REMARKS

ON

DIABETES AND GOUT IN THEIR RELATIONSHIP TO LIVER DISEASE, WITH HINTS REGARDING THEIR SCIENTIFIC TREATMENT.

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As the presence of sugar in urine is not in itself a disease, but simply a sign which may arise from a multiplicity of morbid conditions, I think I am justified in making the five following nosological divisions of the subject:—

1. Hepatic diabetes—including the gouty variety.
2. Cerebral diabetes—including all cases of saccharine urine arising from nerve derangements.
3. Pancreatic diabetes—the most deadly form of the disease.
4. Hereditary diabetes—a form by no means uncommon, and one, too, where both brothers and sisters may labour under the disease without either their maternal or paternal parent having been affected by diabetes; though more distant members of the family may have suffered from it.
5. Food diabetes—including all forms of saccharin urine arising from the ingestion of unwholesome substances.

The presence of sugar in urine is due to a disordered animal chemistry, diabetes being, like gout, a chemical form of disease. As far as I am aware, however, there are but two ways in which the faulty bodily chemistry causes sugar to appear in the urine, and it was this belief that led me, no less than a quarter of a century ago, to divide all cases of diabetes clinically, as well as scientifically, into two great and distinct classes. To the one I gave the name of diabetes from excessive sugar formation; to the other that of diabetes from diminished saccharine consumption—malassimilation.

Patients belonging to the first class are in general well nourished, and are so amenable to treatment that they may be kept alive and in comparative comfort for a quarter of a century and more; those belonging to the diminished consumption group are in general so little influenced by either medicines or diet that the vast majority of them succumb to the exhausting effects of the disease within a few weeks after its commencement.

These views were published in 1865 in a course of "Lectures on Urinary Derangements" in the *Medical Times and Gazette*; and again in 1866 in a book entitled *Diabetes: its Various Forms and Different Treatments*. Besides which the entire lectures were translated into French by M. Hahn, and published in Paris in 1875 by Delahaye under the title of *De l'Urine et de ses Altérations Pathologiques*. Notwithstanding which, in 1880, M. Lancereaux published an article in *L'Union Médicale* entitled "Diabète gras et Diabète maigre," thereby, not only adopting my two divisions, but merely parodying my words, without so much as alluding to my name in connection with the subject. However, this is of the less importance, seeing that he has failed to perceive that, not only is his nomenclature descriptively incorrect, but, at the same time, it labours under the disadvantage of not furnishing even so much as the remotest clue to the pathology of the two classes of cases it is supposed to signalise. Consequently it is both clinically and scientifically objectionable.

Were I asked to give types of the two classes of the disease I would give hepatic diabetes as an example of that arising from excessive sugar formation, and pancreatic diabetes as that resulting from diminished consumption—malassimilation. It is with the former class alone I shall at present deal.

CASES ILLUSTRATIVE OF HEPATIC DIABETES.

CASE I.—The patient was 50 years of age, and being a member of the Semitic race, like most others of the well-to-do among his co-

religionists,¹ accustomed to indulge in rich foods, work hard mentally, and at the same time take very little muscular exercise.² After listening to his history and examining him thoroughly, from finding his liver not only tender on pressure but enlarged to the extent of 6 inches in the right nipple perpendicular line, I diagnosed the case as one of hepatic diabetes, and gave a favourable prognosis; from believing that the sugar would decrease and ultimately disappear when the hepatitis subsided. The case was treated accordingly, with the result that within six months the sugar had so completely vanished that seldom more than the faintest traces of it were detectable.

Some five years or so afterwards he got another attack, the quantity of the urine occasionally being as much as 80 ounces in the twenty-four hours and the specific gravity sometimes reaching 1040. The liver, though not sufficiently tender to merit the title of "inflamed," was nevertheless larger than it had been before: it seemed, indeed, now to be chronically hypertrophied. This relapse I then regarded, and still continue to regard, as being mainly if not entirely due to his having returned to his former habitual mode of high living. This second attack of diabetes lasted, with occasional intermissions in its severity, for nearly two years, without the sugar having been observed on a single occasion entirely to disappear.

He had no recurrence of the disease for nearly ten years—when he got another attack, which, although nothing like so serious or so prolonged as the second, was much worse than the first, the quantity of water passed being usually 70 ounces and of a specific gravity of 1038. He lived to be over 75, at last succumbing to an attack of bronchitis.

CASE II.—The next case I will allude to is that of a gentleman in whom the diabetic state was not detected till he was 65. When I first saw him he was passing 120 ounces of urine in the twenty-four hours, with a specific gravity of 1041; and the amount of sugar on March 26th, 1891, according to the analysis of Mr. Alfred Wm. Stokes, F.C.S., was 24.3 grains per ounce. The case was, therefore, regarded as an unfavourable one for when patients pass over 2,920 grains of sugar a day, as this man did, they very often slip through one's fingers, no matter how they are treated. This patient had not brought on his diabetes by either overeating or drinking, for he was remarkably steady and simple in his mode of living, his only indulgence being a single glass of ale at dinner, and a glass of whisky diluted with water in the evening, along with a cigar. Nevertheless, as he had suffered, I was told, more or less from a disordered liver for at least six years, although there was nothing detectable wrong with it at the time, his history was so distinctly biliary that I diagnosed the case as one of hepatic diabetes, and prescribed accordingly, giving him alkalies, jalap, and iodine. This had an immediately beneficial result, for in five days the specific gravity of the urine had fallen to 1038 and the quantity to 100 ounces. The improvement went on more or less steadily for four months, the daily average amount of urine being less than 80 ounces, and the specific gravity a little over 1030. This is all the more noteworthy from the fact that the patient was not put upon a restricted diet, the only farinaceous food he avoided being potatoes. So much had he improved, that in little more than the four months I gave him permission to take a trip to the United States, from which he returned in twelve weeks with a slight augmentation of his diabetes; but not much, as the specific gravity was only 1033, and the quantity 80 ounces in the twenty-four hours. He again rapidly improved under treatment, and I neither saw nor heard anything of him till January 21st, 1892, when Dr. Pocock, of St. Mark's Road, incidentally told me (while we were consulting about another case of hepatic diabetes) that the patient was then both looking and feeling perfectly well.

CASE III.—As I have alluded to this other case of Dr. Pocock's, I may say a few profitable words regarding it. The gentleman was 60 years of age, and living on his means, accumulated during a rather irregular life in the Australian bush. Dr. G. F. Grosvenor detected his diabetic condition in 1886, while he was under treatment for an attack of dyspepsia, and on a codeine line of treatment he greatly improved until strychnine was added to the prescription in somewhat ample doses. He was then not only seized with violent strychnine twitchings, but the amount of sugar in the urine became notably increased.

In 1883, that is to say, three years before the diabetes was discovered, he had an attack of jaundice, and his liver had been always more or less troublesome since, while a couple of weeks previous to my being called to him he passed a gall stone. Dr. Pocock analysed the urine (of which he was passing on an average 50 ounces, of a specific gravity of 1032), and found that it contained 12 grains of sugar to the ounce. From the patient having steadily improved after the consultation I heard nothing more of him for many weeks, when I was again called to him, and told by Dr. Pocock that the sugar had almost entirely disappeared until ten days previously, when, in consequence of a mental upset, it suddenly returned as bad as ever.

CASE IV.—I first saw the patient (a temperate man, aged 59, living in one of the healthiest parts of Buckinghamshire) on February 3rd, 1890. His liver was hard, enlarged, and tender; the urine, 110 ounces in the twenty-four hours, was so loaded with saccharine matter as to assume the appearance of thin brown treacle on being boiled with caustic potash of a specific gravity of 1060. Notwithstanding this, with the removal of the hepatic physical signs, in three weeks, the quantity of the urine fell from 110 to 80 ounces, whilst its specific gravity at the same time dropped from 1052 to 1026, and the amount of sugar was barely sufficient to turn the urine of a brown sherry colour on boiling it with caustic potash. By September 17th the quantity of urine had fallen to 34 ounces, and the specific gravity to 1020, with merely a trace of sugar detectable in it; while more sur-

¹ The number of Jews that suffer from diabetes is remarkable. In the *Asiatic Journal* of January, 1892, it is stated, on the basis of statistics collected in America, that, while among Christians only 2.74 males and 1.21 females per 1,000 are affected with diabetes, no fewer than 19.85 males and 19.59 females among the Jews are victims to it. This, I believe, is in a great measure due to the proneness of Jews to liver diseases, the majority of cases of diabetes being of the hepatic variety.

² I have fully explained, at pages 18-24 of my book on *Inflammations of the Liver and their Sequelæ* (Churchill and Co., 1886), the proneness there is to hepatic derangements when an insufficient amount of muscular exercise is taken to consume all the ingested hydrocarbons of rich foods.

prising still is the fact that on July 9th, 1891, the average amount of urine daily passed was only 26 ounces and the specific gravity 1017, with not a trace of sugar in it.

I heard nothing more of him till February 3rd, 1892. On that day I received from him a letter containing the following passages: "I feel I must write and let you know how I am.....I am altogether a different man; in fact, I am perfectly well, and feel better than I have done for years past, and am increasing in weight.....Dr. Reynolds can find no sugar in my water." This report led me to write to Dr. Reynolds (High Wycombe), and inquire if the patient's statements were actually true, as I feared he might be unjustifiably jubilant about his state. Dr. Reynolds at once returned to me a confirmatory reply. I neither saw nor heard anything more of the case till February 1st, 1893, when he came to me again complaining of hepatic symptoms, the liver measuring over 5 inches in the right nipple line, and being tender on pressure; the quantity of urine being only 30 ounces, and the specific gravity 1020. With the potash test there was merely a very slight darkening of the pale straw-coloured urine and nothing more.

It may be well for me to mention that by far the most common cause of hepatic diabetes in temperate climates is the habitual use of stimulants coupled with rich foods. The reason of this is not far to seek, seeing that in 1853 I was fortunate enough to discover that animals could be rendered diabetic by the simple introduction of stimulants into their portal veins.³ So important were these results considered by the Society of Biology of Paris, to which I communicated them, that it appointed a commission, consisting of Professors Bernard, Wurtz, Robin, and Verdeil to report upon them. And lucky it was that the Society thus stamped them with importance, as it is due to the information obtained from them, and the subsequent equally successful results of Bernard, who induced saccharine urine in animals by simply introducing stimulants directly into the duodenum, that the modern teetotal system of treating diabetic cases originated, which has done so much to reduce the mortality.

Enough having been said regarding the hepatic diabetic cases of temperate zones, I will now give a sample or two of those thought to be traceable to liver congestions resulting from chills caught in the tropics, as well as to injudicious tropical dieting. I have several, at different ages, that I might select from, but as the preceding cited cases have all been of persons of over 50 years of age, I will now only refer to those occurring in much younger subjects.

CASE V.—An Anglo-Indian was invalided home at 34 years of age after thirteen years' residence in the tropics. He weighed 10st. 8lbs., was fair-haired and bright complexioned. He said that he had lived a very temperate life. When he first consulted me, on October 24th, 1890, he was passing 60 ounces of urine of a specific gravity of 1035, containing from 8 to 10 grains of sugar per ounce. As his general health appeared good, and his liver only slightly enlarged, I considered the case a favourable one for treatment, and so it turned out to be; for so rapidly did the patient improve that within ten weeks the urine had diminished to a daily average of 43 ounces, had a specific gravity of 1027, and no sugar was detectable in it. He was consequently allowed to return to India on January 16th, 1891—that is to say, in less than three months of his landing in England.

CASE VI.—The patient, aged 32, was fair complexioned and of good development. His father and one of his brothers died of diabetes, and an aunt of his, who is still alive and well, got rid of the same disease while under my care twenty years ago. The patient came to me direct from South Africa, where he had for several years been leading an active—I might say an arduous—outdoor life. Under treatment he rapidly improved, but imagining himself out of danger, and delighted at being home once more among his friends, he got careless of treatment, threw off restrictions, and began eating and drinking as if he were a healthy individual. Suddenly all the bad signs and symptoms returned. This led to my having a consultation with Dr. Pavy, who saw him several times afterwards. The sugar again diminished. The amount of urine passed decreased, and his general health proportionally improved; but from being sadly deficient in moral control, and being surrounded by injudicious friends, no sooner did he feel himself better again than he began, while at the seaside, acting as if he were a perfectly healthy man, and suddenly, after a day of excitement, exposure, and fatigue, became prostrate and sick. This was soon followed by drowsiness and coma, and he died within forty-eight hours after the onset of the serious symptoms. Unfortunately Mr. Hoffmeister of Gosport, under whose care he was at the time, failed to obtain a *post-mortem*, and, although only a supposition on my part, my familiarity with such cases leads me to believe that this, like the interesting case of the banker, narrated by my son, though it began as a purely hepatic case, gradually drifted into and terminated as one of pancreatic diabetes, an ending to the hepatic form of the disease unfortunately by no means rare.

In proof of the possibility of keeping cases such as were formerly regarded as perfectly hopeless alive and in comfort for many years, I will here give the sequel to the two typical cases related by me in my lectures published in 1865,⁴ the one of whom, the lady, is still alive, while the other only died

in 1890, that is to say, no less than thirty years after he first came under my care; he must in reality have lived at least thirty-two years while suffering from the disease. The survivalship in this case is all the more remarkable, seeing that the diabetes was so inveterately constitutional that one of his sons manifested it before the third and the other before the fifth year of his age, although he himself was well enough to be able to perform the duties of a clergyman up to within a very short time of his death.

PROGNOSIS.

After having carefully weighed the prospects of life according to the form of the diabetes under which the patient labours, the next things to consider are the respective values of certain signs and symptoms which may possibly furnish a clue to the longevity in each particular form of the disease. If there be absolutely no loss of flesh taking place, I boldly say that I believe the patient, with care and attention to medical rules, more especially if I have diagnosed the case as one of diabetes from excessive formation, may live for years. The earliest sign which causes me to take a gloomy view of a case is loss of flesh. When the loss of flesh is very gradual, the patient may live a year or two, but when the emaciation is markedly progressive I estimate the chances of life by months only. The next sign to which I attach importance is the appearance of acetone in the urine, for when acetone is detectable by the perchloride of iron test the patient usually dies within six months. There are, however, exceptions to the rule.

CASE VII.—The patient, a free living, military man, aged 39, was sent to me on November 4th, 1891, by Dr. Molony, of Ballingarry. The case from the first was regarded as a bad one, for the quantity of urine was 10 pints (200 ounces), specific gravity 1035; and he had begun to lose flesh two years previously. Indeed, when he came to me I looked upon it as utterly hopeless. He stayed a fortnight in London, and I was pleased to be able to send him back to Ireland considerably improved. The improvement went on for a time; but a change for the worse took place, and Dr. Molony sent him back to me in the summer of 1892. A letter, dated June 15th, preceded him, in which occur the following passages: "He started yesterday morning for London to do the journey in easy stages.....the urine is 80 ounces, and the specific gravity 1031, and 10 per cent. of sugar.⁵ Acetone present." I may mention that Dr. Molony first discovered acetone in the patient's urine on December 14th, 1891.

On arriving at Dublin he was so weak that Dr. Myles tried to dissuade him from continuing his journey. But that he refused to do, and came on to London. When I saw him, on June 20th, he was then so upset by the fatigue of the journey as to be in a most pitiable state. Not only had the quantity of the urine increased to 6 quarts (240 ounces), but its specific gravity to 1035, and it contained an abundance of acetone. Besides which he was livid, breathless, emaciated, and so weak as to require to be assisted into his brougham. I had him weighed a few days after his arrival, and though he was a man of 5 ft. 11 in. in height, he weighed only 7 st. 8 lbs., his normal weight being 13 st. All this led me to think the end was nigh. Yet, marvellous to relate, such an effect had a change of medicine and diet upon him, that he not only once more rallied, but by August 10th, that is to say within two months, the urine had diminished to 80 ounces, its specific gravity varying from 1026 to 1030, and the acetone almost entirely disappeared. At the same time he had increased from 7 st. 8 lbs. to 9 st. 1 lbs.⁶ in weight, and so greatly improved in strength that he was able to walk a mile up the less steep part of Hampstead Hill. During these two months I had not only allowed him ordinary diet, but given him 4½ ounces of cod-liver oil daily, with alkalies and honey as well.

On leaving town for my holiday I placed him under Dr. Ralfe's care, but he only saw him once. On my return, two months later, I found he had had a severe relapse. His urine had again a specific gravity of 1035, and was about 6 quarts in quantity, with abundance of acetone in it. He again improved, and on November 13th, 1892, when I saw him along with Dr. Payne, of Hampstead, he was passing 3½ pints of urine of a specific gravity of 1033, with only the faintest trace of acetone in it. His thirst had subsided, and both his pulse and his general condition were fairly good.

This is no doubt a very exceptional case, for instead of the patient dying, as one would have expected, within six months after the acetone was detected in his urine, he actually lived nearly a year, as he did not die till November 21st, 1892. His death occurred most unexpectedly. In the evening before he had expressed himself as feeling very much better; indeed the words he used were "getting on splendidly." Nevertheless he died in the morning in a state of syncope, on getting suddenly out of bed.

A still more unfavourable sign than acetone is, to my way of thinking, the advent of an ethereal apple-like odour of the breath. When that sets in I at once reduce my estimate of the prospects of life to weeks. For the odour conclusively shows that the blood is impregnated with diacetic and

³ Recherches sur la Physiologie du Diabète Sucre: Nouvelle Méthode pour Produire le Diabète chez les Animaux, *Comptes Rendus de la Société de Biologie de Paris*, 1853, vol. v.

⁴ The cases will be found in full in my "Lectures on the Urine and its Derangements," in the *Med. Times and Gaz.* of 1865, as well as in my book on Diabetes; its Various Forms and Different Treatments, published by Walton and Maberly in 1866.

⁵ In a letter dated November 20th, 1892, Dr. Molony told me that on April 4th, 1892, he had found 41 grains of sugar to the ounce in the patient's urine.

⁶ To those familiar with the clinical history of diabetes, this regaining of 2½ lbs. weight per week is not the least remarkable feature of this unusually remarkable case; seeing that, notwithstanding having never carried any superabundance of flesh, he was still alive, after having lost 44 per cent. of his normal weight—a most exceptional circumstance under such conditions.

oxybutyric acids—the unmistakable harbingers of death. But even here one is liable to be mistaken, as I have known in very exceptional cases not only the ethereal odour of the breath, but even repeated threatenings of diabetic sickness, set in several months, six and more, before the patients succumbed.

A further warning of the approaching end we have in the appearance of aberration of intellect and drowsiness. I look not only on the drowsiness, but the terminal sickness and vomiting, in fatal cases of diabetes as but ocular evidences of the toxic action upon the nervous system of retained excrementitious saccharine substances and decomposing matters in the circulation, as has been pointed out by Dr. Vaughan Harley.⁷

Finally, when in addition to the aberration of the intellect and drowsiness the breathing becomes embarrassed, coma invariably rapidly follows, and within the brief space of a few hours the curtain falls and ends the scene.

HINTS ON TREATMENT.

A highly significant and most important change in the treatment of diabetes has come about since experimental investigation revealed the seat of the animal saccharine function and some of the causes of its increase and diminution.

When first I entered the arena as an experimentalist on diabetes there existed but four salient factors in the treatment of the disease: restricted diet, opiates, stimulating tonics and alkalies.

Now, thanks to the knowledge derived from experimenting upon animals, all this is changed; and with the change has come about, not only an immense diminution in the death-rate, but likewise a decrease in the number of remedies propounded for its cure. Formerly the number was legion. Opium, morphine, codeia, belladonna, cocaine, strychnine, phosphorus, valerianate of zinc, tincture of iron, iodide of potassium, sulphide of calcium, salicylate of soda, antipyrin, turpentine, jambul seeds, jaborandi leaves, bilberries, salol, pilocarpin, sulphonal, ergotin, nitroglycerine, creasote, iodoform, sulpho-carbolate of soda, liquor potassæ, bromide of ammonium, alkaline citrates, nitric, lactic, carbolic, hydrochloric, and hydrobromic acids.

Added to this, we are told that the application of blisters to the epigastrium, galvanism to the spine, and massage to the limbs, as well as the employment of Vichy, Carlsbad, and some other mineral waters, together with a free use of peptonised food, have only to be persevered in sufficiently long to effect an almost certain cure.

As in the above list there are remedies the very antitheses of each other—both as regards chemical constitution and physiological action—one might be tempted to exclaim, "What an absurdity!" Yet, strange to say, there is no absurdity about the matter, the seeming discord being but harmony not understood. For, as we have seen, there being two distinct and diametrically opposed causes for the accumulation of saccharine matter in the blood, which leads to its elimination by the urine, there must be equally two opposing sets of drugs employed in remedying it. Hence it is that in the very inconsistencies in the action of the remedies lies their therapeutical strength. Consequently, when judiciously selected and appropriately administered each oppositely-acting drug contains in it an essence of wisdom, which leads to successful treatment.

Since the sugar is only the visible sign of the invisible faulty chemistry that requires to be set to rights, we no longer attach the same importance to the diminution of the sugar which invariably takes place when a patient is subjected to restricted diet. A diminution in the quantity of sugar daily eliminated by a diabetic is not an infallible sign of improvement, the output of sugar being only a trustworthy sign when considered in connection with other things. This is proved by the fact that even in severe cases of diabetes the sugar occasionally totally disappears from the urine when the patient is attacked with an acute disease, such as typhoid fever or inflammation. The same thing has been observed to occur after severe accidents and grave surgical operations, while it not infrequently happens that, if the disease be sufficiently

severe to terminate fatally, not only has the excretion of sugar by the kidneys been noticed to be arrested before death, but even the liver after death has been found devoid of glycogen.

As far as I am aware, no one has as yet ventured to explain this curious phenomenon, so I may as well give my idea of the matter, which is: (1) The sugar only disappears from the urine in the case of diabetes arising from excessive saccharine formation; (2) its disappearance is due to the depressing effects the superadded acute disease or injury has upon the sugar-exciting formative nerve power, precisely in the same way as nerve shock, either the result of mental emotion or physical injury, arrests the secretion of bile.⁸

The line of treatment I recommend to be pursued is in every case to begin by putting the organ supposed to be at fault to rights, be it liver, nervous system, or pancreas, at the same time—as the liver is the sugar manufactory of the animal body—always taking care that the biliary functions are in good working order. In the next place endeavour to raise the general health of the patient to its highest possible standard by giving him plenty of fresh air and healthy muscular exercise within the margin of fatigue, and keeping away from him all mental and bodily-lowering influences.

In cases of diabetes the result of excessive sugar formation, as all hepatic cases are, a restricted diet is essential; but to wholly stop the saccharine supply is not what is wanted. For were we to do so we would arrest every function of animal life, for a certain amount of sugar is absolutely essential to their proper performance. A healthy man of about 13 stone weight uses up daily no less than 2 lbs. of sugar.⁹

In diabetes from excessive sugar formation there is manufactured over and above it sometimes as much as 2 lbs. or 3 lbs. in the twenty-four hours; and as this additional amount is not required for the wants of the system, it is eliminated with the urine as so much useless material. Consequently, it is not the normal and requisite 2 lbs., but the abnormal and not required 2 or 3 lbs. more of sugar that the non-starchy diet is intended to prevent being formed. It is with this object that a proteid diet is given in all cases of diabetes due to excessive sugar formation, for the liver can manufacture sufficient saccharine matter out of proteids for the wants of the system without there being run much risk of its manufacturing a superabundance. The following table indicates the general principles of dietary I adopt in cases of diabetes from excessive sugar formation:

MAY EAT.

Meats.—Beef, veal, mutton, lamb, pork, venison, hare, rabbit, and all kinds of feathered game and poultry; fat bacon, ham, salted beef, tongue, and tripe. Eggs—raw, boiled, poached, or fried. Butter, Devonshire cream, and cheese of any country and kind.

Fish.—All kinds of sea and freshwater fish—boiled, fried, stewed, or broiled, including eels, smelts, whitebait, crabs, lobsters, prawns, shrimps, as well as sardines and anchovies—fresh, salted, and in oil or butter; kippered herrings, bloaters, and smoked or dried haddocks.

Soups.—Animal soups of all varieties—oxtail, gravy, hare, turtle, eel, prawn, clam, chicken, grouse, and other game soups; bovril, beef-tea, Liebig's extract, Valentin's meat juice, Brand's essence, and such-like animal soup preparations.

Cooked Vegetables.—Cabbage—white and red, cauliflower, Brussels sprouts, spinach, turnip-tops, greens, sorrel, Jerusalem and leaved artichokes, broccoli, tomatoes, onions, and mushrooms.

Uncooked Vegetables.—Lettuce, chicory, endive, dandelion, celery, shalots, watercress, sorrel, and tomatoes, either simply with salt, or made into salad; in the latter case lemon juice should be used instead of vinegar, with plenty of oil, but very little pepper.

Puddings.—Egg custard, calves' foot, gelatine, isinglass, Irish and Iceland moss jellies and blancmanges, flavoured with salt or sweetened with saccharin.

Breads.—Gluten and bran breads¹⁰—plain or toasted gluten rolls, cracknels, almond, cocoa-nut and bran biscuits, gluten sponge cakes, as well as rusks; all of which, carefully prepared, may be obtained from Collard, 146, New Bond Street; Blatchley, 167, Oxford Street; Van Abbot, 6, Duke Street, Grosvenor Square; Bonthron, 106, Regent Street; and elsewhere.

⁸ I have entered fully into this point (p. 73 78) in my book on *Diseases of the Liver*.

⁹ It is surprising how much sugar a healthy person can assimilate. Dr. Vaughan Harley, while working with Professor Dastre at the Sorbonne in Paris, took 400 grammes (13 ounces) of cane sugar daily until he completely upset his digestion, without any ever appearing in the urine; and again, while working with Professor Mosso at Turin, 500 grammes (17½ ounces) with a similar negative result; and this he regards as due to the fact that not only was he healthy, but at the same time taking active muscular exercise.

¹⁰ If the bread be well prepared and free from starch it does not become either of a violet or a blue or blue-black colour, but only of a reddish brown, when iodine water (¼ tinct. iodine + ¾ distilled water) is applied to it. The depth of colour indicates the amount of starch present.

⁷ "Pathogenesis of Diabetes," BRITISH MEDICAL JOURNAL, August 27th, 1892.

Fruits.—Oranges, limes, lemons, shaddock, olives, pineapples, bilberries, raspberries, blackberries, red and white currants.

SHOULD AVOID EATING.

All wheaten, barley, oatmeal, or other forms of ordinary bread; pastry, pie-crust, dumplings, pancakes, porridge, as well as all kinds of farinaceous puddings—sago, rice, semolina, cornflour, arrowroot, revalenta, malts, and maltine in any shape; likewise *paté-de-foie gras*, and, indeed, liver in any form. Asparagus,¹¹ potatoes, peas, beans, lentils, beetroot, parsnips, carrots and turnips, rhubarb—stewed or in tarts—chestnuts, raisins, prunes, and dried figs.

MAY BE PARTAKEN OF IN GREAT MODERATION.

Oysters, mussels, clams, vegetable marrow, sea-kale, radishes, cucumber, green French beans, melons, apples, pears, peaches, apricots, grapes, gooseberries, strawberries, and cherries; likewise almonds, filberts, walnuts, and hazel nuts.

Skim milk was thought by Dr. Donkin to fulfil by itself all the objects aimed at in restricting or totally excluding the use of farinaceous foods; but when milk is given, as given it may be freely, it is much better to give it fresh than skimmed. For in giving the latter you not only give all the saccharine matter which normal milk invariably contains, but at the same time you deprive the patient of its non-sugar forming, highly nutritious, oleaginous ingredients constituting the cream.

The above form of dietary for diabetes due to excessive sugar formation requires considerable alteration in order to make it suitable for that due to diminished saccharine consumption—malassimilation. It is necessary to supply to the body such easily assimilable foods as will retard emaciation, while they at the same time keep up the vital powers of the patient. Hence in these cases, not only fresh milk, but cream, butter, and even cod-liver oil should be given freely, and when greasy stools are met with, as in the pancreatic variety of the disease, from there being an absence of pancreatic juice, give along with the oil either liquor potassæ or carbonate of soda dissolved in glycerine in order to emulsify the fats, and thereby render them more absorbable by the intestines. Not only so, but when the loss of flesh and strength is great, as it is not the presence of the sugar in the circulation, but the want of its assimilation, which causes them (as by increasing the supply of the wanted nutritive material you augment the chances of its assimilation), do not hesitate to give freely the most readily assimilable saccharine substances, namely, honey and pure cane sugar. Kulz even recommends *lævulose*, the exact analogue of diabetic sugar.

For similar reasons, when patients suffering from excessive sugar formation begin to lose flesh and strength, and show signs of mental weakness, at once relax the severity of the restricted diet, and allow them toasted brown bread, along with fats and plenty of green vegetables and fruit.

Two different kinds of mineral water are useful to diabetics, the saline purgative, and the alkaline non-purgative waters. The beneficial action of purgative mineral waters is best seen in cases of diabetes from excessive sugar formation, and it is due to precisely the same cause as a restricted diet—namely, to reducing the saccharine supply. If the ingested food be swept out of the intestines, before its nutritive ingredients have had time to be taken up by the intestinal absorbents, it might just as well never have been swallowed, in so far as furnishing materials to the liver to manufacture sugar with is concerned. Alkaline non-purgative mineral waters act by virtue of their alkalinity, in precisely the same way as liquor potassæ and carbonate of soda, namely, by emulsifying the fatty matters of the food and thereby increasing their absorbability by the digestive canal and thus conducing to retard emaciation and death. Hence their advantages are seen best in the diabetes from diminished consumption of pancreatic cases.

I now approach the most important form of liquid ingesta, the alcoholic. None but those having had much experience of liver diseases and diabetes can have the faintest idea of the powerful influence alcohol has in the production of both of them. It is not the drunkard, but the self-styled moderate drinker class which show this most potently. Of all the exciting causes of diabetes with which I am acquainted I give the palm to spirits. It matters little whether they be taken under the name of arrack, brandy, gin, rum, or whisky,

¹¹ Asparagus eaten in large quantities induces a flow of saccharine urine—an actual glycosuria even in healthy men, as I found by experimenting upon myself. See my lectures on the *Urine* and my book on *Diabetes* already referred to.

their effects are identical; and, what is more, one often finds that diabetics, though not “nippers” themselves, come of a drunkard stock.

Before I was so lucky as to discover that alcohol introduced into the portal circulation of dogs induced glycosuria, it was the routine and almost invariable practice to try to sustain the strength of diabetic patients with alcoholic beverages. But no sooner did my researches become known, and Bernard had further shown that dogs could be rendered diabetic by alcohol introduced into the duodenum, than the stimulant plan of treatment gradually began to be discontinued. Dogs pass sugar in their urine in the brief space of two hours after stimulants are injected into their portal veins. For these reasons I counsel the discontinuance of all alcoholic beverages, distilled as well as fermented, whisky, brandy, rum, gin, arrack, port, sherry, Madeira, Marsala, Champagne, and Burgundy; ale, stout, porter, and cider, as well as all varieties of liqueurs, as being more or less detrimental. Only in very exceptional cases do I advise in cases of diabetes the use of an alcoholic drink, and that is, when weakness and loss of appetite show themselves in cases of diabetes from excessive formation, and increasing debility is a marked symptom in those due to diminished saccharine assimilation. Then and then only do alcoholic stimulants do good instead of harm.

As all diabetics suffer more or less from thirst, I am not one of those who prohibit their drinking bland liquids—tea, coffee, lemon squash, koumiss, soda, puralis, and Salutaris waters, as well as milk, with or without aerated water added, beef tea, bouillon fleet, bovril, and Liebig's extract. In cases where the thirst is annoying to the patient I bid him acidulate iced aerated water with a few drops of lemon juice or of dilute phosphoric acid, and slowly sip it. Phosphoric acid seems to me to quench the craving for fluids better than anything else.

First, as regards the drugs that act beneficially in diabetes the result of excessive sugar formation. These are all of the narcotic and anodyne class—opium, morphine, codeine, hyoscyamus, cocaine, bromide of ammonium, and such like. And they act, I believe, by virtue of the power they possess of reducing hepatic nerve activity. This opinion is justified by reasoning from analogy, and the fact that the output of sugar is reduced during their employment. Opium, morphine, and codeine do not always produce equally beneficial results in apparently identical cases, nor even in the same case at different times. Codeine, for example, may give unsatisfactory results where morphine is found potentially useful, and, where both have failed, crude opium may produce the desired effect. It is a common practice to go on augmenting the dose of the narcotic in proportion as it loses its beneficial effect. In this way patients have been given from 10 to 20 grains of codeine, and from 20 to 60 grains of opium, in the twenty-four hours. This, in my opinion, is a highly reprehensible mode of practice, as I have more than once heard of cases in which it has been followed by disastrous results. Whenever I find $1\frac{1}{2}$ grain of codeine or a couple of grains or so of opium for a dose producing little or no effect, either in reducing the amount of the urine or its specific gravity, I think the failure is most likely due to my not having selected the form of narcotic suited to the case.

The beneficial effects of croton chloral often surprise me, but I seldom or ever give it except in combination with a vegetable narcotic or anodyne. As an example of the good effect it sometimes exercises on a case of diabetes, I may mention that, given in conjunction with opium, in Dr. Molony's case of the Major already cited, the quantity of urine was not only reduced from $1\frac{1}{2}$ gallon to $3\frac{1}{2}$ pints in the short space of twenty-three days, but at the same time its specific gravity fell from 1036 to 1030—a result so favourable that I fancy the reader will ask for a formula, in the hope that he may by its aid be equally successful. To give a single formula that will answer in every case of a protean disease like diabetes is, however, out of the question; so all I will do is to give the one employed in the case just alluded to. It is the following:—℞ Croton chloral, gr. $\frac{1}{2}$; opii, gr. j; ext. aloes barb., gr. $\frac{1}{4}$; ext. gentianæ, gr. iss. M.; one pill to be taken three times a day.

In cases of diabetes the result of nerve depression, as well as those arising from pancreatic disease, I find strychnine of great service when given in the form of nux vomica extract in

$\frac{1}{2}$ gr. doses three times a day in a croton chloral pill combination. Indeed, it seems to me that everything tending in any way to improve the general health in such cases is of benefit to the patient. Hence not only strychnine and quinine, but likewise mineral acids—notably phosphoric and nitrohydrochloric—are of service. Antipyrin I once or twice found very useful, as well as occasionally the peroxide of hydrogen.

Should non-success follow upon the treating of diabetic cases upon the principles inculcated, I trust before they are condemned the reader will kindly reflect that he may have erred either in the differential diagnosis of the case, or in his selection of the remedy employed for its cure.

A CASE OF FOCAL EPILEPSY: TREPHINING: ELECTRICAL STIMULATION AND EXCISION OF FOCUS: PRIMARY HEALING: IMPROVEMENT.

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WITH REMARKS

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REPORT OF THE CASE BY PROFESSOR RUSHTON PARKER.

A boy, aged 9, from St. Helens, Lancashire, was sent to the Liverpool Royal Infirmary by Dr. Knowles on account of fits at the end of September, 1892. The family and personal history were healthy, and nothing was known of any epileptic or other fits previous to this case. As to injury, the boy had fallen on the right side of his head while at play in October, 1891, when he vomited slightly about an hour later. Nothing more was noticed wrong until about three weeks later, when there occurred a slight tremor of the left hand, which subsequently twitched several times that day. These tremors and twitches became more frequent, but were at first confined to the hand, and still of momentary duration (according to the father's opinion). After the middle of December, 1891, the fits became longer in duration, and affected the forearm. Later the head began to move in the fits, and in March, 1892, the eyes turned to the right. By this time twenty or thirty fits a day occurred, with all the movements above noted sometimes combined. Whatever he happened to be doing, whether talking, whipping a top, or what not, would merely be momentarily interrupted during a fit and be resumed immediately after. He was first noticed to fall in June, 1892, and in July of the same year, while staying in Ramsey, Isle of Man, he fell about twice a day, vomiting and weakness following. At last the falls became so frequent that he was not allowed to go alone, even about the house. The twitching fits have always been of the same character, and have never implicated other parts than the left hand and arm, the head and eyes; but though increased in frequency and length, no fit has lasted longer than about ten seconds. No dulness or stupidity, loss of power or sensation, headache or other ill consequence, has ever resulted. There has never been a cry or other sound in any way associated with a fit, nor has he ever bitten his tongue or micturated at these times. As to "aura," he used to be aware when a fit was coming on, and said he "felt funny" in the left arm from shoulder to wrist, but nothing in the hand. It has been all along difficult to decide where the movements began, whether left shoulder, forearm, wrist, fingers, or thumb; but it was finally decided that the thumb and wrist movements seemed to be the first. In the hand there was slight twitching tremor of fingers and thumb, none of which were flexed into the palm, but all kept apart. The forearm was held at right angles to the arm, in the position of pronation, the elbow being flexed and extended in short limits. The arm was held abducted slightly during these movements. The head, in two or three jerks, moved towards the right shoulder, and there remained during the fit, while the eyes moved together to the right. It was also difficult to say where the last movements occurred, but apparently twitching of the hand could be so considered.

On December 6th the eyes were examined by Mr. T. H. Bickerton, oculist to the Royal Infirmary, and found healthy in all respects.

On December 7th, 1892, chloroform being given but without previous injection of morphine, he was trephined over the right Rolandic area, with the view of finding and excising the motor centre of the left thumb and wrist. The line estimated to be over the Sylvian fissure was drawn from a point one inch and a quarter outside the external angular process of the orbit to a point three-quarters of an inch below the most prominent part of the parietal eminence. Reid's base line was marked, and from it two verticals drawn to the sagittal line, one just in front of the external auditory meatus, and the other at the hindmost part of the mastoid process. The sagittal end of the posterior vertical was now joined to the Sylvian end of the anterior, the diagonal thus drawn being one recognised method of estimating the fissure of Rolando. Another measurement was made by marking a point on the sagittal line one centimetre behind the central point between the naso-frontal junction and the external occipital protuberance, according to Professor Victor Horsley's suggestion in Cunningham's Memoir (Royal Irish Academy, 1892). This point came nearly three-quarters of an inch in front of the sagittal end of the diagonal above referred to, so a fresh line parallel to that diagonal was drawn from the new point. A line midway between the two was then adopted as that of the fissure of Rolando. The situation of the thumb centre was estimated by marking a point about midway between the sagittal end and the Sylvian end of the line adopted. This is not a very accurate statement, but it is the nearest to the fact that can be recollected.

The skin was punctured at this point, and the bone entered with a bradawl, after which a semicircular flap of skin, including cranial aponeurosis, stripped with a smooth raspator, was turned downwards, and the pin of a trephine entered at the guiding bore-hole. On removing the disc, an inch and a-half in diameter, and opening the dura by a tripartite incision, the Rolandic fissure was found crossing the middle of the trephine hole, and the genu of the ascending frontal convolution exposed almost exactly in its centre. Stimulation of the cortex at one point evoked movements of the thumb, and at an adjacent point movements of the wrist. The areas thus stimulated were now scooped out with a sharp spoon after incising the pia around. Bleeding from the large vessel occupying the fissure became somewhat persistent, so two ligatures of silk were placed upon it. At the moment of tying one of them a spasmodic movement of the right hand occurred. Some present thought this a semi-conscious act, due to partly restored sensibility. No fluid except warm water was brought in contact with the brain until after the electrical excitation was over, when sublimate solution 1 in 10,000 was used. The dura was sewn with silk, and the disc, previously cut up and wrapped in lint wet with warm sublimate solution 1 in 10,000, replaced to about two-thirds of its bulk in small tessellated fragments. The skin and cranial aponeurosis were reattached by a few stitches after washing with 1 in 40 carbolic lotion, and cyanide gauze applied without drainage. At the end of five days the wound was deeply healed, and most of the edge; the remainder being completed by scabbing in fifteen days. The slight pulsation and yielding over the trephine hole gradually diminished until January 25th, 1893, when he went home, and by February 20th could no longer be perceived.

After operation, on the same day, nine fits were noticed, twenty-seven the second day, six the third, three the fourth, three the fifth, and afterwards from thirty to forty a day. He was allowed up about the sixteenth day, but, having a week later fallen almost into the fire, he was sent back to bed for a couple of weeks or more.

Before operation his case was related to Mr. Victor Horsley, who kindly offered suggestions, advising excision of the shoulder centre, and this was, in consequence, at first intended. Concurrent testimony on the spot having subsequently pointed rather to the thumb and wrist centres, it was eventually decided to select them, as indicated in Ferrier's book.

The patient was subsequently brought once a fortnight to hospital, and, on March 6th, reported about four to ten fits a day, chiefly in the afternoon. Since then further improvement has taken place. Time alone will show whether or no genuine advantage has accrued to him.

I wish to thank Mr. T. H. Agnew and Mr. J. S. Macdonald for the notes from which this report has been prepared.