lack of spontaneity. He would do little or no work and was generally lacking in volition.

A month after cessation of treatment he had a short phase of restlessness and more active hallucinosis,

with return of impulsive behaviour. When this settled he returned to his former state. He was discharged on 8th March showing no further change.

This case demonstrates the value of treatment in quietening an hallucinated patient. It would appear to be a good sedative in such a case, and seems to reduce the intensity of the hallucinations.

DIAGNOSIS: Hebephrenia.

RESULT: Partial Remission.

Case 15. (M.B.)

A man aged 19, a leather manufacturer in his father's business, was admitted on 20th January 1933.

The patient came from a family of successful business and professional people, some of whom were inclined to be self-conscious, introverted and self-absorbed when younger. He himself was the elder of two, having a sister aged 13.

When younger, the patient was quite normal except for an attack of rheumatic fever when he was 10. He was a quiet, rather timid but obedient boy, showing some affection for his parents. At school he was rather below the average - in spite of having an I.Q. of about 120. He failed in his school certificate examination and did not like games at all. From the age of 12 onwards he was noticeably introspective, and his parents felt that they had lost touch with him. He had few interests in outside things, his one hobby being cathedral architecture. On leaving school he went to Germany, to learn the language, for eight months. Then he worked in his father's business for a few months until he went to a training college in London, where he broke down.

It was possible to give only small doses at first because of his violent reactions, with respiratory spasms and grossly irregular heart. It is interesting that, though no signs of any gross valvular lesion have ever been detected in this case, there is a history of rheumatic symptoms involving the heart when he was 10. It was found that Coramine, 2 c.c.s orally each morning before injection, helped the pulse regularity considerably. Treatment was stopped on 29th October after forty-six days of treatment with nineteen shocks. Throughout the course there was no improvement or change in the patient's condition at all. Since the treatment there has been a continuation of the dementing process.

DIAGNOSIS: Hebephrenia with Dementia.

RESULT: No improvement.

Case 16. (W.A.)

A single man aged 23, a grocer's assistant, was admitted to West House on 1st April 1938.

The patient was the eldest of the second family of a sea-faring man. The family appeared to be quite normal except that the mother, who was twenty-five years younger than the husband, was of the cyclothymic disposition, being subject to fits of depression and elation.

The patient was a normal enough boy, except that he was inclined to be timid and easily scared. In the home he was most obedient and had a particular attachment to his mother. To begin with at school, he showed considerable promise, but later took more interest in sport, at the expense of his studies. His mother was ambitious for him and wanted him to go on to a higher education, but he refused to do this, saying that he wanted to earn some money and help to support his mother. He therefore went into a grocer's

business as an assistant. Here he worked well and was commended for his neatness and smartness.

For some years before admission the mother had noticed a gradual change in his personality. Whereas before he had been a bright and carefree, obedient boy, he became morose, brooding and at times stubborn and irritable towards his mother. Six months before admission he became rather opinionated and arrogant, saying that he knew everything about life without having to read it in books. He began to misunderstand remarks that were made about him, and felt that he was being left alone by his family and friends. He confided very little in his family. Two months before admission he went off his food and sleep, and one day wandered away from home and went into the country instead of going to his work. He was found in a dazed condition eighteen miles away and persuaded by a farmer to return home. It is believed that his intentions were very vague, all he wanted was to be away from everything that was unpleasant. He later complained that he was exhausted and unable for work. Then he complained that he could not micturate, and sometimes for days on end he would not pass water.

On admission he presented the appearance of a person perplexed. He was vaguely depressed and bewildered. He had various hypochondriacal ideas amounting to delusions. He felt that he had a bad odour proceeding from his insides, that he had no feeling, that he was dead and yet couldn't be killed, that people were making a fool of him, that he was in league with the devil. He admitted that at times he felt strange impulses inside him, telling him to do things that he did not want to do, although there were no actual voices. He related two incidents when he seemed to have auditory hallucinations, though no corroboration of this could be obtained. He could not pass urine and allowed his bladder to become distended.

Insulin treatment was begun on 4th April and continued until 16th May, when he had been given thirty-four days of treatment with eighteen shocks. By this time he was much improved, and did not express any delusions at all and was able to work quite diligently in the ward. He still complained of depression and sleeplessness and inability to concentrate, with occasional vague abdominal discomfort. Treatment was resumed on 4th July and continued until 30th July, when he had completely remitted. He had

excellent insight into his condition and was quite symptom free. Altogether he had been given fifty-eight days of treatment, with twenty-five shocks. He is now (January 1939) employed as an attendant in a cocktail bar, reports regularly, and shows no recurrence of his trouble.

This case is typical of the type that recovers, showing a harmonious affect, predominantly depressive.

DIAGNOSIS: Schizophrenic Reaction type.

RESULT: Complete remission.

Case 17. (H.McC.)

A married man, aged 39, a clerk in a railway company's office, was admitted to Jordanburn Nerve Hospital on 19th June 1936.

The patient's father, who had been a chronic alcoholic, had died when the patient, the oldest boy in a family of four, was only 13, leaving him to look after the family. He had shown considerable intelligence and ability, and had intended taking a higher education and then going to the University, or perhaps into the Civil Service. Instead he had to find a job with a railway company, where he steadily worked his way up until he became a clerk.

His history is one of chronic depression dating from 1913. His symptoms were for many years referable to his stomach, and took the form of vague pains and discomfort accompanied by flatulence. A brother and a sister were both very much like the patient in this respect, and it is of interest that the father died of gastric carcinoma. All the family on the father's side and all the siblings were of the over-worrying, brooding, hypochondriacal type though there

was no mental tainting in the family.

The alimentary symptoms continued with little improvement until one month before admission, when he was undergoing a course of "Weir Mitchell treatment". During that time he was overfed, and thought that he had received a great shock to his system as a result. Then he developed the idea that his symptoms were not physical but mental and that he was slowly dementing. He blamed his early masturbation for this state of affairs. This continued until, at the time of admission he was agitated and miserable and thought that he would never get better. He had found that the additional responsibilities of his work were too much for him, and he had to give it up three months before admission. He improved slightly after admission and then quite suddenly developed ideas that he was the worst patient in the hospital and that the other patients were watching him to report his condition to the doctor. He declared that there was a thought-reader in the ward, who directed his actions at night, telling him how to sleep. The predominant feature, however, continued to be the depression with hypochondriacal preoccupations, and feelings of hopelessness. He had particular insight into his paranoid experiences. As the symptoms did not clear up and because he was very sleepless, he was persuaded to enter West House as a Voluntary patient.

The state of depression, with loss of interest and initiative and hypochondriacal preoccupation continued. He would not exert himself in any way, being content to lie about on a couch all day. Work of any sort was abhorrent to him. He would not even trouble to read a book.

Insulin treatment was begun on 13th July 1937. At the end of the thirty-fifth day the patient refused to go on with treatment because of the dreadful experiences of the return of consciousness. He was given only five shocks. Throughout the rest of the treatment he was given relatively mild hypoglycaemias and interrupted in the euphoric stage. When given glucose he usually became talkative, active and sometimes very cheerful, declaring that he was drunk, and making witty remarks. On the whole, however, any improvement noted in the hypoglycaemic period was lost throughout the day.

A month after the cessation of the treatment he began to show a marked return of energy and interest,

and was able to be up and about all day, doing some clerical work in the ward and reading and playing games such as cards and chess. This improvement has continued, with slight relapses, throughout the past eighteen months and now he is well enough to return home. He is quite symptom-free and has returned to his former self, showing an activity and initiative which at times would be said to be mildly hypo-manic.

The case is undoubtedly one of manic-depressive psychosis, with a brief episode of paranoid reaction. The improvement noted cannot be ascribed to the treatment, as this had been stopped for a month before improvement was noted. One would conclude that such a case does not benefit from this type of therapy.

DIAGNOSIS: Depression with Paranoid Trends.

RESULT: No improvement.

Case 18. (S.B.)

A single man, a tailor's assistant, was admitted on 13th January 1934. He was aged 28 years.

His family history revealed no abnormality whatever. From an early age he had been shy, backward, and unable to fit in with those of his own age. On leaving school he went into a tailor's business, but he did not apply himself at all to his work. He had certain ill formed ambitions to become a minister, but these did not materialise. He had no interest in the opposite sex. His sexual development was immature. He did not smoke, drink or tell a lie.

For about two years before he was admitted he had been worried over masturbation and other sexual matters.

The illness started soon after this, with development of ideas of reference and frequency of micturition.

He would refuse regular meals, but took food out of the larder when no one was looking. He became more and more withdrawn from outside interests, gave up his work, and finally refused to go out of the house at all. He had previously shown evidence of day-dreaming with rich fantasy formation, of a sexual nature. If he merely looked at a girl he would make out later that he had made an indecent assault upon her, which required an apology.

On admission he was nervous in his manner, stut-tered, and frequently apologised for his imaginary misdemeanours. He was mildly depressed. He complained that people could see him even though they were not looking at him, and that they criticised everything that he did. He related many stories of his alleged offensive behaviour towards girls, and how his family were disgusted with him. These were without foundation. He was at times auditorily hallucinated. At that time he was quite well preserved intellectually and was orientated perfectly.

Since then he has shown several different phases in his psychosis. For some time he was hypochon-driacal, believing his food to be contaminated, refus-ing to eat, and losing weight. Later he improved so that he was able to work and go out each day. Then he became wildly excited, hallucinated, with wild phantasies about his birth and the possibility of his parents committing suicide. He quietened down and continued in a state of chronic hallucinosis with delusions of a hypochondriacal nature. The disorder of thought was further emphasised by his loss of vocabulary, and by deterioration of affect. Since then, apart from a period of stupor, he has steadily demented, showing evidence of perseverations of speech, and stereotopies of movement and attitude, profound loss of affect and general interest.

Insulin treatment was begun on 16th August 1937, and stopped on 6th September 1937. He was given fourteen days of treatment, with three comas, with an average dose of 25 units. His physical reactions were so severe and alarming, and he presented so much difficulty in regaining consciousness, that treatment was discontinued. It is possible that his carbo-hydrate metabolism is disordered as his blood sugar curves were all abnormal.

There was no improvement at all in his mental condition, despite the fact that, in addition,

psycho-therapy was included and carried on for some weeks thereafter. The patient continued to dement. It cannot be said that there was any of the so-called "vacuum formation" as a result of treatment.

DIAGNOSIS: Hebephrenia with Dementia.

RESULT: Not improved.

Case 19. (C.McI.)

A schoolboy, aged 18, was admitted to West House on 22nd September 1937.

He was an only child in an unhappy home. The father, who was a police sergeant, was alcoholic and had lived a life of infidelity. He was discharged from the police for misconduct towards a woman. There was no history of mental illness in the family. Despite his adverse home circumstances he had proved himself clever and bright at school, taking a keen interest in both the scholastic and the athletic side. He was in addition artistic and musical. His home life had made him at times reticent in company with other boys, and he felt there was a difference between himself and other boys.

A few weeks before he was admitted he had been studying hard for the Bursary Competition and had also been dabbling in medical books. He had always intended to go in for medicine. He had been rather worried about his face being disfigured by acne spots, as he had always prided himself in his appearance. He came across some pictures of secondary syphilitic rashes in some medical book, and immediately thought he had inherited syphilis from his father. This precipitated an attack of acute excitement, bordering upon delirium. He collapsed in a public park and was admitted to the Royal Infirmary, where he became wildly excited, confused, disorientated and hallucinated auditorily and visually.

He was admitted to West House when the more acute symptoms had subsided. He remained, however, in a state of agitation, with strong convictions that he had syphilis and that he had some serious heart disease.

Insulin treatment was begun on 27th September and he improved rapidly after the tenth day, when he was having 80 units of insulin. The dose was gradually increased until, by the twentieth day, he was having 150 units, which gave him a fit. Fits occurred again on the 22nd, 23rd and 24th days with 120, 110 and 100 units respectively. No comas were produced at all. On the 16th November, three days after cessation of treatment, he became excited and restless, walked up and down the ward and was very talkative. He would not stop talking, as he took little notice of his surroundings. There was considerable increase of pressure, with clang association and slight distractibility. Questions were answered irrelevantly. This state continued until treatment was started again on 29th November. It was found that even a dose of 210 units, given on the 57th day, was insufficient to produce coma. On 19th March, after the patient had had 93 days of treatment, with thirty shocks of which six were fits, treatment was stopped. The improvement which was noted on the sixty-fifth day continued so that by the end of treatment he was symptom free, showing a harmonious affect and considerable insight into his condition.

He was discharged on 6th April, 1938, and has entered the University to take up his B.Sc. in Agriculture. He still remains in excellent health and, in addition to his ordinary studies, is working for a Civil Service Examination.

This case presents some of the features of a manic-depressive psychosis, but the disharmony of affect and the presence of rather bizarre delusions, with a tendency to withdraw from reality, would tend to class him as predominantly schizophrenic.

DIAGNOSIS: Acute Schizophrenic Reaction type.

RESULT: Recovered.

Case 20. (J.McL.)

An Agriculture student, aged 24, was admitted to Jordanburn Nerve Hospital on 23rd December, 1937. He was one of twins.

As a child he was particularly soft-hearted, devoted to animals. He was excessively conscientious, slow and painstaking. He was honest and straightforward to a degree. Often he would become dreamy and wistful and said that what he wanted out of life could never be attained, and that he would like always to remain young, a dreamer, and 'happily sad'. At his work he was clever, and he mixed well with other boys, although he felt a strain within him when in company. At school he was very anxious to please the teacher, and his work weighed on him. Games were an effort for him, though he stuck at them and played quite well.

He took little interest in the opposite sex, but always prided himself on his appearance, comparing himself to actors and the like. He was always intensely interested in his health. Most of his time was spent with his twin brother, with whom he had much in common.

His trouble started when he went to the University to study agriculture. He became preoccupied with his health, and developed various fads about his diet and fresh air. He strove hard to come up to a routine existence which he had set for himself. Then he became afraid of emissions which had been rather frequent. He thought that if he retained his faeces he would not suffer in this way, and worked out elaborate plans, including a definite diet, which would help him. This continued until his fourth year and was almost unnoticed by friends and family alike. From being an exceedingly clever and capable person, he was beginning to find work difficult, no matter how hard he drove himself. Then he failed in some examinations, which was most unusual for him. When studying for them again he locked himself in his room and avoided all company. He complained of pains in head and abdomen. He would drink excessive quantities of water. Then one day he said that he was totally changed. Something in his stomach had "jerked" and everything had become strained. By careful regulation of his water intake he seemed to improve slightly.

He kept himself cool by special clothing and went for long walks and did deep breathing exercises. Again he failed in his examinations and by this time he was absent minded, preoccupied and difficult to get in touch with, lacking in consideration and tact which before he had possessed. He was admitted in this condition but, showing no improvement, was transferred to West House as a Voluntary patient for Insulin treatment.

Treatment was begun on 20th January, 1938. After thirty-three days of treatment, during which he had fifteen shocks, the course was terminated. The average dose of insulin given was 65 units. A feature of the hypoglycaemia in this case was the presence of what appeared to be flexibilitas cerea on returning to consciousness. The patient gave the appearance of unconsciousness, but proved to be easily rousable from these states. He kept his limbs extended for several minutes, and any change of position imposed from without was retained indefinitely. He would often roar and shout throughout these states as though partly conscious, but he would always answer quickly and correctly if spoken to.

Hypochondriacal ideas vanished after the course was finished, though there was never a return of insight. He continued to be rather preoccupied and had difficulty in making decisions of a relatively trivial nature. He was eventually discharged a month later, and has made a satisfactory readjustment, returning to his studies and passing his examinations with little difficulty.

This case is thought to be an atypical form of Schizophrenia simplex. The fragmentation of the personality, the bizarre behaviour and ideation, the very insidious onset and the absence of appropriate affect would seem to bear this out.

RESULT: Partial Remission.

Case 21. (R.A.A.)

A commercial traveller, aged 36, was admitted on 23rd May, 1935.

In his youth he had been a bright capable person with many interests and hobbies. He was an excellent pianist and good at sport. His education had been expensive, the patient having been to an English Public School, where he was not very happy and apt to be homesick. He was described as generous, polite, popular, and with a greater interest in men than in women. He was married and had two children. A maternal cousin was in a Mental Hospital.

On leaving school he went into the Indian Army, where he was constantly getting into trouble and drinking heavily. At the age of 24 he inherited a large sum of money, which he spent in a life of drunkenness and extravagance. He continued to drink heavily until about three years before admission, when he gave it up quite suddenly and completely. He then became a traveller for a whiskey firm and was doing quite well when the present illness developed, six months before admission.

At that time he began to complain that people were reading his thoughts. His behaviour changed, so that he became quiet, secretive and suspicious. At times he stood for many minutes staring into space, and often he adopted a listening attitude. He said that people were influencing him through the wireless. He wrote notices to his friends, saying "I am not responsible for this and am under some influence". He gave up his work entirely, and began to drink again. On admission he gave the impression of being puzzled and bewildered. He could not attend to the simplest questions and could not understand the significance of being admitted to a mental hospital. His conversation was scanty and unintelligible. At times he expressed vague paranoid delusions, that he was being experimented upon, and that his thoughts were not his own. At times he was aggressive and unco-operative, and at other times he was almost euphoric. Occasionally he admitted to hearing voices, which gave him strange messages about other people. He had no insight into his condition. In view of the alcoholic history, memory and other relevant tests were carried

out but revealed no abnormality.

The patient's condition continued without any change until 8th September, 1937, when Insulin treatment was started. He was given sixty-two days of treatment with twenty-two shocks and two fits. Owing to his rather poor physical condition he reacted violently to 60 units of insulin. It was rarely possible to prolong the coma beyond half an hour. Throughout the treatment, which was stopped on 15th January 1938, there was no change in his condition, except that for a short period he seemed to take more interest in his surroundings. This was not maintained, however, and he soon slipped back into his former state, perhaps showing, more recently, a tendency to greater apathy and general withdrawal of interest. He is now untidy in his habits, writes innumerable complaining letters, often very unintelligible, and has no insight into his condition.

DIAGNOSIS: This has been considered to be a case of Paranoid Schizophrenia.

RESULT: No improvement.

Case 22. (J.D.)

A single man, aged 28, an honours graduate in Arts, was admitted to West House on 2nd September, 1937. There was a history of a previous admission to Jordanburn Nerve Hospital a year previously.

He came of an apparently normal family though the father had died when he was quite young, leaving the mother, an emotionally unstable person, to bring up the children.

He was by nature a quiet, studious and retiring person, who never sought company. He was dominated by his mother, who attended to every aspect of his

existence until he was quite grown up.

After a fairly successful career in Arts, he failed to obtain a pass at the teaching college. He then went into a C.A.'s office and remained there for two years, until he broke down, two years before admission.

The illness was precipitated rather suddenly, when he was drinking beer with some friends. For him this was unusual and it gave rise to some conflict. He declared that his mother knew he was drinking, even though she was far away, and that she could hear every word that was passing between him and his friends. He became rather excited, and remained in this state until admission to Jordanburn. He had ideas of reference and believed that others knew his thoughts. Then he went into a state of inactivity with puzzlement, and later into a stupor with resistiveness and negativism, refusing food, and sternly opposing any attempt to feed him or speak to him. Occasionally he would become impulsive and strike out, but more commonly he would become abusive and obscene in his language for short spells. He did not improve, but was taken home, to be admitted to West House some time after. He continued to be in a state of stupor, with marked resistiveness. The stupor was occasionally punctuated by outbursts of obscene language, and sometimes he was shameless in his conduct, exposing himself. He took no interest at all in his surroundings, and lay in bed all day with his eyes closed.

Insulin treatment was started on 8th September, 1937. He was given forty-four days of treatment, with fifteen shocks. The early part of treatment was arranged to give him light hypoglycaemias in the hope of bringing him out of his stupor. In this state he became slightly more talkative, though one could not get in contact with him very much more. He said that the absence of his false teeth made it impossible for him to speak. Later this light state seemed to make him more agitated and miserable and he was often crying out for help. Full shocks were then given, but with no benefit. For short periods after interruption he would become restless, talkative and miserable, but came no more near in touch with reality. Psychotherapy was impossible. On 8th November, treatment was stopped as he developed scarlet fever. No improvement was noted during the period of illness, and in spite of the fact that his mother has taken

him home, there is no improvement.

The features of this case would indicate clearly that the condition is one of Catatonic Stupor.

RESULT: No improvement.

Case 23. (N.J.C.B.)

A single male, aged 24, an architect, was admitted to West House on 16th October 1935.

His early life was uneventful, being brought up in a family with three sisters. His father, a clergyman, died of paralysis agitans. His mother's father died of senile dementia. He was at school until he was 16, when he went into an architect's office. His school record was average. He was a bright, sociable, talkative boy, keen on sports and with a healthy interest in both sexes. The work was congenial and he was quite efficient. He took an interest in politics. A younger sister is a mental patient. In 1930 the left leg was removed below the knee for recurrent giant cell tumour of the ankle. A year later he began to lose interest in his work and lacked his former ambition. He became irresponsible at his work. For no reason he would not go to the office, but would wander about the town. He told lies to cover up his mistakes. In the end, because he was inefficient, he was dismissed. He has done no work since 1932. In 1933 a change was noticed in his mood. He was dull and morose whereas formerly he had been bright and sociable. This was in part due to the fact that he had been trying to get work, but unsuccessfully. He felt that he could not mix with his fellows, and found that his siblings were a source of annoyance to him. He accused one sister of hypnotising him. He much resented his mother's attitude to him in driving him on to get work. He visited the police because he thought people were going to do

him physical harm. He wrote many letters to a girl he hardly knew until her mother threatened to take action against him. He thought that she had some mesmeric influence over him, and caused him to "fade away".

On admission he was quiet, morose, and spoke of his feelings in a detached way. He said that he was afraid that he was going to do violence to his sister and thought that he was better away from home. He said that he heard "echoes of voices" when he was sitting quietly by himself. They annoyed him by their accusing tone. He complained of his stomach being out of order. He improved and was discharged in June 1936. Late one night, a year later, he came to the hospital and asked to be admitted because he felt that he had a tumour on the brain and wanted immediate operation. He had done no work since his previous admission, although he had looked for it. He became discouraged, irritable and often abusive at home, and went to the police several times complaining that strange influences were working upon him. He explained that he was now in the secret service doing special detective work. He had been visiting the doctor twice a week with various hypochondriacal complaints. On his second admission he showed more apathy, and expressed more delusions of a paranoid nature. He thought that he was intercepting sexual feelings between a man and a woman, and was generally being subjected to malignant influences. Everything was mysterious and had a double meaning. Neologisms were used. He said that he knew the doctor 120 years ago, explaining that everybody lived for ever. He said that he was in Edinburgh and Berlin at the same time. He had no insight into his condition.

Insulin treatment was started on 10th July 1937. He was given forty-two days of treatment with eighteen shocks. The highest dose reached was 250 units. Hypoglycaemia was characterised by great psycho-motor excitement, with myoclonus. On the twenty-ninth day of treatment he showed signs of improvement, with more harmonious and normal affect. He took more interest in his surroundings, worked well in the ward, showed enthusiasms and did not express any bizarre ideas. This improvement continued and was maintained. He said that he felt that his head was much clearer, and examination revealed an absence of any delusions or hallucinations. He had also shown an affective and behaviour readjustment so well that he was discharged

in October 1937. It was intended that he should go to a farm, but this did not materialise. He was recently readmitted in the same condition as before, having done no work at all.

The Diagnosis in this case is clear - Paranoid Schizophrenia.

RESULT: Partial temporary Remission.

Case 24. (J.B.)

A single man, aged 35, an engineer, was admitted to West House on 4th May 1937.

He came of a good working class family, and was the elder of two boys. His life had been a continual succession of disappointments and misfortunes. As a child he was badly burned over the chest. When he was eight he fell and injured his spine. Six months later he had a psoas abscess, requiring operation. Later he suffered from recurrent dislocation of the right shoulder. In 1930 a tumour was removed from the left knee, which recurred requiring amputation of the leg above the knee. His frequent illnesses and operations interrupted his schooling and later his work so much that he was only able to obtain a job doing monotonous work in a mill. He was excessively reserved, sensitive, not inclined for company, preferring to remain at home in the company of his mother, who was his main interest. From the age of 25 he took a great interest in a very narrow religious sect, and found considerable solace in this retreat from the world. He had no other interests. Two years before admission he had some intimate relations with a woman of 45.

A month before admission he began to say that his workmates were making signs to him, as though in an effort to protect him from some unknown danger. He felt that hundreds of pounds were being spent upon him by some benefactor in order to let him go for a first class holiday. He became depressed and very quiet, sitting for hours on his bed in meditation. He seemed at the same time to lack confidence in himself, becoming hesitant in his speech, and was constantly preoccupied by some perplexing mystery. He went off his food and lost weight.

On admission to hospital he gave an appearance of one depressed. It became apparent, however, that the depression was not so deep as his sighs and his slowness of speech would indicate. He was very much preoccupied by thoughts that everyone was banded together and in league either against him or for him. He felt that psychologists were influencing him in some strange way. He was self-condemning, saying that he had committed all the sins that there were to

commit. Answers to questions were stereotyped, and he showed considerable thought blocking.

He continued in this state of preoccupation until 10th July 1937, when insulin treatment was begun. On the fourteenth day he had a period of myclonus with 180 units. After interruption he became more bright and talkative and said that he felt "much more normal although there was still a little something there yet". He took more interest in his surroundings but lapsed back in the late afternoon. For the next few days he became more spontaneous in the afternoons but self-accusing in the evenings. He talked more than hitherto. On the twenty-sixth day he was encouraged to work on the poultry farm, though he did not display much interest therein. If left to himself, he preferred to stand in a corner almost motionless. After forty-two days treatment, with seventeen comas, treatment was stopped. By this time he was rather brighter, would smile and converse more freely, and was doing some work. It was obvious, however, that he remained preoccupied, and the delusional system was untouched by treatment.

For a few months after the treatment he remained in the above condition and then slowly became more and more withdrawn until by January 1938 he was in a state of stupor, with stubborn refusal of food, mutism, and even incontinence. He lost weight. Occasionally he became excited, and would have an impulsive outburst of swearing, a practice quite foreign to his former nature, and would slap himself severely on the face; before meals this was common. Sometimes he would shake over his whole body. He remained in this condition until July 1938, when he was given a course of cardiazol. After four injections he recovered completely, and is now about to be discharged as a complete remission.

RESULT: No improvement.

DIAGNOSIS: Though there are undoubtedly elements of the manic-depressive psychosis in this case, yet it was thought that the symptomatology was predominantly schizophrenic. The affect being well preserved, one would have said that such a case would have done well with insulin.

Case 25. (I. MacK.)

A boy of 18 was admitted to hospital on 23rd May, 1934.

Since his admission the father, a clergyman, has developed a mental illness. No other history of mental illness could be elicited in the family.

As a child the patient was rather timid, afraid of thunder and lightning. At school he was below average intelligence and, although he had several hobbies such as painting, drawing, music and sport, he never excelled in any of them. He was never popular with his fellows and was inclined to be reserved, and at times irritable and bad-tempered. He was singularly lacking in ambition.

His illness could be traced back to the age of 14, when his parents noticed that, in performing such simple tasks as dressing, he was abnormally slow. He would spend long periods gazing at himself in the mirror. He became slower in his lessons, and became more quick tempered. He was taken from school and seemed to improve, although remaining sensitive. Then shortly after he complained that he was hearing voices calling his name. A further year at school and a short time in Germany marked another slight improvement, but on return from Germany he did not recognise his father, who had gone to the boat to meet him. He was sent to school again but remained there for only six months. He became more withdrawn and resented interference. He became antagonistic towards his mother and often ran after her and struck her. Once he threatened her with a knife. He declared that his mother was looking too much at him, and discussing him adversely when her back was turned. He would listen outside his parents' room at nights. His habits became dirty, he would not wash or even go to bed. He tried to jump out of a second flat window and on one occasion urinated in the garden in full view of strangers. A brief period on a farm proved unsuccessful and he was finally admitted to the Royal Edinburgh Hospital.

On admission he was apathetic, dull, did not speak much, took no interest in his surroundings and was slightly disorientated for a time. No

abnormalities of thought content could be elicited. His intelligence proved much below average. He lacked attention. Since then there has been a steady deterioration so that by May 1938 he was very apathetic, could not be usefully employed, took no interest in his appearance or surroundings, would not carry on a rational conversation and seemed preoccupied. His behaviour showed no great abnormality - rather there was a marked deprivation of thought, vocabulary, movement and volition.

Insulin treatment was started on 3rd May 1938. Sixty-one days of treatment were given, extending over a period of three months and consisting of twenty shocks. No improvement of any sort, mentally, was noted. He put on several pounds in weight and had an excellent appetite. The total duration of the illness until treatment was begun was eight years.

The duration of illness and the extent of involvement of the personality were both very adverse factors in carrying out successful treatment in this case.

DIAGNOSIS: Schizophrenic Reaction type.

RESULT: No improvement.

Case 26. (D.M.)

A boy of 20, a law apprentice, was admitted under certificate on 27th January 1938.

His mother was a very incompetent woman who did not understand her children in any way. She pampered them and sheltered them and would not allow them to play games as other children did. A cousin of the mother was known to be insane. The patient himself, from early youth had been timid and retiring and, though he was not allowed to play games with other boys, it is evident that he was very much afraid of rough sports. In his classes he was always the youngest and weakest, but was quite clever. This made him come in for much bullying at the hands of other boys in the class.

Although gross symptoms did not appear until a year before admission there were vague premonitory changes evident two or three years before that. From being an amiable, polite and approachable boy he became withdrawn and resented interference. He became opinionated, arrogant and moralising towards his family, and refused to help in the household duties. On leaving school he went into a lawyer's office and while there he broke down. On the basis of knowledge acquired in his legal studies he developed the idea that every one was a criminal or a sinner. He accused his mother of various sexual offences. He developed ideas of reference in which he saw a meaning in everything he saw and read. Everything had a double meaning, there was a secret code in books which others knew, but were keeping from him. He felt that others were reading his thoughts, which were as loud as other people's voices. Then he refused food, saying that it was poisoned. Later he struck out at his brother and father and had to be forcibly restrained. He was admitted immediately after this last episode.

Delusions of persecution directed mainly against his mother, and feelings of influence with ideas of reference were the main features. Only occasionally was he auditorily hallucinated. Retrospective falsification was also noted. His affect was not harmonious - he smiled and laughed when he related his experiences of assaulting the family. Bizarre bodily delusions were also present; he thought that his eyes

were full of fire and that he was burning everyone up. He felt that pains inside him had a prophetic quality - he could tell when patients were going to die by the feelings in his abdomen. He had no remorse for his actions. His intelligence and orientation were well-preserved.

Insulin treatment was begun soon after admission on 1st March 1938. He was given thirty-six days of treatment during which he had twenty-nine shocks. No attempt was made to probe into his mental condition during the course, but it was inferred from his behaviour - his increase in initiative and interest, his more harmonious affect and his more settled state - that he was improving. At the end of the treatment investigation revealed that all the bizarre symptoms had disappeared. There were no more delusions or hallucinations, ideas of reference or retrospective falsification. He still remained rather puzzled and reticent about his illness, and did not show any real insight, and his affective response was still rather dull. In addition he was still somewhat withdrawn. His parents were exceedingly afraid to have him home so soon, thinking that he might assault them again. Accordingly he was kept in hospital till January 1939. Throughout this time he continued on this rather better level, but still far from being really well integrated. Arrangements were made for him to go to a farm, and so he was discharged relieved. He returned again, however, about a month later, having broken down in much the same way. Once more, but this time without the aid of Insulin, he has made a good readjustment and is back at former level.

DIAGNOSIS: Paranoid Schizophrenia.

RESULT: Incomplete remission.

Case 27. (J.B.).

A carpenter, aged 19, was admitted on 3rd February 1937.

Family History: Negative.

Personality: Shy, timid but intellectually well endowed; brought up by his grandmother who dotes on him.

Present Illness: Of one year's duration on admission. Gradual onset - was at first morose, quiet and unapproachable, began to brood over his sins and thought that he was in danger of hell fire and that he had venereal disease. He thought he heard the voice of God telling him that he was about to die. About a month before admission he had several periods of great excitement in which he became impulsively violent, throwing furniture about the room and striking his grandfather.

On admission, he was in a state of great excitement, was hearing unreal voices which told him that he was the Christ, Robert Burns, and other great personages. He refused food, declaring that it was poisoned. Soon after he relapsed into a state of stupor with negativism, mutism and akinesia, refused food and lost weight. Occasionally he would mutter to himself, grimace and turn his eyes upwards as though he were conversing with unreal persons.

This patient showed some features of a manic-depressive reaction and is, at the same time, of the pyknic body build. The insidious onset, the bizarre nature of his delusions, the presence of hallucinations and his manneristic behaviour are sufficient to justify a diagnosis of schizophrenic reaction.

Treatment: Insulin treatment was started on 10th July 1937, with 15 units. On the 3rd day of treatment, three hours after an injection of 45 units, he began to whisper. This was the first time he had spoken for three months. He asked for a cup of tea and some buttered toast, which he ate well. He asked for more toast and butter, which was given and eaten with some degree of heartiness. On the fourth day of treatment, two hours after an injection of 65 units, he was

sitting up and asking in a strong voice for a toasted roll and milk. He was able to keep up a conversation for the next hour and dressed himself very well and expressed a desire to go home. He said he felt perfectly well, but had no idea of the time of day or the date.

On the sixth day of treatment he said he felt very much better and wanted to go down town. That afternoon he was taken into the town and showed considerable interest in all that went on around him. At times his conversation was clear and spontaneous but at others he was apt to become dreamy and slipped back into his stupor again. He would awake from this with a start, smile and apologise for "dreaming". His thinking was more rational and he expressed no delusions or hallucinations, and he co-operated reasonably well.

After this initial clearing up of the catatonic symptoms the dose of insulin was increased daily until a deep coma was produced. He was given ten deep comas, after which he showed a further improvement and, as he himself was rather unwilling to carry on with the treatment, it was stopped on the 7th August 1937.

Progress; This patient, although considerably improved at the end of treatment, was not discharged as he was lacking in initiative, refused to work and was generally lazy and untidy in his habits. He gained weight, slept very well and showed no delusions or hallucinations of any sort. Since then he has shown further improvement and is likely to be discharged in the next month or two.

Notes: The treatment in this case was dramatic in its earlier effects in bringing about a re-adaptation to his environment. Further treatment with deep shock, however, did not bring about any further advance. Perhaps this was due to the rather short course.

DIAGNOSIS: Catatonic Schizophrenia with Stupor.

RESULT: Partial remission.

Case 28. (D.McL.)

A biscuit factory worker, aged 31, was admitted on 13th March 1938.

Family history: Negative.

Personality: A schizoid personality of high intellectual ability for his class. For a working man has an excellent knowledge of literature, philosophy, psychology and the sciences: a rather ambitious, keen individual with many interests. He had a schizophrenic breakdown lasting five months five years ago, precipitated by working conditions. From this he made a good recovery.

Present illness: Of a fortnight's duration on admission. Patient had again been over-worked in the biscuit factory (14 - 16 hours a day); weighed just nine stones (normal 11 stones) and was just recovering from bronchitis.

The illness was characterised by vague paranoid delusions, the patient believing that he was the victim of an unknown and mysterious system; constantly puzzling out the mystery and never finding a solution. He believed he was being accused of homosexuality; wrote to the king to ask his pardon for this son; thought his wife was his half-sister and his child was an adopted daughter; complained of intense pain between his eyes. He was so preoccupied with this puzzling mystery that he could concentrate on nothing else. He took very little food and did not sleep at all for several nights before admission. All attempts to work were given up after a few minutes' trial. He would try to read but could only turn the pages over listlessly. He would start to smoke but soon would lay down his pipe and try to interest himself in something else; very soon this, too, would be given up. He did not seem to be able to escape from his perplexity.

Treatment: Treatment was begun on 2nd April 1938 with 20 units insulin. For the first few days he was very miserable and apprehensive about the treatment. On the fifth day, two hours after an injection of 60 units insulin, he became very talkative and euphoric. He said that his wife had already noticed a change in

him (he had gained 6 lbs. in weight). He took up a magazine and stated cheerfully: "I can read like billy-o"; still, however, lacking in power to concentrate and actually only idly turning over the pages of the magazine. This was the first sign of a change in his mood from depression to elation. During the hypoglycaemia and for half an hour after interruption his predominant mood was one of elation henceforth.

The shock dose (80 units) was reached on the seventh day. By the twelfth day he had gained one stone in weight altogether and, to all appearances, had returned to his normal cheerful self. He displayed keen insight into his illness and adopted a rather detached outlook on his trouble. He admitted that he had had some funny ideas about his wife, believed that she was his half-sister and that his child was not his own. On the twenty-fifth day of treatment, after having received eighteen shocks, the treatment was tailed off and stopped on the 4th of May 1938, the twenty-seventh day of treatment.

RESULT: Full remission.

Notes: This case demonstrates:-

1. The physical benefit derived from insulin treatment.
2. The change from apprehension to euphoria during hypoglycaemia.
3. That an otherwise recoverable case has a shorter stay in hospital with insulin treatment.

DIAGNOSIS: The previous personality was undoubtedly schizoid in nature. Many features of the illness were of a schizophrenic colouring - the bizarre behaviour and delusional material - but there is a harmonious affect with some depression. His previous reactions to life's situations had been fairly adequate and the prognosis, therefore, was favourable. He may, however, be diagnosed as a Schizophrenic Reaction Type.

Progress: Patient was discharged on 28th May, 1938, and after a month's holiday took up work in a cycle shop. He continues in good health and admits that his present condition is much better than after his last remission. He is thus still a fully remitted case after nine months.

Case 29. (I.R.)

A student of Divinity, aged 24, was admitted on

Family History: Negative.

Personality: Previously a very conscientious, shy, good-natured and helpful boy. At the age of 14 contracted poliomyelitis and has now a disfiguring scoliosis with torticollis. His physical appearance is almost repellent.

Present Illness: Dates back two years and was precipitated by a sequence of failures at the University, where he had intended studying for the Ministry. He was in a mental hospital from 9th February until 31st August 1937, and the diagnosis then was paranoid schizophrenia.

The main symptoms then, and also at the present admission, were peculiarities of behaviour with occasional impulsive outbursts, delusions that "there was an organised system of 'band-strumming' irritating him". Hallucinations of hearing and ideas of influence were also present and he began during the last few months to develop rather exalted ideas about himself, thinking he was cut out to be Prime Minister or the leader of a new political organisation. As no improvement was shown and he had frequent impulsive outbursts, breaking windows, smashing things, it was decided to start a course of insulin treatment.

Treatment: Treatment was started on 1st November 1937 with 10 units. On the nineteenth day he was receiving 160 units and for fifteen minutes he was in a light coma. Until then only a very profuse sweating had been noticed during the hypoglycaemia, and no improvement in his mental condition. On the 18th December (thirty-first day of treatment) he was receiving 200 units but reacting only with a very light and short coma, sweating being still the most prominent feature. By now he was working in the gardens and seemed more contented.

Treatment was resumed on 4th January with 40 units. The dose was gradually increased until by the fifty-ninth day he reacted with a deep coma to 210

units. By this time he was no longer troubled with the idea that people were speaking about him and was given full parole and was working all afternoon in the gardens. Since the start of the insulin treatment he has had no impulsive outbursts.

On the sixty-fourth day of treatment he was given 215 units at 8 a.m. At 10.30 myoclonic twitchings starting in the face and becoming generalised were seen. Eyes were staring and he was sweating profusely. At 10.45 he gave a cry and went into an epileptic seizure; breathing became more and more difficult; face became cyanosed; pupils were large and irregular and reacted very sluggishly to light. Tonic spasms were followed by clonic, with spontaneous Babinski. Pulse became thready and rapid (120 - 130 p. min.). Sixty c.c.s of 20% glucose were injected intravenously. At 11.0 200 gms. glucose were given intranasally. At 11.15 his colour was returning and he was rousable but not responsive. He had a disgruntled expression and seemed to resent interference. At 12 noon he relapsed into a deep coma, sweating, salivating and twitching; respirations were shallow and irregular and there was pallor of the face; pulse 110 and a little stronger. A further 100 c.c.s glucose were given with .5 c.c. adrenalin. At 12.35 his colour was returning but he was still not responsive or rousable. He was starting to shiver. At 2.40, despite a further 200 c.c.s glucose intravenously and 200 gms. intranasally he was still in coma. Lumbar puncture was performed and about 15 c.c.s taken off. B.P. was 116/70, pulse 120. At 4.0 p.m. he was still in light coma, though a further 160 c.c.s of glucose had been given. He had been shivering and his temperature was now 100.6°F., pulse 118, and B.P. 130/68; skin very hot, dry and flushed. At 5.0 there was no change and his temperature was 103. At 7.0 he was just rousable, temperature still 103°F. At 9.30 the temperature was 101.6°F. and he was roused sufficiently to answer questions. He had a peaceful night but in the morning complained of severe headache, worse when he got up (? lumbar puncture). He remained in bed for the next two days and was still complaining of slight headache at times but of nothing else. Treatment was discontinued as he had had by now sixty-four days of treatment, although only six days of shock.

Progress: On the 6th March, about a month after treatment, he was still occasionally complaining of people

speaking behind his back and was rather depressed about this. Since then he has been free from symptoms and has shown some insight into his condition. At his own request he was discharged on 30th April.

RESULT: Incomplete remission.

Notes: This case demonstrates:-

Protracted hypoglycaemia, its signs, symptoms and treatment.

Case 30. (R.M.)

A schoolboy, aged 17, was admitted to Jordanburn Nerve Hospital on 2nd June 1937.

A grandfather had died in a mental hospital and the mother was in a mental hospital for some weeks after the birth of her second child. The father was an exceedingly shy and nervous person. The patient was one of a family of five, of whom all the rest showed no abnormality.

From infancy the patient was shy and reserved, but quite intelligent at school. His father, who was a miner, wanted his son to take a higher education to be fitted for a career better than his own. The patient said that he had been in love with a girl since he was 11, and that they were both very shy of each other. In the home he was polite and helpful. He took a great interest in religion and thought he could help to put the world straight that way. He was keenly interested in games of all kinds.

His illness came on quite acutely. One day he thought that his father, in conversation with someone else, was talking about him. He went up to his father and asked him what it was all about, and appeared to be excited. Later he collapsed on the floor. When he was picked up he said that he had had a message from God. He said that he had read of a still small voice prompting the King in his speech and he was convinced that the voice was his own. He said that the King was coming to visit him in his home, and that he should go and meet him. He set off on his bicycle and rode to Edinburgh, a distance of about twenty miles. He continued to talk of the King and said that the King was providing for his future. At times he became angry when contradicted. It was quite impossible to carry on a conversation with him, as he would always change the subject.

On admission he was timid and reserved, and did not like to have his case deeply investigated. He was discharged and readmitted within the next month. While at home he had been sleepless, singing and playing the organ all night and day, and wandering out of control of his parents. On the second admission he showed marked ambivalence in everything which he

attempted to do. He wondered whether he should go in or out, whether he should go home or to the seaside and so on. Shortly after admission he became mute, and completely withdrawn, except when he occasionally answered questions in an irrelevant, sometimes incoherent manner. He was therefore transferred to West House as a Voluntary patient on 25th September 1937.

The state of mild stupor continued until Insulin treatment was started on 29th September. On the thirteenth day he showed signs of returning interest and spontaneity. He was able to dress himself and carry out a conversation for some time after the hypoglycaemic period. As usual with these cases, this did not persist throughout the twenty-four hours, but gradually extended until, by the twenty-sixth day, he was able to attend the Occupational class where he showed some returning initiative. On the thirty-seventh day he was able to help in the ward work and to dress himself and look after himself generally. He had taken up reading and had attempted some drawing and painting, in which he showed some proficiency. His thirty-ninth day was his best in the Occupational class. Treatment was stopped on the forty-second day, after he had been given seventeen shocks. A feature of his comas was the profound restlessness, with rapid fluctuations of pulse rate every five seconds. The "lucid period" showed a gradual extension into the twenty-four hours as treatment progressed.

This case can be called one of acute schizophrenic reaction, it being difficult to place him in any of the recognised sub-groups. A feature of the case is the preservation of affect and intelligence, both of which aided his recovery. By the time he was discharged on 2nd December 1937, he was symptom free, showed considerable insight into his condition, but remained very shy and reticent, inclined to become unduly disturbed if his condition was deeply investigated. He returned in February 1938, when he and his father reported further improvement and a loss of much of his reticence. There were no unusual symptoms. Recently (January 1939) he has written to say that he is making application for a job. It is probable that this boy was rather ambitious in many ways and his ambitions were thwarted. The discovery of his limitations precipitated his illness.

DIAGNOSIS: Acute Schizophrenic Reaction type.

RESULT: Incomplete remission.

Case 31. (J.D.)

A single man, aged 28, a clerk, was admitted on 16th March, 1938.

At the time he was admitted, his mother was in a state of menopausal depression. His father was a nervous, highly strung, schizoid personality. A female cousin of the father had had three nervous breakdowns during her puerperia.

From childhood patient was quiet, reserved, polite, considerate and very attached to his mother. At times he could be very stubborn. At school he took an average place. He did not go about much in company, preferring to stay at home and read. Nothing original or active was ever expected of him. He had always a poor opinion of himself, and was sensitive to criticism.

When he left school he went as a clerk to a brewery office. He did not like the work there, and felt dissatisfied with his small wage. For about a year before his admission he had been interested in a girl who worked in the same office. She was ten years younger than he was. He appears to have been infatuated by her but never made any display of his feelings, though he took her out almost every night in the week. He became intensely jealous of other men's interest in her. His illness dates from the time, three months before admission, when she jilted him. He became depressed and found it difficult at his work, as the girl was in the same office. Three weeks before admission he refused to go to work at all, in spite of considerable persuasion from his father. He became silent, would not get up in the morning, would not read and gave no explanation for his behaviour. On three occasions he went out of the house and did not return till night. He said that he had gone to Glasgow, but did not give any account of what he did there. Once he went to the sea-side and stood for a long time gazing at the sea. He said that he had thought of committing suicide.

On admission he was silent and much preoccupied with thoughts of the girl who had jilted him. He said that he could not get her out of his mind. All day he remained almost motionless in bed, thinking and

day-dreaming. He did not look around him, and took no interest in anything. He said that he was thinking of all the things he might have been, and of the things he and his girl could have done together. When allowed up he would stay in the same position, motionless and expressionless, for hours on end if permitted. From time to time his head would be seen to jerk upwards. He could not account for this at all. He admitted having ideas of reference, but no hallucinations or delusions were elicited. His condition was considered to be a schizophrenic stupor, in view of the previous personality, because of the rich thought content throughout, in the absence of depression.

By the 7th of July his condition was no better. He could not take his food without help, or even dress himself. He was untidy, preoccupied and entirely withdrawn. Insulin treatment was then started. By the 8th day he was showing a slight improvement, talking more, and able to dress himself and take his food. This improvement did not continue though he was given sixty-four days of treatment, with twenty-seven shocks. The coma dose was 100 units. Recently he was given a course of Cardiazol, with more beneficial results, and was discharged as a partial remission.

DIAGNOSIS: Catatonic Stupor.

RESULT: Partial remission.

Case 32. (G.H.)

A married man, aged 31, was admitted to Jordanburn Hospital on 19th May 1938. He was a teacher.

From his early childhood he had been a rather timid, shy, over-sensitive individual - in his own words, "more of a dreamer than a practical person". He proved to be more intelligent than the other members of his family, with whom he has never had much in common. With the aid of bursaries, and by working in offices during his holidays, he was able to go to the University where, after three years of conscientious study, he obtained an M.A. degree. He then went to a training college for teachers. Here he did not do so well. He felt that his fellow students did not understand him, and he did not pass his examinations so easily. He took a post as a teacher when he finished college, but had been working for only a few months when he had a breakdown. He was depressed and worried over his work, thinking he was unsuited for it. Then he became excited and almost confused, losing his memory for three months when he was a patient in a mental hospital. There he was diagnosed as acute schizophrenia. He recovered and within six months was back at work.

About a month before he came into Jordanburn he again became depressed, and began to think that he was suffering from leprosy. He said that he thought seminal fluid had leaked into his pyjamas one night, that it had been absorbed through his skin and had then reached his blood, giving rise to his leprous condition, which was manifested by various spots over his body, and a foul odour from his breath. He believed he was infecting everyone around him by his breath, and was even responsible for disturbances at a meeting he attended, and for the withering of plants in his home. These delusions were very fixed and did not cause him very much distress. He was perplexed and almost apathetic. There were no hallucinations. At times he spoke of suicide, though protesting that he thought it a coward's way out.

On 13th July 1938 he was transferred as a voluntary patient to West House, where Cardiazol treatment was begun. He did not like treatment at all, though his symptoms cleared up after two injections. He

said that he agreed that his ideas were imaginary, and was now prepared to forget them. He said that he was also much more cheerful and had more interest in life. On July 28th he was discharged, but came back two days later. His wife said that he had been expressing the same delusions again, and doubted whether they had ever left him. He had disliked treatment so much that he had made misleading statements about his feelings and thoughts, in the hope of discharge. On August 1st, Insulin treatment was started and by the sixth day he was showing signs of improvement. On coming out of hypoglycaemia he said that he seemed to be in some new experience, and that something had happened to him. He became more talkative and cheerful, did not object at all to treatment, and helped in the work of the ward. On the tenth day, with 88 units, he had a fit. On the thirteenth day he had his first shock. By the sixteenth day he had improved so much that treatment was stopped. He was by this time symptom free, with no depression, taking an active interest in all that was happening in the ward, helping in many ways in ward work, reading, eating and sleeping normally. He had gained almost full insight, though he admitted that there were certain of his experiences which were still a mystery to him. He was discharged on 27th August, 1938, and returned to work in November. He has had no relapse at all, and says he feels much more fit to carry on with his work than he used to.

Progress: He remains in good health and at his work - six months after discharge.

DIAGNOSIS: Again this case demonstrates features both of a delusioned and of an affective involvement. One is inclined to think, however, that the schizophrenic features are the more important. Such a case seems to be most benefited from this treatment. Schizophrenic Reaction type.

RESULT: Complete remission.

Case 33. (I. McG.)

A man, aged 24, was admitted on 27th January 1938.

A second cousin of the father was known to be in a mental hospital. There was no other history of mental illness in the family. The patient was the eldest of three sons.

From an early age the patient was a timid, shy and backward child. He was difficult to rear and cried excessively for little or no reason. In all his actions he preferred to be led rather than to lead. His younger brother, who was two years younger than he, always looked after him, and they were much attached to each other. He was afraid of animals, even of hens. A slight noise would make him start. In the home, as he grew older, he was a model of politeness and helpfulness. He spent most of his spare time reading and studying, and did not go into company at all. At school he was clever and efficient, excelling in chemistry. When he left school he went into a chemist's shop, where he worked for four years. Then he went to the Technical College to sit examinations for qualification as a pharmacist. During these years as an apprentice he became more reserved, and spent all his time studying for his examinations. He usually worked until 1 or 2 in the morning. He had no interest at all in girls, and had no permanent or intimate companion. He was always a most even-tempered person, though occasionally, with very little cause, he would burst out in a rage, which would quickly subside. He was told in the chemist's shop that he was very poor with his hands.

Two years before admission the first real abnormality was noticed, although the parents admit that there was a slow progression into abnormality over a number of years. One night, while studying for an examination, he called his mother into the room. He was very agitated and declared that there was a mouse running about his room. No mouse could be seen. For some days after this he continued to be upset and rather afraid of slight noises. He was sent to Edinburgh to stay with his aunt, but she became alarmed by his behaviour, and arranged for him to be admitted to Jordanburn Nerve Hospital. At that time he was hearing

voices speaking to him and his behaviour was being influenced by what he heard. He improved considerably while in Jordanburn and was therefore discharged. He was not long at home before he began to hear voices speaking to him again. He alarmed his parents by his behaviour. He said that the voices told him to do silly things and he couldn't help obeying them. Often he would answer them back, and would use obscene language to them. He would strike his father because the voices told him to. He would suddenly get up from his table and walk away. Often he would turn round on his father and, using the most vitriolic language, he would accuse his father for bringing this terrible disease upon him. He would sit and stand in one position for long periods. He would often laugh to himself. In conversation with others he would always repeat what they said before replying. His father would say, "Bring me that brush" and he would say "Bring me that brush" and at a later date might carry out the command. These changes caused him to be totally unfit for work. He lost all interest in everything and seemed content to drift along without any aim.

On admission he presented the picture much as described above. It was obvious that the patient had shown a rapid dementia. His intelligence, emotional response and interest in his surroundings were all grossly impaired. His behaviour was impulsive and directed by his voices. He had no insight into his condition at all. There was great poverty of thought and action.

A course of Insulin therapy, consisting of forty-seven days of treatment with thirty shocks, was given. The course was started on 15th February 1938 and completed on 20th April 1938. Laryngeal spasm was a common accompaniment of coma in this case. Average shock dose was 56 units. The treatment had an undoubted sedative effect and reduced the intensity and effect of the voices. This case shows the benefit so far as sedative action is concerned.

Since treatment was stopped he has gradually returned to his former state. A course of Cardiazol treatment was carried out but with no more satisfactory results.

DIAGNOSIS: Paranoid Schizophrenia.

RESULT: No improvement.

Case 34. (H.M.)

A man of 19, a lace manufacturer, was admitted to the Royal Edinburgh Hospital on 24th April 1937. He had previously been in two mental hospitals.

His father had died six years before this, in circumstances that pointed to suicide. There was no history of mental illness in the family. The patient was the middle child of the three.

As a child he was subject to temper tantrums, and was always stubborn and strong-willed, inclined to be spoilt by his mother. He was above the average at school, and although good at games was rather studious. He left school at the age of 17 and took classes at the Royal Technical College, Glasgow, to fit him for his father's occupation of lace manufacturer. While there he became depressed, lost interest in his work, and went into a nursing home for some weeks. He appeared to improve, but soon relapsed and was speaking of suicide. He was admitted to a mental home where he became dull silent and apathetic and appeared to be hearing voices. He was at times impulsive and would give no account of his behaviour. He was given a course of Calcium Gluconate, and later a course of "Pyripher" but with no good effect. He occasionally expressed vague suspicions that he was being watched, and misidentified the nurses in the home, saying they were members of his family. He thought that an attendant was a Roman Catholic priest. He refused food from time to time. On one occasion he said that he thought sexual intercourse would cure him and frequently gave evidence of sexual preoccupation. He was then transferred to Craig House, where his condition remained much the same for some months. In September 1937 he became more withdrawn, remaining silent and quite quiet by himself in one position for long periods. Occasionally he became more excited, and shouted out as though in pain, apparently hallucinated.

By November 1937 he was in a state of mild stupor, with resistiveness, negativism, refusing food and resisting interference. He was almost mute, answering very few questions, and then only in a whisper. Treatment was begun on 16th November 1937. Throughout the course there was a steady improvement. By

the fourteenth day he was able to talk in a clear strong voice, and took an interest in his surroundings. He took to working in the occupational class and was soon teaching the other patients how to do basket-work! Vague paranoid ideas continued to be expressed, however, and he gave the impression of being reserved, cold, and at times callous in his attitude. His manner was off-hand and he lacked insight and proper judgment. On the thirty-fifth day of treatment his mother was so impressed with his improvement that she decided to take him home, although it was apparent that he was still far from well. He had been given seven shocks in all.

The return from a stuporose state was quite dramatic in this case, although he did not return to complete normality thereafter. According to reports from his mother he remained well for several months, though remaining reserved and self-willed. He refused to return to his work in the lace factory and preferred to go as a salesman in a motor firm. He was not long there, however, when he decided he would like to go abroad and wanted to apply for the post of purser on a liner. He has continued to be a great source of worry to his mother, who finds that she cannot handle him at all.

DIAGNOSIS: Schizophrenic Reaction type.

RESULT: Partial remission.

Case 35. (J.K.)

A bank-clerk, aged 30, was admitted to West House on 25th February 1938. There had been a history of a previous admission to the Hospital ten years ago and of admission to two other mental hospitals since.

The patient's mother and maternal aunt were described as "queer people" who took a strong interest in spiritualism. The patient himself was backward and shy from an early age. His schooling was much interrupted by the fact that the parents' home shifted frequently. He was at no fewer than seven schools in all. On leaving school he tried farming but a month later gave it up. He tried three times before he was successful in passing the entrance examination for the Commercial Bank, where he has been employed ever since. He was always a difficult member of the family, obstinate, shy, self-contained and yet decidedly aggressive at times. He disliked social contacts and avoided the opposite sex. Towards his friends he was retiring; in the home he was aggressive, especially towards his mother. In his earlier years he had been very fond of his mother and tended to show aggression towards his father.

His first illness started about eleven years before his first admission at the age of 20. He refused to work, saying that members of the staff were talking about him and laughing at him. Everyone was saying that he was mad. He took to his bed and refused to get up for some weeks, but had no complaints of physical illness. Then he became hallucinated, imagining that people were telling him to end his life. He wrote farewell letters to his friends. While in hospital he was depressed, tearful and subject to auditory hallucinations. They were calling him a rotter, and rebuking him for his autoerotic practices, which had been a source of worry and conflict to him for some years. A feature of his illness was the expression of very vague ideas of persecution. Although not much improved, he was discharged and was able to carry on with his work until about a year before his second admission to West House at the age of 30. Again he thought that his colleagues were laughing at him, and calling him names. He thought that the police were in league against him. He was admitted to two mental hospitals within a comparatively short period and was then transferred to West House

from Murray Royal, Perth.

On admission he gave the impression of being in good physical health. He was a tall, active and good-looking young man. For some days he would not settle at all. He wandered about the ward in his pyjamas, and on several occasions tried to walk out of the ward in this attire. He expressed vague paranoid ideas that he was being hypnotised and being subjected to persecutions from an organisation. He was hallucinated, hearing voices giving him advice. He made vague statements that his body was in a serious state. At times he believed that he was someone of great importance, and often spoke of the King and Queen as his friends and fellow conspirators in some scheme that he had started. His mood was one of apathy. He took no interest in his surroundings and would not co-operate in any work. Answers were rarely given relevantly. When questioned he did not pay attention, seeming to be preoccupied with other thoughts.

Insulin treatment was begun on 27th April 1938. On the ninth day he was given 95 units. One hour after injection he began to cough violently and spat up a little blood. His face was oedematous and there was cutis anserina over his body and limbs. Urticarial rashes were evident on the body, with large wheals. He responded well to an injection of 1 c.c. adrenaline 1:1000 sol., and 50 c.c.s Glucose i.v. Four hours after this he had a full seizure. The following day he had another hypersensitive reaction with the same dose. The next day, with 80 units he had another such attack. Each time the condition yielded quickly to adrenaline s.c. Another brand of insulin was used on the twelfth day and only 2 units were given. This brand was used subsequently and the dose was very gradually increased by 2 c.c.s daily. By the fifty-second day he was being given 80 units, which produced a shock. A slight improvement in his mental condition was noted in that he was slightly more co-operative and would do some work in the ward. He continued to express vague paranoid ideas, and often would seem to be preoccupied with his delusions. Treatment was continued until 26th September, when he had been given eighty-two days of treatment. In spite of this great duration, however, it was not possible to give him more than two shocks, as the physical reactions were so severe. On the fifty-sixth day he had a return of his allergic reaction with 72 units of insulin. It was impossible to give

the patient a higher dose than 60 units as there was always a slight temperature reaction in the evening. At the end of treatment there was no significant improvement. He still continued to talk about the persecuting organisations and often said that he was some important person, who was the intimate friend of kings and princes. The patient is still in hospital and showing signs of dementing. He is extremely untidy, is listless and apathetic, and cannot be persuaded to do any work.

This case demonstrates the difficulties that may be encountered and also the fact that a chronic case such as this is probably better left without such treatment.

DIAGNOSIS: Paranoid Schizophrenia.

RESULT: No improvement.

Case 36. (J.W.)

A farm-worker, aged 24, was admitted to West House on 13th July 1934.

The patient came from the island of Orkney. His family were of rural stock and were free from any mental tainting. He was the second of a family of six.

His early life was normal. On leaving school he went to labour on a farm. He did good work until at the age of 21 he began to complain of a pain in the chest. This persisted and eventually made him give up work. He consulted several doctors and was X-rayed but nothing could be found to account for his complaint. About a year before admission he began to lose interest in his surroundings, would not go out in company and refused to read. Then for a period of three weeks he took no food at all. He gave no explanation for his conduct and, apart from this and the fact that he was rather more quiet, he looked in good enough health. Then he became sleepless and would not go to bed at all, remaining in a sitting-up position in a chair all night. He developed ideas that he had been infected by a girl he knew, although he had had no intimate connections with her at any time.

On admission he was quiet, preoccupied, taking no interest in his surroundings and occupying the same position for long periods, staring fixedly before him. Soon he went into a state of mutism, when he refused food and was rather resistive. He lay curled up in bed, holding his stomach as though he had extreme abdominal pain. This state continued for some months and then he improved sufficiently to attend the occupational class, where he took more interest and did quite good work. From time to time since then he has been subject to periods of mutism and occasional impulsive behaviour, when he strikes out at others. He is a powerfully made man, and actively resists interference during his phases of excitement. His predominant affective response has been one of apathy.

Insulin treatment was begun on 8th September 1937. At the end of fourteen days treatment was stopped as the patient was becoming more and more

resistive to treatment. He had been given four shocks. No improvement of any kind was noted, rather he became more resistive and unco-operative.

The duration of illness in this case - about six years - and the fact that a prolonged course could not be given, were adverse factors.

DIAGNOSIS: Schizophrenic Reaction type.

RESULT: Not improved.

Case 37. (M.McN.)

A student of arts, aged 19, was admitted to the Royal Edinburgh Hospital on 25th September 1938.

The patient's home conditions were abnormal in that the father, a clergyman in the Free Church of Scotland, was a man of strange and vicious habits. Towards his family he was bigoted, cruel and unsympathetic, at times uncontrollably bad-tempered, at others hypochondriacal.

The early years of the patient's life were normal. He showed considerable precocity, and always took first place in his classes at school, despite the fact that his schooling was seriously interrupted by illness. At the age of 11 he began to lose weight, looked pale and had little energy. His father browbeat him, goading him on at his studies and calling him defective. One day he was knocked off his bicycle while going to school. He came home and was put to bed by his mother. The father discovered this and made the child dress and return to school. This cruel and unsympathetic incident was typical of the father's attitude to his son. As the patient grew thinner the mother became alarmed, but the father refused to consult a doctor. Eventually, without the father's permission the mother took the child to a doctor, and alimentary tuberculosis was diagnosed. After spending six months on a farm he returned and improved, but later he developed tuberculous peritonitis and symptoms of meningitis. After a protracted illness and an operation, he made a fair recovery. His father, who had been away from home, was furious when he heard that his son had been subjected to an operation. Schooling was continued and, in spite of his handicap, he passed his Higher Leaving Examination and was second in the County Medal Examination. The patient's attitude was always one of quiet resignation.

At 18 he became very interested in a girl from South Africa. When she left for home he seemed to become very infatuated. He wrote many letters to her, giving evidence of a rich fantasy life. He had shown no other interest in girls. In 1937 he went to Edinburgh University to study for Honours English. The change of environment, with complete freedom from

the harsh restrictions of the home caused him to "kick over the traces" in a mild way. He smoked, went about with girls, went to the pictures and generally enjoyed himself in a way that was in direct opposition to the principles of his father. His work suffered so much that he failed in his first degree examinations. He had never failed in an examination before and this greatly upset him.

He returned home to work for the "re-sit" and showed evidence of a change there. He was extremely quiet, uncommunicative and at times depressed. One day he went to a British Israelite meeting in the town and came home in a state of great excitement. He seemed to be elated and was over-talkative. He declared that he had now "seen the Light" and that he was no longer a listener but a talker. Soon after he returned to Edinburgh, where a state of restlessness and over-talkativeness continued. He became sleepless, would settle to no work, and appeared to be preoccupied with his new religion and with the problem of Pacifism. He was very upset by the international situation (the September crisis).

On admission he gave evidence of great increase of pressure of activity, was distractible, elated and almost uncontrollable. He became at times commanding and aggressive, occasionally abusive. He thought that he knew all the patients and staff in the hospital and called them by familiar names. The picture soon changed to one of purposeless activity, with bewilderment. He would not speak, except occasionally to himself, was quite unapproachable, would not answer questions, refused to eat, constantly fell out of bed and was disoriented.

It was in this state that Insulin treatment was begun on 10th November 1938. As treatment progressed, the patient made a gradual improvement and came back into more touch with his surroundings. As one might expect, the immediate hypoglycaemic period gave evidence of a dramatic return to normal interest of a temporary nature. At these times he would waken from coma, ask where he was and carry on a normal and rational conversation for some minutes. This would disappear, and showed no signs of lengthening out into the rest of the day. He was able to go to the occupational class and later was allowed to go into town with his family. He continued to be preoccupied at times, was very reserved, and unwilling to discuss his

position. Frequently he would not answer questions. Since cessation of treatment, which occurred on 16th January, the patient has continued to improve in much the same way. His behaviour is now in every way normal and there is no abnormality of thinking. At no time during the illness was there evidence of hallucinations or of any formed delusions. Treatment consisted of forty-two days with thirty-one shocks.

DIAGNOSIS: There is little doubt that this is a case of a acute manic reaction, there being little to indicate a schizophrenic reaction. The duration of illness before admission was one month, and the onset was relatively acute. The total duration of illness has been seven months.

RESULT: Partial remission.

Case 38. (J.B.)

A man of 23, a building contractor, was admitted to the hospital on 11th August 1933.

There was no history of mental illness in the family. The patient came of healthy parents, and the home conditions were excellent. His early life was quite normal. At school he was clever, capable at his work, sociable, a keen footballer and an accomplished player of several musical instruments. He was of athletic build.

His illness came on insidiously, the first symptoms noticeable occurring in 1929, four years before admission. He had been working hard at evening classes and doing his work as a building contractor as well. In June 1930 he had a smash with a motor-bicycle and was slightly concussed. Thereafter he became unsettled, restless, excited, at times confused and difficult to manage. His work became unsatisfactory, his behaviour became erratic, asocial. Later he became apathetic and developed ideas of a fantastic, pseudo-philosophical character. He said that his condition was due to self-abuse and that he was not really the son of the people with whom he was staying. After a short period in a mental hospital in 1931, he returned home but was no better. In March 1932 he became impulsive in his behaviour and was at times wildly excited, being auditorily hallucinated. He then became dreamy, exclusive, speaking infrequently and irrelevantly, and at times actively homicidal and suicidal.

On admission he presented the picture as above, and it was with the greatest difficulty that he could be kept reasonably quiet and free from dangerous impulsive outbursts. He refused food and was sleepless. He lost a considerable amount of weight. A few months after admission he became quieter, but much more withdrawn and preoccupied, living in a world of fantasy. He spoke and laughed to himself, and adopted stereotyped attitudes. Mannerisms were common. A gradual dementia set in, so that by September 1937 his condition was beyond hope of recovery. His behaviour was entirely governed by his inner thought life. He was constantly hallucinated, talking to himself, laughing

and grimacing. He would always misidentify individuals, persistently calling the doctor "Mr Smith".

Treatment was begun on 8th September 1937. On the twelfth day of treatment the patient was giving so much resistance that the injections had to be discontinued. Two months later the course was started again and continued until 12th February 1938. He was given forty-one days treatment with thirteen shocks. A slight improvement in his behaviour was noticed. He became more co-operative and much more quiet. He was transferred to a quieter ward, allowed up all day and worked quite well in the gardens. The basic illness continued, hallucinations were unaffected, and there was no actual disturbance of the thought content. The duration of the illness before treatment was begun was nine years. In addition, a considerable amount of dementia was undoubtedly present.

DIAGNOSIS: This case was diagnosed as one of Hebe-
phrenia, and in 1933 the prognosis was considered to
be hopeless.

RESULT: No improvement.

Case 39. (W.D.)

A glass-worker, aged 37, was admitted to the Royal Edinburgh Hospital on 24th August 1938.

He came of a healthy and quite average working-class family. There was no history of mental or nervous illness in any member of the family. He was the second eldest in a family of seven.

His birth and first three years of life were normal in every way. Then a spinal curvature was noted and he was treated for Pott's disease. He was put in a plaster jacket and kept in his bed till he was 13 years old. Throughout this time he was a happy and courageous boy, never complaining or feeling that his lot was too hard. His schooling was interrupted as a result but as he grew older and stronger he was able to attend a special school. His special hobby was drawing and painting. When he was 13 he was encouraged to walk with the aid of crutches. He was of very small stature and all his life he has been weak and quite unable to walk any distance - perhaps 100 yards at most. Soon after he could walk a little he started to work, first as a moulder's apprentice and later as a thermometer maker. He liked work, was skilful and diligent. He made few friends and was always unhappy in the company of girls. In spite of his handicap, of which he was rather sensitive, he was able to carry on a relatively normal existence. He was very generous, enjoying doing odd jobs for friends, and for his mother to whom he was much attached. He had always taken a little port in the mornings to steady him.

About eight months before admission he began to complain of a trembling of the hands and felt that his interest in work was flagging. He seemed to be depressed and lacking in energy. His work became more and more difficult until he had to give it up altogether. He took to alcohol in an attempt to stop his depression and shakiness. He had always felt rather sensitive about his appearance and had taken a little to drink to give him more confidence. Eventually, a month before admission, he was admitted to the Royal Infirmary. After two days in the ward he suddenly became acutely excited, imagining that he was suffering from some terrible and incurable disease.

He was hearing voices telling him that he was finished and that he must do away with himself. He attempted suicide by cutting himself with a safety razor. He severely lacerated his arms, chest, neck and legs. He was transferred to the acute ward in the Infirmary and was later admitted to West House.

On admission he was for a short time relatively calm, and could carry on a rational conversation, giving an account of his illness with accuracy. From time to time he became subject to outbursts of excitement, during which he was actively hallucinated both visually and auditorily. He pleaded to be put out of his misery. He declared that he was an animal and that he would be better dead. He made half-hearted attempts to strangle himself. During some of his more "lucid" moments he explained that he had an "awful fear". He did not want to die before his mother. He said that he thought that he had mercury poisoning and that he was about to die when he was admitted to the Infirmary. He said that he was always afraid that people would call him a "hunchback". He said that he heard voices telling him that he had a brain tumour, that he was a dog or a rat, that he wasn't himself. Memories of sexual experiences with a baby girl, and later with a boy friend were reactivated and associated with much misery. He felt that he should pay for his sins by death. He wanted a razor to cut off his testicles.

Insulin treatment was begun on 5th September 1938. It was stopped on 7th October after he had been given seven shocks. Because of his small size it was found that 40 units produced a deep coma. Physical reactions were marked and the original shakiness of the hands was accentuated. No improvement was noted throughout treatment. His mother took him home, against medical advice on

DIAGNOSIS: This case was considered to be one of acute Schizophrenic Reaction.

Case 40. (W.T.)

A miner, aged 37, was admitted on 26th October 1937.

Family History: Negative.

Personality: Bright and promising boy, clever and industrious; shy and sensitive; has always been quiet and not fond of company.

Present Illness: 12-18 months' duration, with a previous attack seven years ago characterised by a paranoid reaction towards his father and hallucinations of hearing.

Present attack started with depression, hallucinations of hearing, followed by abnormal behaviour - refused to go out of the house, refused to speak and finally refused to take food.

On admission gave the appearance of a benign stupor with peevishness, refusal of food and the use of neologisms: required daily tube feeding until 11th February 1938 when insulin treatment was begun.

Insulin Treatment: On the tenth day he was given 130 units. Four and a half hours after injection he was persuaded to drink glucose and, ten minutes later, ate a meal consisting of soup and fish and potatoes - this was the first time he had taken any food since admission. For the next ten days of treatment hypoglycaemia was interrupted by glucose drink when he became euphoric and dreamy. Immediately after he took a meal with no persuasion; sometimes he even asked for more. On the twenty-second day, as no further progress was noted, hypoglycaemia was allowed to continue until a deep coma was produced.

On the fifty-fifth day of treatment he had had twenty-three comas and was able to take at least one good meal a day - this just after interruption. He was now more talkative and sociable, occasionally worked in the wards or in the gardens and had lost much of his apathy. He had also gained half a stone in weight. Treatment was discontinued although he was still quiet, shy, disinclined to associate with the other patients, preferring to sit by himself and

occasionally read.

After ten days, treatment was resumed as he had not taken any food by himself during that period and had relapsed almost into his stuporose state. On 26th May treatment was interrupted by the patient deciding to go home. He had been given seventy-one days of treatment, with thirty-one shocks. No further improvement was noted.

DIAGNOSIS: Paraphrenia.

RESULT: Temporary partial remission.

Notes: This case demonstrates:-

1. That light hypoglycaemia is effective for stuporose states.
 2. That high doses of insulin are effective in the treatment of patients who refuse to eat.
-

Case 41. (M.P.)

A student, aged 20, was admitted to Jordanburn Nerve Hospital on 23rd March, 1938. He was one of two brothers. His brother, who was older than he, dominated his life as a child. Their temperaments were very different. The patient was always quiet, shy, retiring and preferring to live a life of phantasy and abstraction, whereas the brother was a 'realist', well built, muscular, interested in sport, sociable, well-developed psycho-sexually.

From an early age the patient had reacted in a faulty manner to life's situations. A strong attachment to his mother, with a feeling of tenseness amounting to resentment towards his father, characterised his attitude in the home. At school he was afraid of playing games and very shy, especially in girls' company. He was very fond of a "pretty face" but had never the courage to go about with girls. At 14 he gave up all his sporting interests and concentrated upon his work. He excelled in his class, especially in mathematics. On leaving school he went to St. Andrews University with a bursary. He took first place in mathematics and a high place in his other subjects. Sexual habits began to worry him, and strong feelings of guilt became apparent. Then, at the age of 18, he started to complain of breathlessness, palpitation and shaking of the whole body. He felt weak and heavy about the limbs, and lacked concentration and power of sustained effort. He worried lest his heart was affected and, in spite of electrocardiographs taken when he was 19, he continued to be afraid of heart failure and death. He was much depressed, lost interest in his work so that in October, 1937, he gave it up altogether.

On admission he was apathetic and seemed to lack the proper response. He said that he wanted to die and yet he was afraid to die. Fears of heart failure, death preoccupations, tremblings, palpitations were all present. His case was very fully investigated and a course of analysis was instituted. After three months psychotherapy he had considerably improved and had obtained much insight into his many symptoms present - lack of energy and confidence, palpitation and preoccupation with various fears.

The course was started on 6th July and stopped on 16th September 1938. He was given twenty-seven shocks. A feature of his treatment was the ease with which he had gone into a very peaceful coma with 64 units.

This dose was never varied. Not much change was noted until the twenty-fifth day, when he had had fifteen shocks. By that time he had gained more confidence, was much more cheerful and willing to go into company. This symptomatic improvement went on until by the end of treatment he was able to do very much more than hitherto. Whereas before he had been content to remain indoors all day, reading or doing nothing, he was able to be out most afternoons. He played games, including badminton, resumed his hobby of photography, went out to see films and lost his palpitation. In addition he had gained several pounds in weight. Arrangements were then made for his discharge and he is now working in a C.A.'s office in Edinburgh and meeting life on a more equal footing. He has been encouraged to take more interest in social matters, and has accordingly joined a badminton club which he attends regularly and with enthusiasm.

The features of this case are those, essentially of an anxiety state, appearing in a schizoid personality. The presence of a rich phantasy life, which had paralysed him so far as normal living was concerned, and the fearful preoccupations leading to apathy and even suicidal contemplation, all indicate a severe disorder rather more involved than a mere anxiety neurosis. There is little doubt that psychotherapy and insulin treatment were about equal in their effects in synthesising the personality. Such a case demonstrates clearly the value of a combination of treatments.

DIAGNOSIS: Anxiety state in schizoid personality.

RESULT: Incomplete remission.

Case 42. (E.S.)

A clerk, aged 25, was admitted to hospital on 5th May 1937. No abnormal family history could be elicited.

He was an only child and much fussed over by his parents. At the age of four he showed signs of nervousness and shyness, becoming difficult to understand. At school his record was below average, both scholastically and athletically. At the age of 18, while at public school, he was noticed to be more lazy and indifferent, spending his time day-dreaming. Various means were tried to stimulate his interest and initiative, but all failed. He was sent on a world tour; he went on a farm; he worked in a shipping office for some time. Then he began to complain of vague abdominal pains, and was restless at nights. A normal appendix was removed, with no change in his condition. A further attempt at work resulted in reappearance of symptoms of greater intensity. There was inattention, stupidity and truancy, and at times he was confused in thought and speech. Psychotherapy was tried, but he became irritable in the home and was violent towards his mother. He took trips without motivation to London, Ireland and to various members of the family. He was thereafter in three mental hospitals within the space of a few months. Impulsive behaviour became apparent in hospital, and he attacked attendants with violence. He stated that he had murdered his aunt, a nurse and two girls. Frequently he heard voices ordering him to perform acts of violence.

On admission to hospital here he was apathetic, facile and withdrawn. Answers to questions were evasive. At times he would laugh and smile to himself with no apparent cause. Often he would talk to himself in a loud voice, and then become excited, smashing articles of furniture and trying to break down doors. He would go to the window and shout such phrases as "That's all very fine" or "You can't do that". Very quickly his more excited phases would subside, and he would become docile and withdrawn. He took no interest in his surroundings, and gave no evidence of spontaneity. His condition remained much the same until July 1938, when insulin treatment was begun. Physically he was in excellent health, being

a big, robust, athletic-looking man.

The course of therapy lasted fifty-three days, during which he was given fifteen shocks. Soon after treatment was begun it was learned that his behaviour was more quiet, that he did not laugh to himself so much and that he had ceased to have attacks of violence. On one or two occasions, on returning from consciousness, he became more approachable and seemed to be a little more "lucid". These periods were infrequent, however, and were always transient. No change was noted in the psychotic process.

The duration of illness until treatment was started was eight years. This duration and the degree of involvement were both adverse prognostic factors.

DIAGNOSIS: Hebephrenia.

RESULT: No improvement.

Case 43. (D.S.)

An ironmonger, aged 33, was admitted on 9th October 1930.

Family History: Father was three times in a mental hospital with attacks of melancholia. Two paternal uncles suffered from some form of mental illness.

Personality: Self-assertive, headstrong and quick-tempered.

Previous Illness: Was in hospital during the War following scalp wound. Diagnosis - dementia praecox.

Present Illness: Dated from his mother's death in 1929. He became morose, sleepless and complaining of heaviness in the head. A year later, there being no improvement, he was admitted to hospital. Since admission the illness has been variable, with no improvement. At times he is quiet, surly, preoccupied and apparently miserable, believing that he is going to die. At other times he is wildly excited, violent and impulsive, throwing articles at staff and patients. He precipitated himself at the window and believed he was about to die; dramatised his fear of death by making himself rigid, throwing his head back and declaring that he was dead. Occasionally he is docile and amiable. Usually he is unapproachable and unco-operative, resentful of any interference. His stream of thought is disconnected and irrelevant. He is often talkative, usually incomprehensible and occasionally perseverating. There is no apparent association between phrases. His mood is incongruous with his thinking and he will suddenly laugh for no obvious cause. There is a total lack of spontaneity of thought or action, and he has no power of sustained interest. No hallucinations are present although he admits to hearing unreal "voices" before admission. There is no intellectual impairment, and some insight. He knows that he is a patient in a mental hospital and his whole attitude is one of despair and misery towards it. He is well orientated.

Though there are some manic-depressive features in this case, there seems little doubt that the reaction is preponderantly schizophrenic. His attitude to everything is distorted and unpredictable. There is present an intra-psychic ataxia.

Treatment: Treatment was begun on 5th November 1937. For the first two days he could scarcely be persuaded to remain in bed, was obscene and very noisy. On the 7th day, with 90 units, he was more amenable and euphoric during treatment. Interruption with glucose drink at 1 p.m., but it was not till 6 p.m. that he fully awoke. Until then he spoke with a slurred, thick voice, but did not know where he was and had a vacant expression. On the 9th day he had his first light coma with 80 units. On the 22nd day he was responding to 100 units with a light coma coming on two and a half hours after an injection. The dose was, therefore, reduced until by the 46th day 40 units produced a deep coma. After interruption with 200 gms. glucose by intranasal tube, the coma deepened with loss of corneal reflex, profuse sweat and salivation and hypertonic spasms with flexion and extension. This coma continued until interrupted by 60 c.c.s glucose intravenously. This deepening of coma after interruption by nasal feed had occurred several times before. It was, therefore, thought advisable to interrupt by intravenous route each day and this overcame the difficulty.

Treatment was continued till the 60th day, when the coma dose was only 25 units.

Hypoglycaemia in this case was characterised usually by profuse sweating, great excitement, whistling, screeching, roaring, contorting and grimacing. The coma even with such a small dose invariably supervened before three hours and scarcely ever deepened until after interruption with intranasal glucose. Return to consciousness was always slow and showed the same symptoms as in hypoglycaemia, only more pronounced; he was extremely talkative, cheerful and amiable for some hours afterwards. He gained a few pounds in weight and became much more co-operative in his behaviour.

After a course of Cardiazol therapy in July 1938, this patient showed considerable agitation, with incoherent speech and at times impulsive behaviour. A second course of Insulin was started on 30th September 1938 and stopped on 3rd December 1938 after forty-three days with thirty shocks. No improvement was noted. A feature of his second course was that the shock dose was 60 units as against 100 in the first course.

DAIGNOSIS: Schizophrenic Reaction type.

RESULT: No improvement.

Notes: This case demonstrates:-

1. That chronic cases do not always require large coma doses.
 2. The danger of deepening coma after interruption by intranasal glucose and the advantage of it in these cases.
 3. The phenomenon of sensitization.
-

Case 44. (D.T.)

A man, aged 21, was admitted on 21st January 1938.

His mother and grandfather were of marked cyclothymic disposition, the latter having passed through a depressive illness lasting nine years. Other members of the mother's family were unstable, hypochondriacal, and frequently took to their beds for no reason except that life was too hard for them. The father had died a few weeks before admission to hospital; this event just preceded the development of the more acute symptoms of mental illness.

As a child he was very quiet, timid, and did not make friends easily with other children. His intellectual and physical development were normal and at school he proved to be clever above the average, especially in English. As an infant he had been occasionally subject to fainting fits, when he turned blue and then white. At the age of 10 he left Edinburgh, his birthplace, and went with his parents to Chicago and later to Philadelphia. He enjoyed travelling, and gave no trouble to his parents, always being most polite and considerate. He earned the nickname of "the Clean Boy" as he was always tidy about his appearance. As he grew older he showed promise in both the cholastic and the athletic sides. His interest was collecting photographs and newspaper articles about important people in the sporting, dramatic and political worlds. His knowledge of these people was encyclopoedic. This hobby kept him at home, and he never went out much or mixed with other children. He despised girls and parties. When he was 16 there was some trouble in the home because his father was staying out till very late at night, apparently in another woman's house. This considerably upset the patient, and he would frequently challenge his father about his conduct. Frequently there were scenes in which the patient was very overwrought. He would wait up at night till his father came home, and would be most weary and sleepy in the mornings. His work began to be affected. On leaving school he went to work in a publishing business. His attainments in English and Elocution made him a likely person to become an announcer on the Radio, and it was intended that he should be a Radio Informer for

his firm, answering listeners' questions. He started with proof reading but only after three weeks he was unhappy at work because his colleagues were watching him and following him to his home each night. The attentions of a chiropractor served to make him worse. He became sleepless, anorexic, offensive to his father, and would often mutter and joke to himself. Because of the development of illness in both father and son the family returned to Edinburgh. His father died and shortly after this he shut himself up in his room at home and refused to allow any one to enter. He refused food, did not wash or shave, accumulated all manner of filth on the floor, wrote innumerable articles for the papers which he then tore up and burned. He slept little and all night long he would prowls about the house and terrify his mother, who couldn't go near him. He kept the windows closed, shuttered and curtained. He could be heard repeating "blood, blood, blood" many times to himself.

When the doctor came to certify him he became terrified, shouted out "Keep me, keep me" and fell in a faint on the floor. On admission he was in an extreme state of filthiness and weakness. Being tall and haggard, he presented a terrifying picture. For several days he was restless, very unhappy, would faint or become very terrified if examined and could not be made to co-operate even in taking his food. Mannerisms were a striking feature of the condition, and he maintained an offhand, detached manner which is characteristic of the illness. He would never remain at rest. This state continued until insulin treatment was started on 30th August, 1938. A course, consisting of fifty-two days with twenty-seven shocks, was given but no improvement was noted except that he gained nearly a stone in weight. Treatment was characterised by a marked physical reaction during coma, with invariable vomiting and occasional rise of temperature after interruption. Mild after-shock was common. Atropine with the glucose feeds seemed to give some benefit. At no time did he show any lucid intervals.

The duration of illness before treatment was about two years. The relatively short duration of illness, together with the fact that the patient was well enough adapted, and intellectually and physically endowed, might have argued a favourable prognosis. The complete ineffectiveness of treatment proved that these criteria were of no value. The patient

176.

continues in this state of serious involvement.

DAIGNOSIS: Schizophrenic Reaction type.

RESULT: No improvement.

Case 45. (R.B.)

An accountant, aged 31, was admitted to the Royal Edinburgh Hospital on 5th March 1938.

The patient's father and one sister had been certified patients in mental hospitals. The other members of the family were all inclined to be hypochondriacal.

The patient was born shortly after the father was discharged from mental hospital. The father was cruel towards his family and often punished the patient severely for minor offences. At school the patient was clever and popular. Two attacks of pneumonia, several attacks of "rheumatism" and a "strained heart" interrupted his schooling. At 14 he broke his nose and subsequently suffered from nasal catarrh. He left school after this and went to Glasgow University, where he studied mathematics and philosophy, intending to become a science teacher. At this stage he started the habit of masturbation, which has continued. After three months at University he had to give up work because of a "nervous breakdown", with headaches, nausea and anorexia, brought on in association with guilt feelings over masturbation. Then he had an attack of incontinence of urine. He became afraid of returning to Glasgow, and so gave up his plans of going in for teaching. For a short time he was in England to convalesce, and there he fell in love with his cousin. On returning home he obtained a post as assistant to an accountant. He quickly learned his job, took classes and then sat and passed his examination for C.A. He worked in Glasgow and then broke down again with headaches, vomiting and sleeplessness. A further period of convalescence in England brought him in contact with his cousin, with whom he was still in love. He was then examined by a specialist, who proof-punctured both his antra and straightened the nasal septum. A short period on a farm did not improve his condition and he went with complaints of rheumatic pains and abdominal pain. He was operated upon for appendicitis and seemed to improve for a short time. His auto-erotic practices continued and in an effort to overcome this habit he indulged in illicit relations with many different women acquaintances. His love for his cousin persisted until he declared to his parents that he was going to marry

her. This was met by stern resistance from the parents and so, to spite them, he went off and married another girl. He was at that time employed with an Insurance Company. After two years of married life he felt business was too much for him and became ill with pains in the cheek, headache and vomiting. A radical antrum operation was performed for acute sinusitis. Thereafter he became progressively more depressed and lost confidence in himself. He was given a course of Weir Mitchell treatment and improved again. He would not return to his work but went off to the country and started marked gardening. Symptoms persisted for about two years but, just as he thought matters were improving, he developed tonsillitis. After this he started a small insurance business in Stranraer, and was very successful. He developed an infatuation for his secretary and declared to his wife that he was in love with her. The strained position at home was responsible for an aggravation of symptoms, and he became afraid that he would be knocked down and killed by motor traffic. He became depressed and thought that life was not worth living. He drank a bottle of what he thought was poison, but nothing happened. He was then admitted to a home in Edinburgh, where he continued in a depressed state, threatened suicide and at times was actually hallucinated. He imagined that he saw his family in his room. He became terrified by this and thought he was going insane. He was admitted to the Royal Edinburgh Hospital, where his condition remained unaltered. His chief complaint was pain in the cheek bone which, he said, was driving him mad. He threatened suicide and frequently attracted attention by falling in a "faint" upon the floor, though not losing consciousness. He was apprehensive and very much afraid of everything.

Insulin treatment was begun on 21st March 1938. On the ninth day of treatment he was given 100 units insulin and went into deep coma for about fifteen minutes. On returning to consciousness he was at first confused, later euphoric and over-talkative. He remained in this state of euphoria for about half an hour, when he said that he was feeling in excellent health. The pain had disappeared and the depression had lifted. This did not persist, nor did it return throughout the rest of the course. At the end of treatment he was more calm, his fainting fits had disappeared. In his more euphoric moments his greater approachability was utilised by short sessions of psychotherapy. After sixty-three days with fifteen

shocks treatment was stopped. Soon after this many of his symptoms reappeared, notably the pain in the cheek, the depression and loss of confidence. He was examined by a neuro-surgeon and later operated upon for trigeminal neuralgia. Unfortunately this method of treatment was no more successful than other measured which had hitherto been adopted.

DIAGNOSIS: This case is one of psychopathic personality, in which the patient has reacted in an inadequate manner to each and every life situation. Insulin treatment was carried out primarily in the hope of clearing up the more serious symptoms, and in this it met with some success. Psychotherapy was also made use of in the more accessible phases of treatment. It is doubtful, however, if this is a suitable case for insulin treatment.

RESULT: Temporary partial remission.

Case 46. (J.A.)

A man, aged 20, was admitted to hospital on 17th June 1937. A maternal grandmother had suffered a mental breakdown from which she recovered, but which left her temperamental.

His early life was normal, except that his mother spoiled him and lavished too much attention upon him, protecting him from the realities of life as long as she could. When he went to secondary school he met with a big surprise, and did not like being with so many other boys. In spite of this he excelled in his lessons and won a prize at the end of each session. He was a big boy for his age, and strong. He played cricket, rugby and golf. In the home he was shy and reserved towards his father, but was more intimate with his mother. He made few friends at school. At 15 he became greatly attracted to a girl. At this time sex matters had been a prominent source of worry to him and he admitted masturbation guilt feelings. He had been told by a friend that such a habit led to serious illnesses. At 17 he left school and came to Edinburgh to study Medicine. He worked with great zest and took an interest in the social life of the University, which he found refreshing. He obtained the medal in Zoology and passed his 1st professional examination with no difficulty, though he worked very hard and until late at night for it. He joined the O.T.C. and took an interest in the "Oxford Group". At the beginning of his second year he became badly worried in case he would not get through his work. He slept badly and went off his food. He lost weight and developed the idea that he had cancer. He poisoned his thumb, and somehow developed the idea that he would be thought lazy and malingering. He then fell behind with his work, and he thought that he was letting the family down. He broke down completely, could do no work at all and finally consulted a doctor who advised him to give up medicine. Shortly after this he broke off relations with the girl with whom he had been friendly since the age of 15. He remained at home, leading an aimless existence, lying in bed for the greater part of the morning and having little inclination to read or take exercise. In April 1935 he broke down and wept bitterly, giving no explanation for this except that he thought that he had been "overdoing things". He did not know what

was going to happen to him and he "felt Godless". After seeing a mental specialist, of whom he was much afraid, he was advised to take up work again in a chemical works laboratory. A slight improvement followed but soon his interest flagged and he became despondent as ever. He began to fear that he was going insane and that others noticed this too. He lost weight, was often sick and had to give up work altogether. He became irritable in the home and would fly into tantrums. Once he tore his shirt into shreds; on another occasion he broke up a chair when he was having an argument with his father. His tantrums became so frequent, especially at night, that he became unmanageable at home.

On admission he was obedient and quiet, apparently content to remain in hospital. He was unapproachable, and he would give no account of himself. Despondency was the most striking feature. Often he would repeat: "What's the use of it all?" in a hopeless despairing manner. He felt that he had failed in life and at times entertained the idea of suicide. He said that he was too much of a coward and that this was also a failing of his father, to whom he showed some vindictiveness. Apart from reading occasionally, and playing the organ, he displayed no interest or spontaneity. He continued to be dull, apathetic, preoccupied and lacking in volition until insulin treatment was begun on 31st April 1938. His first reaction to treatment was rather antagonistic. He saw no reason for it, and complained that if there was any good in it he should have been given it nine months before. During light hypoglycaemia for the first ten days he became more talkative, expressing vague paranoid ideas, and saying that the effect of the treatment would only be temporary, that his improvement was up to himself, and that he would be better killed. After twenty-two days treatment was stopped. He had been given twelve shocks with one fit. It had been intended to resume treatment later, but he showed some improvement, with return of such initiative, shortly after cessation of treatment, that he was put on probation. Much of his apathy had disappeared and he seemed anxious to leave hospital and try to work again. He was discharged on 9th July, but returned on 5th October 1938, having returned to his former state. It is understood that he met with a car accident and sustained some injury. A course of triazol injections was given but with no

success. He continues in a state of chronic apathy with seclusiveness.

The probable duration of illness before treatment was three years, although symptoms of a mal-adjusted personality were observed nine years before treatment was started. Such a case, with no productiveness of symptoms, with insidious onset of long duration, is particularly unfavourable for treatment.

RESULT: Partial temporary improvement.

REFERENCES.

- Anon. Sketches in Bedlam. London, 1823.
- British Medical Journal. Leading Article - "Insulin for Schizophrenia", 1938, 1, 900.
- Bychowski, G. et al. "Recherches sur le traitement des maladies mentales par l'Insuline." L'Encéphale, May 1937.
- Cameron, D. E. Further Experiences in Insulin Hypoglycaemic treatment of Schizophrenia. Journal of Nervous and Mental Disease, 1938, 87, 14.
- Encephalogram of Schizophrenics during Insulin Treatments. Am. J. Psych., 1937, 94, 183.
- Cohen, H. and Libman, J. Observations on the site of the antagonistic action of posterior pituitary extracts on Insulin Hypoglycaemia. Quart. Jour. Med., 1937, VI, 151.
- Conolly, J. The Treatment of the Insane without Mechanical Restraints. London, 1856.
- Deussen, J. Methodische zur Insulin-Schocktherapie. Allgem. Zeitsch. f. Psych. v. Med. - 1937.
- Dussik, K. T. Zur Schizophreniebehandlung. Allgem. Zeitsch. f. Psych. v. Ihre Grenzgeb. 1938, 107.
- Easton, N. L. A case of Protracted Hypoglycaemia. Am. J. Psych., 1938, 94, 853.
- English, W. M. Report of the treatment with Manganese Chloride, of 230 mental patients. Am. j. Psychiat., 1929, 9, 569.
- Feldhofen, M. Schwierigkeiten und Gefahren der Insulinschockbehandlung der Schizophrenie. Allgem. Zeitsch. f. Psych. v. p-g. Med. 1937, p. 281.
- Fraser, R., Mann, S.A., Maclay, W.S. Hyperinsulinism due to Pancreatic Islet Adenoma. Quarterly Journ. of Med., 1938, VII, 115.

Fraser, R. Interruption of Coma in Insulin Shock.
Lancet, 1939, 1, 140.

Freudenberg, R. Insulin Therapy - A Review with
special reference to Mechanism of Cure.
J.M.S., 1938, 64, 348, 165.

Frostig, J. P. Tentative directions and system of
recording. (Trans.)
Arch. Neur. & Psych., 1938, 39, 219.

Gellhorn, E. Action of Hypoglycaemia on Central
Nervous System.
Jour. Amer. Med. Assoc., 1938, 110, 1433.

Effects of Hypoglycaemia and Anoxia on the
Central Nervous System. A basis for
rational therapy of schizophrenia.
Archives of Neurology and Psychiatry, 1938,
40, 125.

Gillmann, S. W., & Parfitt, D. N. Insulin Sensitivity
& Sensitization.
Lancet, 1937, 2, 743.

Glueck, B. Clinical Experience of Hypoglycaemic
Therapy of Psychoses.
Jour. Ment. Nerv. Dis., 1937, 85, 5, 564.

Effect of Hypoglycaemic Therapy on the
Psychotic Process.
Am. J. Psych., 1937, 94, 171.

Grosh, L. C. Insulin in the Treatment of Acute Mania.
Jour. Nerv. Ment. Dis., 1938, 87, 5, 559.

Hamilton, J. G. After-Shock in Treatment of Schizo-
phrenia.
Lancet, 1937, 2, 1074.

Henderson, D. K., and Gillespie, R. D. Textbook of
Psychiatry. London, O.U.P., 1936.

Henderson, W. R. and Wilson, W. C. Intraventricular
Injection of Acetyl Choline and Eserine in
Man.
Quar. Jour. Expt. Phys., 1936, 26, March 16.

Horanyi-Hechst, B. et al. Blood Sugar during Hypo-
glycaemic Shock Therapy of Schizophrenia.
Ztschr. f. Klin. Med., 1937, 131, 435.

- Hinsie, L. E. and Katz, Siegfried, E. Treatment of Manic-depressive Psychoses. Am. J. Psychiat., 1931, 11, 131.
- James, G. W. B., Freudenberg, R. and Cannon, A. T. Insulin Shock in Schizophrenia. Lancet, 1937, 1, 1101.
- John, H. J. The Problem of Insulin Shock. Am. J. Psych., 1937, 94, 175.
- Katzenelbogen, S., Harms, H. and Clark, D. A. Hypoglycaemic (Insulin) Treatment of Schizophrenia. Am. Jour. Psych., 1937, 94, 135.
- Kellog, T. H. Textbook of Mental Diseases. London, Churchill, 1897.
- Lancet, The Leading Articles.-
 1. Prognosis of Schizophrenia. 1938, 1, 384.
 2. Insulin Shock in Psychiatry. 1938, 1, 789.
 3. Treatment of Schizophrenia by Insulin. 1936, 1, 760.
- Langfeldt. A Case of Coma produced with 7.2 units Insulin. Lancet, 1937, 2, 1135.
- Larkin, E. H. Insulin Shock in Schizophrenia. B.M.J., 1937, 1, 745.
- McCowan, P. K. Ninety-Eighth Annual Report, Crichton Royal Institute, Dumfries, 1937.
- Moersch, F. P. Hypoglycaemic Shock in Treatment of Schizophrenia. Proc. of Staff Meeting, Mayo Clinic, 1938, 13, February 23.
- Moersch, F. P. and Kepler, E. J. Psychiatric Manifestations of Hypoglycaemia. Am. J. Psych., 1937, 94, 89.
- Moersch, F. P. and Kernohan, J. W. Hypoglycaemia: Neurologic and Neuropathologic Studies. Arch. Neur. Psych., 1938, 39, 242.
- Müller, M. Treatment of Schizophrenia by Insulin. Annales Medico-Psych., 1936, 15.

- Neuburger, M. History of Medicine, London, O.U.P. 1910.
- Petrie, P. Hypoglycaemic Treatment of Schizophrenia - Some Impressions.
Jour. Ment. Sc., 1938, 64, 348, 156.
- Pickworth, F. A. Discussion - Jour. Ment. Sc., 1938, 64, 348, 161.
- Porch'er, Y. et Leconte, M. Discussion - Remarques cliniques sur la période précomateuse au cours du traitement des états schizophréniques par l'Insulinthérapie. La phase de coma considérée comme non nécessaire.
Annales Médico-Psych., 1938, XV, No. 1.
- Roemer, R. Die Veröffentlichungen über die Insulinbehandlung der Schizophrenie.
All. Zeitsch. f. Psych. und Psych. Ger. Med., 1937, p. 23.
- Ross, J. R. Report of Hypoglycaemic Treatment in New York State Hospitals.
Am. J. Psych., 1937, 131.
- Ross, Jno. The Pharmacological shock treatment of Schizophrenia.
Am. J. Psychiat., 1939, 95, 769.
- Rudolph, G. Discussion - Jour. Ment. Sc., 1938, 64, 348, 162.
- Rudolf, G. de M. Experimental treatments of Schizophrenia.
Jour. of Ment. Sc., 1931, 77, 767.
- Russell, L. W. Insulin Treatment of Schizophrenia.
Lancet, 1937, I, 747.
- Sakel, M. Neue Behandlungsmethode der Schizophrenie.
Vienna, Verleg. Moritz. Perles.
- Origin and Nature of Hypoglycaemia and Therapy of Psychoses.
Jour. Ner. Ment. Dis., 1937, 85, 5, 561.
- Methodical Use of Hypoglycaemia in Treatment of Psychoses.
Am. J. Psych., 1937, 94, 111.

- Sharp, J. B. (Editor) Report of Madhouses.
London, 1815.
- Smith, H. M. Hypoglycaemic Therapy of Schizophrenia
- Eight Cases.
Jour. Amer. Med. Assoc., 1937, 108, 1959.
- Strecker, H. Pullar Recent Advances in Insulin
Treatment.
Jour. Ment. Sc., 1938, 64, 348, 146.
- Discussion - Jour. Ment. Sc., 1938, 64,
348, 163.
- Comparison of Insulin and Cardiozol
Therapies in Treatment of Schizophrenia.
Lancet, 1938, I, 371.
- Van der Veer. Treatment of Schizophrenia with Insulin
Shock.
Am. J. of Psychiat., 1938, 95, 255.
- Wilson, Isabel A Study of Hypoglycaemic Shock Treat-
ment in Schizophrenia.
H. M. Stationery Office - 1937.
- Wortis, J. Collected Abstract of Sakel Treatment.
Jour. Nerv. Ment. Dis., 1937, 85, 581.
- On Response of Schizophrenic Subjects to
Hypoglycaemic Insulin Shock.
Jour. Nerv. Ment. Dis., 1936, 84, 5, 497.
- Experiences with Hypoglycaemic Treatment
of Psychoses.
Jour. Nerv. Ment. Dis., 1937, 85, 5, 565.
- Young, G. A., Young, R. H., and Roucek, L. Hypogly-
caemic Shock Treatment of Schizophrenia.
Am. J. of Psych., 1937, 94, 159.
-