*Some Points in the Relation of Diabetes to Insanity.**

By C. HUBERT BOND, M.D., B.Sc., Pathologist and Assistant Medical Officer, London County Asylum, Banstead.

At the outset it should be stated that, if the term diabetes is to necessarily include the three cardinal symptoms—permanent glycosuria, polyuria, and thirst—the term glycosuria should be added to the title of this paper. For several of the cases upon which it is based, and which, at the request of Dr. Claye Shaw, I am about to communicate to the Association, exhibit little beyond more or less permanent glycosuria. But, inasmuch as there is no abrupt line of demarcation between classical cases of diabetes and those where one or more of the symptoms are absent, and inasmuch as it has already been pointed out by other writers that the presence of mental symptoms is apt to mask the bodily ones, and, further, since allusion will be made to a few possible cases of diabetes insipidus, it has been deemed best to adhere to the original title which appeared in the list of subjects suggested for discussion at this meeting.

That some connection exists between insanity and diabetes appears to be admitted, but their exact relationship is still uncertain. Dr. Maudsley† has drawn attention to the fact that "diabetes is a disease which often shows itself in families in which insanity prevails," and states that the two diseases "are certainly found to run side by side, or alternately with one another, more often than can be accounted for by accidental coincidence or sequence." It is known, too, that various nervous symptoms may develop in the course of the disease. The patient may become apathetic, morose, taciturn, and irritable, and insanity sometimes supervenes.‡ Intense anxiety and other mental disturbance, such as a paroxysm of grief or anger, are stated§ as sometimes having been definite causes of an attack of diabetes. The question of the relationship of diabetes to insanity is not a new one by any means. The subject was discussed by Dr.

* Read at the Annual Meeting of the British Medical Association, held in London, August, 1895.

† "The Pathology of Mind," 1879, p. 113.

‡ "Theory and Practice of Medicine," Bristowe, 7th edition.

§ "Principles and Practice of Medicine," Fagge, 3rd edition, Vol. ii., p. 585.

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Savage* before the Medical Society in 1890. His conclusions I will quote *in extenso*. They are:—"1. Diabetes might arise from local brain disease or injury, and similar conditions might give rise to insanity. 2. Similar bodily conditions might give rise to both diabetes and insanity. 3. In certain states some of the symptoms in diabetes might follow on brain changes without diabetes as a whole being developed. In other cases this might be polyuria or glycosuria. 4. In insanity, proper diabetes was uncommon. 5. Diabetes and insanity ran together in the same families, the same holding good with epilepsy, the two conditions occasionally alternating in the same individual. 6. When insanity and diabetes coincided, the insanity was usually of the melancholic type, and the symptoms of diabetes were modified by the relationship—urine might be small in quantity, or sugar absent, or no increased appetite."

Fairly numerous instances have been recorded where glycosuria has been associated with gross cerebral lesions.† But I have succeeded in coming across but few detailed descriptions of cases in which glycosuria and insanity have been associated. Dr. Savage relates‡ in detail three such cases, while Dr. Clouston has described a "Diabetic Insanity," instancing two cases of true diabetes and one of diabetes insipidus.§ The former author has stated‖ that it was almost unknown for him to have a true case of diabetes among his insane. Dr. Claye Shaw tells me that previous cases which have occurred at Banstead Asylum have shown a tendency for the mental to alternate with the physical symptoms. That it is comparatively rare to meet with sugar in the urine of the insane, I would agree, provided the observations are made upon the total number of patients in our asylums, which usually includes such a large residuum of chronic dements. But limiting our observations to the urine of recent cases, I am of opinion that a larger proportion of saccharine urines would be discovered. Even among the chronic and demented patients, I think it very probable that a thorough and systematic examination of the urines would reveal sporadic cases of glycosuria in sufficient

* "Brit. Med. Journal," 1890, Vol. ii., p. 1184.

† For references to these, *vide* Tuke's "Dict. of Psychol. Med.," Vol. ii., p. 1349.

‡ "Insanity and Allied Neuroses," Savage, 2nd edition, p. 411.

§ "Mental Diseases," Clouston, 3rd edition, p. 636.

‖ "Alternation of Neuroses," "Journ. Ment. Science," Vol. xxxii., p. 490.

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numbers to repay the trouble entailed. To illustrate this, mention might, perhaps, be profitably made of a case in point. In February last we had twenty chronic cases transferred back to us from Nottingham Asylum; the length of time they had been under certificate ranged from six to thirty-five years. An examination was made of the urines of each, and in one instance (W. D.) I satisfied myself that sugar was present. I afterwards discovered that he was passing about 56 ozs. of urine daily, acid in reaction, sp.g. 1017, and containing glucose to the extent of 1¼ grain per ounce (the total amount of urea was 364 grains). Now there was nothing in this patient's appearance or symptoms to lead one to suspect glycosuria. He is a quiet, inoffensive man of 54, suffering from dementia, consecutive to an attack of melancholia, which came on at the age of 28. He is not a specially obese man—weight, 11 stone. He is in very fair health, but leads a completely vegetative existence. He never speaks, not even when addressed.

Certain doubts have been cast in previous investigations, as to whether in some of the cases, where reduction of the copper solution took place, an excess of lithates or some other body, not sugar, were not after all probably the real reducing agent. In the above-mentioned case and in all the following ones, in which I have suspected glycosuria, the urine has always been collected after making sure that no drug was being administered to the patient which might cause a fallacious reaction, and in every instance, before finally coming to a conclusion, the fermentation test has been resorted to.

The present investigation, carried on at Banstead Asylum, has extended over a period of 18 months. Between the 11th of January, 1894, and the 25th of June, 1895, there were (excluding transfers) 268 males admitted to the asylum; and in 175 of these an examination of the urine was made within 48 hours after admission. In 12 instances, or in 6·85 per cent. of these 175 cases, sugar was almost certainly proved to be present. The urine of these 12 patients has been tested for sugar almost daily, involving an examination of considerably over a thousand samples; and at frequent intervals—sometimes daily—the exact amount of glucose has been determined by Pavy's fluid, and corroborated by Roberts' fermentation method, where a sufficiency of glucose was present to admit of this. The following table indicates the varieties of mental disease under

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which these admissions laboured, and the distribution among them of the 12 examples of glycosuria :—

Form of Mental Disorder.	Total Number of Cases.	Instances of Glycosuria on Admission.
Congenital Cases ...	2	—
Epileptic Insanity ...	18	—
General Paralysis ...	30	3
Mania	43	—
Melancholia	55	
Delusional Insanity...	5	—
Organic Dementia ...	6	2
Senile Insanity ...	16	1
Totals ...	175	12

I will now proceed to give an account of these 12 cases, taking them in the order in which they appear in the table. I will supplement this by a description of four cases, which have occurred on the female side of the asylum within the last two years, and to which my attention was drawn by my colleagues.

CASE I. is that of T. M., aged 31. His wife states that he has always been a reserved, quiet man, and of strictly temperate habits. He was the manager of a book-shop, which position he lost, and in consequence was much worried. He became sleepless, abnormally silent, and intensely depressed. Refused to take his food and drink, and to speak. He was admitted into the asylum in June, 1894. He was dull, confused, and partly stuporose. It took him a long time to comprehend and answer questions. Physically, he was weak and emaciated. Pupils sluggish in reaction. Knee-reflex exaggerated. Palate distinctly neurotic, and he has a sister in another asylum. The urine had a sp. gr. of 1031, and contained sugar to the extent of two grains per ounce for a week after admission; the total amount voided was normal. Since then it has been free from sugar except on isolated occasions. His acute mental symptoms have all passed

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off, and he is now very demented; never speaks except addressed, and then only in a listless fashion. He appears to have no delusions. There is little doubt, however, that he is a general paralytic. His speech is typical of the disease, tongue tremulous, and there are plentiful fine tremors round the mouth. All lines of facial expression have been totally wiped out. The pupils are unequal and irregular, and the knee-reflexes are rather too brisk. He has gained 23lbs. in weight. His temperature is, and always since he has been here, has been low,—97° F.

CASE II. is also an undoubted but atypical general paralytic. It is that of A. J. M., admitted into the asylum in November, 1894, aged 31. His mind had then been affected three months. A cousin of his, on the paternal side, died in Hanwell Asylum. The patient shows the neurotic taint in an extremely high and narrow palate. From the first, though excited and restless, he was more depressed than elated. He had a delusion that he was going to be burnt to death. The physical signs, however, were, and still are, typically those of general paralysis. For rather more than three weeks his urine contained sugar, from a trace, up to two grains per ounce. It was free from albumen, usually alkaline in reaction, and of a low sp. gr. (about 1010). The total amount passed was normal. Towards the end of last December he had a succession of "seizures." Since then he has rapidly been going down-hill, and has become very demented. He had a second succession last May, and a third on the 1st of last month. Since the first "seizure" the urine has remained free from sugar. His temperature is usually 0·5° below normal. He has lost rather more than a stone in weight during the last six months.

CASE III. is that of A. H. J., who was admitted in January of this year, aged 34. The diagnosis of general paralysis in this case is only provisional; but the presence of considerable lingual and facial tremor and a fairly characteristic speech is very suggestive of it, especially in the absence of any history of alcoholic excesses, which both he and his relatives entirely deny. Great depression and general apathy, with some delusions of persecution, sum up his mental condition on admission. It was said by his wife that this state had existed, on and off, for a year, and had followed upon much worry from the death of a favourite child and the accidental loss of his employment—that of a labourer. There is no other instance of insanity at all known in the family. The patient, however, had "convulsions" at teething, and has a high and narrow palate. He has a rather nervous manner. The knee-reflexes are if anything slightly exaggerated. Sugar was detected in the urine on admission, and continued for six weeks, from a trace up to 200 grains of glucose daily, the usual amount being 180 grains. During this time the patient remained very depressed, was fond of hiding away round corners; at times he

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showed some tendency to be pugnacious. His depression gradually passed away, and has not returned; but there is a certain amount of mental enfeeblement noticeable. The tremors, however, remain well marked. To return to the state of the urine. Sugar was absent during the second six weeks after admission; it then was present for eleven days. It then again ceased to be detectable for nearly three weeks; it returned for four days, but has not been present from the 24th of May up to now. The sp. gr. has varied between 1010 and 1030, but quite irrespectively of the amount or presence of sugar. The reaction has always been acid. The total quantity of urine passed per diem has never exceeded 70 oz.; it is nearly always close upon 60 oz. At first his temperature remained most uniform at 97° F.; now it is 98°. No other symptoms of diabetes have been observable. He has gained 8lbs. in weight since admission.

To sum up these three cases,—two are undoubtedly general paralytics, and the third one is most probably another. They are of the melancholic and demented type. Glycosuria was present during the time their depression was most marked, and has now passed away. We have no evidence to show whether any trace of glycosuria existed prior to the existence of mental disease.

In the next six cases melancholia has been the predominant symptom.

CASE IV. was that of R. J. M., admitted on September 1st, 1894, aged 46. He had formerly been an asylum attendant, but lately a hatter. No personal or family history was obtainable. On admission he was noted to be a small spare man (weight 7st. 7lbs.). He had an anxious, careworn expression, and looked much run-down. He had a well marked *arcus senilis*. The palate was well formed and the knee-reflex normal. With very great depression there was coupled a very marked impairment of memory for all recent events. The duration of his illness given on the certificate was two weeks. The urine on admission was normal in colour, sp. g. 1015, acid in reaction, free from albumen, but contained sugar. The total amount of urine for 24 hours was estimated six days after admission, and found to be 32 oz., and contained 277 grains of glucose. For a month, during which he gained $3\frac{1}{2}$ lbs. in weight, he remained mentally unchanged. He could not even remember which was his own ward. He was quite conscious of his defective memory, and showed in consequence much nervousness in manner when being questioned. During the next month his depression and confusion partly passed off. Progress was afterwards uninterrupted, and the patient was discharged recovered, after a residence of very nearly four months, having gained a stone in weight. At frequent intervals quantitative ex-

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amination was made of the urine. The amount voided in 24 hours averaged 65 oz., the highest figure recorded being 96 oz. The sp. gr. ranged from 1009 to 1021, but seemed to bear no definite relation to the presence or absence of sugar. For the first month sugar was present almost daily, but in most erratic quantities, varying from a trace up to 280 grains per diem. During the second and third months a reaction was obtainable about every third or fourth day, but its intensity gradually diminished, and for three weeks before the patient's discharge the urine was free from sugar. Patient always denied all alcoholic excesses, though his memory strongly suggested such; but he stated that he had suffered much from business worries.

The chief interest in this case lies in the remarkable parallelism exhibited between the acuteness of the mental symptoms and the presence of glycosuria. This is brought out still more clearly in the following case :—

Case V. was that of T. J. P., single, admitted on April 16th, this year, aged 57, a tobacconist. He had been well educated; had done much work at calculating figures. He had been by no means a teetotaler, but only shortly before this attack had he really drunk much to excess. His father had been insane and committed suicide when the patient was aged seven. No other member of the family was known to have been insane, nor was any instance of diabetes known of. A brother died of phthisis. For six months prior to admission the patient had gradually more and more been showing decided traits of mental derangement. He exaggerated his business worries, and became possessed of the idea that some pecuniary disaster was impending. His depression so far advanced that at times he had an inclination towards suicide. A few days before his removal he became quite excited and lost control over himself. On admission, however, he was quite calm and could give a collected account of himself. Though his memory seemed good, he was yet very confused and recognized the fact. Physically, he was a well nourished man, with a sallow complexion and rather despondent expression. The first cardiac sound was almost inaudible, the second accentuated: the beats occasionally intermitted. He had other signs of vascular degeneration in a very pronounced *arcus senilis.* Palate and knee-jerks normal. The urine on admission contained sugar to the extent of 13 grains to the ounce; and it was afterwards found that he regularly passed 45 to 50 oz. daily, acid in reaction, and free from albumen. A daily estimation of the sugar was made. It rapidly diminished from 13 to 4 grains in the ounce, and ultimately to *nil.* The sp. gr. bore a fairly constant ratio to the amount of glucose present. When this was at its maximum it was 1026; when free from sugar it was about 1012. For the first few days after admis-

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sion the patient was profoundly depressed, and it was then that the sugar was at its maximum. His temperature was very low, ranging from 96·5° to 97° F. Coincidently with his gradual improvement the sugar diminished. He gained weight, looked brighter, and in three weeks was apparently convalescent. For four days the urine had remained free from sugar, but on the 7th of May its sp. gr. rose to 1020, and it contained seven grains to the ounce. It transpired, on inquiry, that his friends had been the previous afternoon, which visit had much upset him, and caused him to become markedly depressed again. A fact such as this should not, I think, be lightly dismissed. For nearly a week the sugar ranged from four to seven grains in the ounce. He then recovered his spirits, and once again the sugar decreased to a mere trace, which remained until the 21st of May, after which date the urine remained free from it, until he was discharged recovered on June 21st.

Most curiously on that morning a good reaction was obtained to Fehling's solution. Is it possible that emotion—joy at his liberation—might have caused this? Outwardly, however, he was in no way perturbed. In this case it is again impossible to fix any date as to the onset of the glycosuria. He informed me that in the months preceding his admission he had lost three stones in weight. This fact makes one think that, at least, it is not improbable that he was passing sugar some little time before, and possibly in greater amounts than when under my observation; but he did not recall that at any time he was specially thirsty or hungry.

These last two cases are interesting in showing that the discovery of glycosuria does not necessarily imply a grave prognosis as regards mental recovery. Out of my small collection of cases, they are the only two that have as yet been discharged recovered. A study of future similar cases might possibly give us data whereby we could use the diminution in the glycosuria as an index of true mental recovery; just as we are always glad to see a melancholic fattening and putting on weight at the time that mental improvement occurs. Though it must be admitted that the presence of sugar on the day of discharge of one of these patients somewhat loosens the closeness of the connection.

CASE VI. is that of T. C., admitted May 10th this year, aged 68. I should perhaps have included him among the senile cases, but mental depression has been so prominent a symptom that I have classed him among the melancholics. There has been no other known instance of insanity in the family. His father and a brother died of phthisis. Patient has been a carpenter. For many years (since the age of 26) he has taken rather too freely of alcohol; but,

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on being left a legacy, he gave up work and drank this money away during the six months before he was sent to us. On admission he was thin and haggard looking. The minute vessels of the skin over the body generally, and especially of the cheeks, were congested, walls of larger vessels hard, and the first cardiac sound was difficult to hear. There is a well-marked *arcus senilis.* The tongue was tremulous; pupils rather contracted, otherwise normal, as were also the knee-jerk and palate. He was very low-spirited and desponding; would cry to himself. His memory for recent events, too, was much impaired. He was found to be passing 108 grains of sugar daily, and at first there was a trace of albumen in the urine, which was acid in reaction, sp. gr. 1020, and was normal in amount. He has never been observed to pass more than 50 oz. per diem. A fortnight after admission the daily excretion of sugar had come down to 44 grains and then disappeared altogether, and has not been since detected except for a trace on the 10th of July. The urea has always been small in amount; has never exceeded 360 grains, but was very slightly under 300 grains when the sugar was at its maximum. His temperature at first frequently registered only 97°F., and even now seldom reaches 98°. His appetite was at first ravenous, but is now rather poor. He has never been unduly thirsty. He has gained a stone in weight. The melancholia is certainly not so marked; but, with the disappearance of glycosuria, it has by no means cleared off in the complete way it did in the two preceding instances. His memory is as bad as ever.

Though not so marked as in the previous two cases, the parallelism between the glycosuria and the mental symptoms is sufficiently seen to make the future history of this patient of great interest.

Case VII. is that of S. H., admitted April 11th, 1894, aged 21. He comes of a very bad stock. He has one sister in Darenth Asylum, another had fits; and several uncles on the paternal side are epileptics. He has a very high and narrow palate. When first he came to us he was very melancholic, had delusions of past persecution, and many peculiar religious fancies. He believed he heard the voice of God talking to him. Traces of sugar were detected in the urine, but it soon ceased to be regularly present. After making good progress he relapsed, and developed most vivid visual hallucinations. He imagined he saw devils, and at such times became excessively violent; he evidently suffered intense terror, and would strike out at the wall or pummel himself regardless of pain. He is now rapidly passing into secondary dementia. Every few weeks, however, he breaks out into this acute state; a bout of excessive masturbation always precedes these attacks. The urine passed immediately after recovery from them used to contain sugar; lately it has not done so.

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CASE VIII. is that of J. K. W., admitted February 21, this year, aged 28, single. Had been a carpenter. He is said to have been perfectly well, mentally and bodily, till three years ago, when he had influenza severely. He has never been thoroughly himself since; he became nervous, excitable, and partly depressed. Has had influenza twice since. In July last year he developed a delusion that detectives were after him. In the following October he had a very bad carbuncle; so it is possible that he has been passing sugar for a considerable time. Since last January he had been getting much more depressed. Has been a teetotaler all his life. His father's mother was insane. He himself has certain traits, Clouston's "danger-signals," of early mental breakdown, viz., a very neurotic expression; large, ungainly, almost asinine ears; a badly formed and asymmetrical cranium, the whole left side of it and of the face being smaller than the right; a deformed palate, its right half, however, being that of a normal one, while on the left side the alveolus commences much too near the mid-line. He was very melancholic on admission; was also very lost and dazed; had a distressed, but half vacant expression. It took him a long time to understand questions, and his answers were often partly incoherent; his power of attention would lapse before he got to the end of a sentence. Was constantly muttering in a low, unintelligible way. Pupils rather small, otherwise normal. Knee-reflexes somewhat too brisk. Temperature seldom above 97·1°F. Patient has remained unimproved, except that he looks a trifle better in health. Mentally he is if anything worse. He sits or stands about all day in a listless, semi-unconscious manner. Has never volunteered a coherent remark since he has been with us. Seems now hardly able to understand a question. He lost a stone in weight, but the last two months has gained 6lbs. Is addicted to masturbation. His appetite is sharp, but there is no abnormal thirst. The urine has contained sugar almost daily since admission in amounts varying from a trace to 200 grains per diem; the usual daily quantity is about 100 grains; on rare occasions it has exceeded 300 grains. The total amount of urine passed in the 24 hours varies between 40 and 48 oz. It is usually alkaline, and frequently deposits much phosphates. The sp. gr. has never exceeded 1030. Sugar has never been absent more than four days in succession. The urea excreted has never reached 400 grains.

This case is interesting in many ways, and it is a matter of great regret that we have no accurate means of saying when the glycosuria commenced.

CASE IX. is that of C. W., married, admitted June 27th, 1894, aged 37. Has been a coffee-house attendant. No insanity in family, but his father died of diabetes about the age of 60. Patient

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had always been of a reserved temperament. Had an attack of adolescent acute mania 14 years ago, and was then a year in Devizes Asylum. The present attack had been coming on for three months, and he had attempted to drown himself. It had been noticed that he always became melancholic towards the end of his wife's pregnancies. On admission to Banstead he was anæmic; fairly stout; weight 9st. 9lbs.; knee-jerks too brisk; he has a normal palate. Mentally he was much depressed, but not then suicidal. Talked in a very lachrymose tone; he, however, answered queries fairly readily and to the point. He has not up to the present shown the slightest sign of improvement; has rather become worse in every way. The depression has deepened; he states it is because of the state he is in, though really he is in very fair health. He is tired of life; sees no hope in the future; would take means to destroy himself. He can occupy himself a little, but in a listless, apathetic way. He is usually sitting down, with his head bowed. Twists his hands together in a nervous manner when addressed, which he dislikes much; and now only speaks in a hardly audible whisper. His eyelids are always closed, and he looks half asleep. By no chance does he ever look one in the face. Since last May it has been known that he is greatly addicted to masturbation. It is to be feared recovery is not going to take place; he has developed the ominous habits of plucking his beard out and of swaying himself backwards and forwards in a monotonous fashion. His memory, however, remains quite good. He has a subnormal temperature, and it maintains a most even height, both morning and evening at 97° F. Pulse generally about 65 per minute. I found sugar in his urine on admission, and on no occasion since has it been absent. His bowels are generally sluggish. There has been no polydipsia or bulimia. Nor does he pass much urine; in fact rather a condition of oliguria exists; very seldom does he pass more than 35 oz. in the 24 hours, and it has fallen as low as 20 oz., while it has never exceeded 44 oz. Quantitative examination has also been very frequently made, and I find, if no preventive means are used, he daily passes between 420 and 440 grains of sugar. By dieting him and using codeia gradually up to three grains a day, the sugar can be reduced to 132 grains, but no amelioration of the mental symptoms occurs. The sp. gr. oscillates between 1025 and 1032. The reaction is always acid. When the maximum sugar is being passed the urea is 490 grains; when the sugar has been reduced it is 340 grains. He has gained weight, and he now maintains it very evenly at 10st. 3lbs.

This completes the description of the six cases, which I have classified under melancholia. But it will be remembered that in each of the three instances of general paralysis,

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mental depression was pronounced, and it exists, too, as a prominent symptom in the three following patients:—

CASE X. is that of J. J. T., admitted June 19th, 1894, aged 66. Had been formerly a lawyer's clerk, and had been well educated. No other insanity in the family acknowledged. The duration of his mental breakdown was then nearly five years. The ascribed cause was shock and fright when his house caught fire. He was never the same afterwards; he became childish and showed an absolute loss of memory for all recent events. Shortly before admission he became very depressed and irritable; at times would be excited and apt to be violent. When first he came I noted him to be a well nourished man, but in impaired health. He had a difficulty in standing long, and was rather tremulous. Knee-reflexes sluggish. Palate fairly well formed. Pupils normal. The first cardiac sound was impure; vessel-wall at wrist rigid; and there was a well-marked *arcus senilis*. He was considerably depressed; emotional, would cry at the thought of the treatment he received. His memory for recent events entirely gone; he could not recall the simplest and most ordinary things. I was unable to satisfy myself that this defect dated accurately from the fright he sustained. He could remember his birthday and reckon his age correctly when told the present date. His depression has now all passed off, but otherwise he has shown no mental change whatever. He easily loses his temper, but his wrath is very transitory. He just as easily melts into tears. Impairment of gait is increasing, and the weakness is more marked on the left side. He at times tends to reel, and is dizzy. Knee-jerks and pupils are normal. He keeps at a very constant weight. His temperature is never above 98° F., but often falls to 97·5°. Pulse usually 80 per minute. The urine has never been free from sugar since admission. The amount voided averages 55 oz. daily; its extreme range is 42 to 80 oz. Sp. gr. never exceeds 1025, it is usually 1012. The amount of sugar varies from 115 to 367 grains daily. Codeia was given for several months, but has not been pushed beyond two grains a day. Its effect on the glucose excretion was practically nil. The urea has never exceeded 350 grains per day; it is generally greater when the sugar is at its minimum. There has been no increased thirst or appetite, and the bowels are regular. I have no facts at all to help me in coming to any conclusion when he first began to pass sugar. The patient's daughter states that he never was addicted to drink, but he himself acknowledges being usually "jolly" on festive occasions; and the instantaneous loss of impressions which he exhibits is strongly suggestive of past alcoholic excesses.

CASE XI. has only been with us a few weeks. It is that of S. E., married, admitted June 19th, aged 65; was a clerk. His is a post-apoplectic case of melancholia with some dementia. His

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daughter states that there has been no other insanity in the family; that in March of last year her father had a "stroke," which left him somewhat physically impaired; but he remained sound mentally until last December, when he had a second stroke. He became very depressed; fancied that he was going to be shot; asked for poison; made mistakes of identity. On admission he was evidently weak; the left side of the body weaker than the right, but the right side of the face looked to be, and, from the history, was the paralysed one; deflection of tongue, however, slightly to the left side. Knee-jerks brisk. There is a partial *arcus senilis.* The heart's action is irregular; there is a double aortic murmur. Palate seems to have been narrow, but jaws are edentulous. Mentally he was very depressed, but he recognized his recent delusions as such. His memory was confused. Temperature 97° F., and remains so. The urine contained sugar and a trace of albumen. The latter was not detected again, but the former persisted until the 10th of July, since when it has not been present except once, 11 days later. The total amount of urine in 24 hours was estimated on the 3rd ult. and found to be 80oz., of a sp. gr. of 1010, very faintly acid, and contained 80 grains of sugar, but only 260 gr. of urea. There was no undue thirst or appetite, but the bowels were very costive. He is inclined to be obese. He is much more cheerful, and not so nervously anxious, but still is rather childish and distinctly mentally enfeebled. The cessation of the glycosuria was coincident with his taking a brighter view of things. It is worthy of note that when I saw the patient on the evening of the 21st ult. (the day the sugar appeared again), without my questioning him at all, he volunteered the information that on the previous day he had felt unusually low-spirited.

This case is somewhat similar to one of the three described by Savage in his "Clinical Manual." The existence of glycosuria, of course, may be a mere concurrence. But the onset of actual insanity being immediately pursuant to a gross brain-lesion, and the striking parallelism between the presence of sugar and absence of a proper sense of well-being, point, to my mind, very strongly towards a distinct reciprocal relation between the phenomena. The patient, however, has been too short a time under notice to permit of much stress being laid upon the case.

Case XII. is an unique one in my collection. It is the only one in which I have certain evidence of diabetes existing before the mental disease, and I have the advantage of possessing full notes of the patient's illness, kindly supplied to me by Dr. Paramore. It is that of J. G., admitted May 9th this year, aged 51, married. Had been employed in a post office for very many years. Had been a man of most exemplary character and steady habits. Was

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always almost hyper-conscientious. A child of his, who is now dead, was weak-minded, otherwise no actual insanity in the family, but patient has an extremely neurotic palate; in fact, it is almost deformed. Many of his relatives suffered much from gout. He himself has slightly suffered of late years. The joints between the middle and distal phalanges of all his eight fingers are enlarged, and afford good illustrations of Heberden's *nodi digitorum*. The joints of the toes and elsewhere show no outward change. Patient's mother was diabetic, and died about 50 years old of gangrene of the foot. He has probably suffered from diabetes, with all its classical symptoms, for upwards of ten years, but he did not know from what he was suffering until two-and-a-half years ago. Since then he has been under medical treatment, but would not properly carry out the instructions. Dr. Paramore thinks the diabetes has *caused* the insanity. At any rate, he brooded much over his complaint, became intensely depressed, and at last actual delusions developed. He imagined he was dishonest, that his wife and relatives had been shot, that he was to be torn to pieces. He once tried to choke himself. No alternation of symptoms occurred; that is, with the appearance of insanity the sugar in the urine did not vanish. In fact, I have reason to think its output was increased, for, having up to then been an obese man, he began to fall away rapidly. On admission he weighed 13st. 8lbs. Skin very dry and powdery. Knee-reflexes abolished; plantar and cremasteric brisk. Tongue dry, red, and cracked. Pulse 80, and feeble. Heart's action weak; first sound almost inaudible. Feet œdematous. Some half-healed boils and sores about the body. Mentally he was as above described. In addition, he exhibited a very bad memory and great confusion, and, as far as one could judge from so short an acquaintance, seemed considerably demented. For several days the urine was collected every 24 hours, and found to average 130 oz. It was very pale, acid, sp. gr. 1026 to 1033, and free from albumen, but contained sugar in amounts varying between 2,500 and considerably over 3,000, often nearly reaching 4,000 grains. Urea nearly 700 grains. He was placed on a fairly strict anti-diabetic diet, and codeia administered in gradually increasing doses. An attempt at using pancreatic extract subcutaneously was made, but was discontinued owing to a tendency to abscess formation. The output of sugar gradually fell to 500 grains daily, with no mental improvement, however; and he still lost weight. But a striking change has now occurred. Since the codeia has been increased to three grains daily the sugar has fallen to 340 grains, the urea to 504, and a very distinct mental improvement is noticed. He is much clearer, is losing his delusions; depression generally absent; has volunteered to do work; is gaining weight. Curiously, the quantity of urine, however, seems to be increasing. Only time can show whether these changes are evanescent. His temperature is nearly always 0·6° subnormal.

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The four remaining cases have many features in common. They are the four females to whom I alluded early in this paper. Three are dead, one remains in the asylum.

Case XIII. was that of E. H. Became insane at 43, but was not admitted till February 12th, 1878, eight years later. No previous history. She suffered from mania, with delusions of persecution. Became demented, but subject to brief maniacal outbreaks. The urine was not examined till very shortly before her death. It was found that she was passing 210 oz. daily, loaded with sugar; sp. gr. 1040. From the dates of notes as to her failing health and other symptoms, it is probable that this had been going on for nearly two years. No maniacal outbursts are recorded after the onset of these symptoms, otherwise there was no mental change. She was very obese up to the end, which was on December 13, 1893, after a syncopal attack. At the necropsy, 36 hours later, the following are the noteworthy points:—Skull-cap asymmetrical, correspondingly to the face. Dura mater rather too adherent. Pia-arachnoid thickened, stripped too readily. Cerebral hemispheres each weighed 19 oz., but the left looked larger than its fellow. Much atrophy in fronto-parietal region; grey matter of a dirty hue; a well-marked *état criblé* of white matter. Cerebellum weighed 5 oz.; pons Varolii and medulla 1 oz.; no naked eye abnormality. Pancreas healthy. Heart-wall was fatty, and there was aortic incompetence; liver showed fatty degeneration; kidneys granular and contracted. Unfortunately no microscopical examination was made.

Case XIV. was that of C. S., admitted September 28th, 1887, aged 63. Her eighth attack. Age on first attack 55; alcoholism the cause. Her right leg was weaker than the left. She had hallucinations, was very maniacal and delusional. She settled down into a quiet, industrious woman, and became considerably demented. Was, however, subject to maniacal attacks at times. A year before her death diabetes was discovered, but, as she had been treated for pruritus for two years, it is likely that it existed for at least three years. Mentally she remained unchanged, but during the last four-and-half years of her life no maniacal attacks were recorded. To the last she was corpulent. She usually passed about 120 oz. of urine, containing 3,600 grains of sugar, sp. g. 1030, no albumen. Treatment much reduced this, and, when fully carried out, cured the itching and thirst. She died of phthisis last January, but her heart had long been a source of trouble to her. At the necropsy, 13 hours after death, the skull-cap was thickened. Dura mater thickened and adherent to it. Pia-arachnoid thickened, stripped too easily, its vessels very atheromatous. Cerebral hemispheres (right 18½, left 18 oz.) shrunken, convolutions atrophied, and the other outward appearances as in the last case, except for a small old softening in right optic thalamus. Lungs emphysematous, old pleural adhesions, cavity at right apex

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and consolidation around. Heart large (19 oz.), aortic valve incompetent, due to atheroma. Pancreas slightly increased in size, pale, bloodless, hard, cut like cartilage in parts, duct patent. Liver 70⅓ oz., fatty. Spleen 7½ oz., very soft. Kidneys 16 oz. the pair, capsules rather too adherent, some cysts. Supra-renal capsules looked natural. The microscope revealed some cirrhosis and chronic venous congestion of the liver and kidneys, and fatty infiltration of the former; in the pancreas much fibrous formation, in parts the gland-tissue was obliterated; healthy semilunar ganglia. Sections through the right middle frontal convolution showed extensive nerve-cell degeneration, not one healthy one could be found; at the periphery were remains of a few "spider-cells" and a slight felt-work formation; no attempt at any cribriform appearances described by Dickinson, constituting the so-called "Gruyère cheese" brain. Those through the pons and medulla, however, are very cribriform. Whether the cavities correspond to Dickinson's I cannot say. Their walls are smooth, and they look to me like holes produced by the falling out of vessels; sometimes one can actually be seen alongside. The vessels were much gorged, and here and there corpuscles free in the tissue could be seen. Here again was marked degeneration in the nerve-cells, especially of the olive.

CASE XV. was very similar. It was that of M. L., transferred to us March 13th, 1890. She had an attack of mania at 44. The state of her memory suggested alcoholism. She became demented. She suffered from heart-disease and dropsy; had several syncopal attacks, one of which was fatal, after her mental affection had lasted eight years. She developed diabetes four years before death. The sugar gradually increased from 200 to nearly 3,000 grains daily. She was always corpulent. She became wet and dirty and much more demented; that, of course, might have been expected independently of the diabetes. At the necropsy, 24 hours after death, the following were the abnormalities:—Pia-arachnoid, as in last case. Cerebral hemispheres (22½ oz. each) much softened and atrophied; white matter had a pronounced *état criblé*. Cerebellum 5 oz., pons Varolii ¾ oz., and medulla ½ oz.; these did not share in the general softening. Pancreas as in last case. Heart, kidneys, and liver, in appearance and weight, exactly as in last patient, except that the liver had a puckered surface and was obviously cirrhotic. Spleen 18 oz., congested. The microscope confirmed these appearances in the liver and kidneys, and showed a further fatty degeneration in the renal epithelium. Sections of the supra-renals, stained with osmic acid, showed black droplets, chiefly in their outer zone, in and around the cells. Those through the semi-lunar ganglia seemed normal. Those through the frontal convolutions and pons and medulla were precisely as in the previous case, except that the vessels of the pons and medulla were not engorged.

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Case XVI. only requires very brief notice. It is that of A. K., re-admitted here May 25th, 1894, aged 61, suffering from senile mania. She had delusions, aural hallucinations, and a very bad memory. Is now becoming quite demented. Early last June she commenced to be very thirsty and passed much urine. A specimen was examined on June 24th, and contained two grains of glucose to the ounce. It was very pale, faintly acid, sp. gr. 1003, free from albumen. The following day she became very maniacal, and has remained mildly so since. The sp. gr. of the urine fell to 1001, and there was no sugar detectable. It remained thus for several days. The sp. gr. gradually increased to 1012, and the amount of urine voided is now normal. Sugar has not again appeared.

Whether this is a case illustrative of the alternation of neuroses must be doubtful until we have had her longer under observation.

While the characteristics of some of the cases show striking analogies to each other, several differ as widely. Hence to draw up a good summary of them is not so easy. But I will endeavour, as briefly as practicable, to marshal the facts I have been able to gather, in as orderly a manner as possible.

Summary.—My instances of diabetes—perhaps I should say of glycosuria—amount, then, to 17 in number. In 12 the mental symptoms, at the time sugar was discovered, were acute; in five chronic. These five (four of whom were women) were examples of sequential dementia; in two a possible remission of some of the mental symptoms was observed with the onset of diabetes; and in one a disappearance of the latter with the accession of maniacal symptoms. But, on the whole, my cases exhibit only to a very slight degree the phenomenon of alternation. Rather the reverse is seen, namely, a parallelism between the presence and amount of glycosuria, on the one hand, and the presence and acuteness of the mental symptoms on the other. This is well illustrated in Cases IV., V., XI., and XII., and slightly in Case VI., and in the three of general paralysis. Case X. shows that this phenomenon is not without exception; for, with the disappearance of melancholia, the glycosuria has not abated. Without giving a name to the insanity from which each patient suffered, it may be said that in my 12 acute cases the prevailing feature was melancholia, and, along with this, there was in most a considerable degree of mental confusion, in some amounting to

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marked amnesia. In speaking of this impairment of memory, it is noteworthy that in 14 of all my cases I was able to obtain some information as to their past habits; and in exactly half of these alcoholic excesses were revealed. The tissue-effects of alcohol as a cause of diabetes have been discussed by others; but I do not think that cases of mental disease, associated with diabetes, have had this relationship so clearly demonstrated before. In six of my cases antecedent worry* was one of the causes given of their mental breakdown. In all but one of the 12 cases some family history was forthcoming; and in six instances insanity existed in other members of the family, and seven of the patients showed personal neurotic stigmata. In two instances a parent was known to have had diabetes; and, in this connection, I might make mention of a case, now in the asylum, of adolescent mania in a girl whose father died of diabetes; her urine is free from sugar. Five cases had exaggerated knee-reflexes, one sluggish, two absent; these two were advanced cases of typical diabetes. The temperature in all 12 cases was subnormal, and sometimes considerably so; but where glycosuria ceased the temperature did not always rise. As to age, eight out of the 17 became insane at or about the climacteric. Only one was an adolescent case, with the exception of another who had an attack of adolescent mania 14 years previously. As regards sex, as before said, no systematic examination was made of the urines of the female admissions. Five of the 12 cases showed distinct signs of general vascular degeneration. The quantities of sugar, in all the cases, varied from traces to 3,940 grains. The amount of urine voided in the 24 hours was above normal in only five of the 12 acute cases. The urea, with but one exception, was always low throughout all the cases; it generally attained its chief output when the sugar was at its maximum. With regard to the two necropsies, where a microscopical examination was made, certain changes in the brain were noted; the pancreas† in both was diseased, and in each the liver and kidneys were cirrhotic.

Diabetes and psoriasis have been said to occasionally alternate.‡ I examined the urines of six patients in the

* For a good example of cessation of glycosuria on the removal of anxiety and other trouble, *vide* "B. M. J.," Oct., 1893.

† Certain possibly similar changes were described by Fleiner, under the name of arterio-sclerotic. ("Berl. Klin. Woch.," Jan., 1894).

‡ Grube, "Brit. Med. Journ.," Vol. i., 1895.

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asylum, both when the psoriasis was absent and when marked, but failed to find sugar.

In conclusion, I might mention that we have four males at present in the asylum who habitually pass an excessive quantity of urine, 140, 125, 75, and 65 oz. respectively, but free from sugar. There is no evidence of their suffering from renal disease. Three are epileptics.

This paper, I fear, leaves the riddle of diabetes as far from solution as ever. It has rather been my intention to contribute further facts and cases as food for profitable discussion.

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*The Surgical Treatment of Idiocy.** By G. E. SHUTTLEWORTH, B.A., M.D., Ancaster House, Richmond Hill.

The fact that considerable attention has been drawn of late years, both in the medical and lay press, to the subject of operations undertaken for the relief of idiocy and other mental deficiencies of child-life, must be my excuse for taking up the time of this section with observations resting, not alone upon my own limited experience, but largely on that of others. The operation of craniectomy, or as some prefer to call it linear craniotomy (that is the cutting out of strips of bone from the skull), has, indeed, almost passed from the domain of science to the region of romance, and articles have appeared in several of our popular magazines under such sensational titles as "Creating a Mind," which have led parents of mentally-deficient children to form extravagant conceptions of the powers of surgery in this direction. It may not, therefore, be inappropriate for medical men to weigh and measure the evidence which has accumulated during the last five years as to the possibilities and impossibilities of operative interference in these cases.

By way of illustration of the popular view of the subject, I may here quote a few lines from an article by Miss Helen Gardener in "Harper's Magazine," which, having been widely reprinted in this country, caused many anxious parents of deficient children under my charge to enquire if some good could not be done by "taking a piece of bone out of the skull to relieve pressure." The article is headed "A Wonderful Surgical Operation," and after asking its readers

* Read at the Annual Meeting of the British Medical Association, London, 1895.

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