

Notes of a diabetic case.

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NOTES

OF A

DIABETIC CASE.

ON the 16th October, 1796, Captain M. was examined, and the following history comprehends the present state of his disease, and a retrospect of its origin and progress.

Present State of the Disease.

He voids about twelve quarts of urine in twenty-four hours; since last night has preserved seven quart bottles, being the quantity made; it is of a light straw colour, has no smell of urine, but has a whey and violet flavour, and its taste is very sweet.

His thirst is excessive, and he drinks during the day seven or eight quarts, and even upwards; the tongue is whitish and moist; there is a clamminess in the mouth, and he spits a white frothy saliva of

a sweetish taste. His appetite for food is variable, sometimes unusually keen, and at odd times as in the night.

His skin is dry but not unusually warm; pulse rather weak and not exceeding eighty-four. His face flushed.

He is frequently sick, and throws up matter of a viscid nature, and of a bitterish and sweetish taste. After eating he has a pain of his stomach which continues often half an hour.

He has a constant pain in the region of both kidneys, extending forwards, but more particularly in the right, in which there seems to be a greater fullness and tenderness to the touch, and there is a retraction of the testicle, with a weakness, sense of coldness, and at night an œdematous swelling of the leg on the same side, with a pain and tenderness of the great toe. He feels a singular, painful, and fluttering sensation in his belly, extending from the situation of his kidneys.

He is regular in his bowels, though sometimes inclining to costiveness; his stools are of a greenish colour, and have no unpleasant smell.

The prepuce of the penis does not retract; it
has

has a whitish appearance with excoriation and forenefs, but is not fwelled.

The gums are reddish and have the appearance as influenced by mercury, the teeth feel loose to him, and as on edge, or the fenfation from sharp acids, and they are peculiarly white; he has loft two of them. There is a fullnefs about the eyes, with a turbid yellowifh caft. He has flight and occasional headachs.

His diet is animal food and vegetables; he has not been particularly refticted; he drinks from a pint to a bottle of port wine daily—other drink, toaft and water. He ufes horfe and walking exercife, but cannot walk two miles without much fatigue.

Mr. Cruickfhanks (Ordnance Chemift, and a Surgeon of Artillery) took thirty-fix ounces troy weight of urine voided to-day, and it yielded by evaporation three ounces and one drachm of a faccharine extract, of the appearance of molaffes but thicker, having nearly the confiftence of wax, and like it tenacious. If therefore the whole of the day's urine had been evaporated it would have yielded about twenty-nine ounces troy weight, an
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astounding quantity to be formed and separated daily from the system. By standing in the air it became moist, and of nearly the consistence, smell and appearance of treacle.

Treating some of this extract with the nitrous acid, he procured the saccharine or oxalic acid, and with a smaller proportion of the acid it produced a substance which in appearance, taste and smell could not be distinguished from honey.

The urine in appearance, taste, spontaneous changes, and the result obtained by evaporation, may be considered as similar to what has been observed by Dobson and others, though there was less sugar and more animal mucilage than in the diabetic urine of the former.

Two portions of blood of about four ounces each were taken on the 18th of October from the same vein, and at the same time: On standing (in the inside of a window fronting the north, the thermometer of Fahr. in the air being fifty-five) the appearances resembled exactly those described by Dobson, except that the serum did not impart a sensibly sweet taste; to me it tasted as whey
with

with a greater than necessary proportion of rennet. The crassamentum of the first cup had a slight buff, rather less serum than natural, and which was opaquely whitish; the crassamentum of the second cup had more of the buffy coat. The buffy coat in both cups was of a blueish colour, similar to what mercury sometimes produces.

On the same day a portion of healthy blood was taken and placed under the same circumstances of temperature, &c. and in the same room with one of the portions of diabetic blood.

In two days the diabetic blood assumed a caseous appearance on the surface, which disappeared with the evaporation of the serum, and the whole mass became dry and resinous in appearance, without having undergone (unless the throwing out a slight animal smell for two or three days, with a mould on the surface of the crassamentum be supposed marks of it) any apparent putrefactive process, and on the 4th November, being sixteen days from the operation, it remained in the same state: whereas the healthy blood exhibited evident marks of great putrefaction in
four

four days, and was obliged to be thrown away on the seventh.

Retrospect of the Origin and Progress of the Disease to its present State.

This disease has continued seven months and upwards. I saw the patient for a day or two in June, when the disease was detected. Previous to which, he had used nitre and small doses of mercury, but then the disease as diabetes had not been ascertained. From June to the date of the present report, he had been living on the kind of diet described, and had taken some remedies under the direction of an eminent physician at Yarmouth, the principal of which were bark and alum. Occasionally he found himself relieved, having less fever, and the quantity of urine being diminished at one time to two or three quarts a day, but without any change in its sensible qualities. Sugar was also allowed during this treatment, and he took it in the form of treacle and spruce beer in considerable quantity, and the disease seemed to increase during its use.

He has fallen away in fat and flesh considerably,
and

and his muscles are flabby. In October, 1794, when in apparent health, he weighed sixteen stone and eight pounds, and in November, 1796, eleven stone eight pounds, shewing a loss by the disease of no less than five stone in weight.

For the six months preceding the attack of the disease, he was sick and vomited at least two or three times a week, and he frequently brought up from the stomach during these vomitings different things which he had eaten several days before unaltered, and the taste was generally sour.

He always eat heartily and drank freely, but not intemperately, and was fond of high seasoned and fat dishes. He had had two regular attacks of gout, and had at other times two severe fits of cholera. He has been twice married, and has two children, the youngest of whom has been rickety. His age is thirty-four. Stature, five feet eleven inches and three quarters. Hair, light brown. Eyes, dark blue. Complexion, fair.

The Nature and Progress of the Disease, with its Treatment from the 16th October.

As the disease was evidently going on, and lately very rapidly, it was thought proper to adopt steps the reverse of what had been pursued.

Two views of the disease presented themselves, the one as depending primarily on a changed process of digestion, the other on a primary and peculiar action and condition of the kidneys.

Mr. Cruickshanks, and Mr. Wittman (Surgeon of Artillery) having seen the patient with me, we agreed to meet on the evening of the 18th October, so as to form our view of the nature of the disease, and a corresponding treatment—to them I submitted the following remarks, and which were founded on what had passed in several conversations we had from time to time on the subject.

1st, The stomach affection pointed out by the variation in the degree of appetite, and the sensation after eating; the state of the digestion for six months previous to the actual appearance of the disease; the costive state and the appearance of the stools; the taste of the salivary discharge; the phenomena of the blood, and the wasting of the body, mark a general disease depending primarily on a changed and peculiar state of the stomach, by which sugar or matter possessing saccharine properties is copiously formed, and a defect of assimilation.

lation. The mere defect however of which will not account for the quantity of saccharine matter formed, though it certainly constitutes part of the nature of the disease. The existence of such a defect in the assimilating powers we apprehend is manifest from the quantity of animal, exclusive of saccharine matter voided with the urine, and from the wasting of fat and flesh, having lost five stone in weight by the disease.

2. The serum of the blood apparently containing less sugar or saccharine matter than the urine, may depend on the power of the kidneys in separating it in common with the other saline matters of the blood; but proving a new and peculiar stimulus their action is increased, and the sugar consequently separated speedily and in proportion to its formation in the stomach.

3. The buff on the blood, the white tongue, the thirst and quickened pulse, with the heat and dryness of the skin, and the flushed face, point out an increased action of some kind in the whole system.

4. The painful state of the kidneys, the feelings in the loins and belly, and of the right leg,

point out some morbid state of the kidneys besides a simple increase of action; indeed some change of structure may be supposed from the mere increase of action and its long continuance, though the peculiar stimulus acting on them might be supposed to induce a morbid condition.

5. The quantity of urine discharged being greater than any quantity of liquids or solids received into the stomach, there may be a greater absorption from the skin and lungs. The increased absorption from the skin no doubt depends upon the great quantity of fluid separated by the kidneys, and this secretion, as has been suggested in the 2d and 4th inferences, upon some peculiar stimulus applied to those organs. The skin absorption may therefore be considered as an effect, and an action of necessity. But exclusive of increased absorption of mere fluid by the skin, it is supposed there may be something peculiar absorbed by the skin and lungs, and which may have a share in maintaining the disease after it has been produced.

6. The objects of treatment therefore would be to destroy the sugar or saccharine process going on in the stomach, (by stomach is meant the whole

whole

whole organs employed in digestion and assimilation) and to promote a healthy assimilation, and as auxiliaries to prevent the supposed increase of absorption from the surface, to diminish the increased action and to change the imagined derangement of the kidneys.

The particular arrangement of the treatment as agreed upon, was as follows.

1st. The diet to consist of animal food principally, and to be thus regulated.

Breakfast; One and half pint of milk, and half a pint of lime water, mixed together—bread and butter.

Noon; Plain blood puddings, made of blood and suet only.

Dinner; Game or old meats which have been long kept, and as the stomach may bear, fat and rancid old meats, as pork. To eat in moderation.

Supper; The same as breakfast.

2dly. A drachm of kali sulphuratum to be dissolved in four quarts of water which has been boiled, and to be used for daily drink.

No other article whatever, either eatable or drinkable,

drinkable, to be allowed than what has been stated.

A diet of animal food, especially as rancid as possible, was proposed with the view of preventing the formation of sugar in the stomach, and by that means to remove the peculiar stimulus which supports the increased action of the kidneys. The kali sulphuratum it was supposed would not only tend to diminish the too great action of the organs of digestion, but likewise chemically counteract the formation of sugar, and thus act in concert with rancid animal food; but the hepatifed ammonia, as will be afterwards described, we now prefer as the most active and certain medicine.

3dly. The skin to be anointed with hog's lard every morning. Flannel to be worn next the skin. The gentlest exercise to be only permitted, but confinement to be preferred.

4thly. A draught at bed-time of twenty drops of tartarised antimonial wine, and twenty-five of tincture of opium, and the quantities to be gradually increased. In reserve as substances diminishing action, tobacco and foxglove.

5thly.

5thly. An ulceration about the size of half a crown to be produced and maintained externally, and immediately opposite to each kidney. And,

6thly. A pill of equal parts aloes and soap to keep the bowels regularly open.

On the 19th October (when he was in the same state as on the 16th) the patient had a copy of the plan of treatment, and which he commenced the same day, and was desired to journalize as he went on.

So soon as the 21st some changes occurred; he made in the twenty-four hours only six quarts of urine, and drank only three quarts of the sulphurated alkaline water; the urine was not so pale, had a cloud in it, and was more urinous in smell.

We think it necessary here to observe, that the blood-letting seemed to relieve the patient, as he felt the evening of the same day, according to his own expressions, lighter, cooler, and more cheerful, and had less pain about the kidneys, and this was on the 18th, the day before the particular treatment was commenced. This circumstance confirms our 3d inference of an increased general action,

Nov. 1.

The only alteration in the treatment since the 21st October, was in the occasional use of sulphur in place of the pills, and the kali sulphuratum increased to two drachms daily. This day the quantity of urine did not exceed four quarts, and the urine was of a higher colour and more urinous smell; thirst less; the drink not exceeding two quarts a day; skin moist and perspires freely in the night; the stomach and belly are much less uneasy, though he complains much of pain from the ulcerated parts in the loins; stools large and very offensive.

Supposing that the quantity of alkaline salt he takes daily in the kali sulphuratum, might have some improper effect on the kidneys, it was resolved to try the hepatised ammonia (pure volatile alkali saturated with hepatic gas.—See Dr. Crawford's paper on muriated barytes, in the second volume of the Medical Communications), a medicine proposed by Mr. Cruickshanks, and who was of opinion it might prove a more certain and active medicine than the other on the stomach, and in diminishing the action of the
system.

system. He was to take five drops in each half pint tumbler of water as drink. He took the first day thirty-five drops at different times, and which in the evening produced sickness and vomiting, with a giddiness and drowsiness. He threw up some apple pyc which he had secretly eaten three days before. The apples and crust had not apparently undergone the slightest alteration. He was directed to leave off the hepatised ammonia for one day, and then to begin with two drops to each tumbler.

On the 4th he drank only three pints of water, and made only two quarts of urine, which to him and his servants (who had been in the habit of tasting his urine from curiosity) was not sweet, and it deposited a red, sandy or lateritious sediment.

On the 5th the opiate at bed-time was discontinued, and on the 8th the rubbing with the hog's lard was left off.

The unction with hog's lard being a troublesome and disagreeable part of the treatment, was discontinued as soon as a decided change took place in the urine, with the intention of renewing

it again if necessary. It being now determined to simplify the procedure as much as possible, the parts deemed most essential were only to be retained, and these we conceived were confinement, animal food, and the hepatised ammonia.

The following reports marked with an asterisk are copied from the patient's own journal; but as they contain important intelligence, we shall occasionally subjoin remarks to them.

Nov. 12th.

* Continued as before; the four drops of hepatised ammonia made me as usually giddy, and having taken at different times sixteen drops, my pulse was only sixty-seven movements in the minute; slept well; no stool; took my sulphur with an increase of one tea spoonful; did not make quite two quarts of urine during the last twenty-four hours, but still of the same paleness as yesterday, though of a salt taste and urinous smell.

13th.

* My urine still of a pale colour, and rather inclined to a sweet taste, made during the twenty-four hours two quarts; drank five half pint tumblers of water, with four drops in each; slept well;

well; perspired much; no stool; took two tea spoonfuls of sulphur.

Note; on the 12th I took much exercise, I also drank some tea, and for supper eat a broiled kidney dressed with walnut catchup.

14th.

* Urine still pale, but not quite so sweet as yesterday, made two quarts during the day and night; drank only four half pint tumblers of water, with four drops in each of the hepatised ammonia. Am desired to leave off bread entirely; I drank some beer which I repeated on the 15th.

As the disease seemed to have been reproduced, an entire abstinence from vegetable matter was directed on the 14th, but it appeared afterwards that he drank some beer on that day, and the day following. However on the 16th animal food was only taken, and which was to be continued without the smallest portion of vegetable matter, nothing to be allowed approaching nearer to it than milk, and even this was to be left off and strong beef tea substituted, should the disease not disappear: and it was intended to try the effects of small doses of the oleum animale.

17th.

* Urine of a much higher colour, and its smell and taste quite urinous; made only three pints and a half during the twenty-four hours; drank in the same time five half pints of water, with five drops of the hepatised ammonia in each, and which occasioned me to be very sleepy and giddy towards the evening, and at that time my pulse was extremely weak, and only beat fifty movements in the minute. Had two stools.

Note; at one time during the afternoon, by accident, I took at least fifteen or twenty drops of the hepatised ammonia at once, soon after which I was seized with extreme languor and giddiness.

Those reports * point out the influence of even a slight deviation from a proper diet and confinement in reproducing the disease, and tend to confirm the explanation given of its nature, and the effects of the hepatised ammonia as a powerful narcotic in certain states of the system.

But as it is evident the disposition to the disease continues, and having a diminished appetite, a pure bitter is therefore to be given with a view of assisting the other parts of the treatment in changing the state of the stomach. The removal of the disposition

position must be finally accomplished by a long perseverance in the means of cure.

From the 21st to the 24th November, he had sickness and vomiting with gripings in his bowels, resembling a common bilious attack, and for the production of which no reason could be assigned. He had an emetic of ipecacuan, and a dose of castor oil. He threw up by the emetic an acid greenish matter, and the morning following the urine was evidently more urinous. The acid green matter thrown up after so long an use of a diet of entire animal food, shews the strongest disposition in the stomach to acidity. The present observation also points out, the probable advantage to be derived from changing the condition of the stomach, as well as emptying its contents, by the occasional use of emetics. It has been observed, that after any unusual commotion in the stomach and bowels the urine has always been more scanty and apparently more urinous the day immediately following. As the patient has shewn a dislike to the sulphur, castor oil is in future to be substituted when he has occasion for such a medicine.

Does not the effects of the hepatised ammonia,
of

of emetics, and in short of whatever induces sickness or unpleasant commotions in the stomach, shew forcibly the dependence of this disease on a condition of it very different from that of health? Do they not shew that such a condition consists in an increased morbid action of the stomach? The affirmative of those questions is rendered still more probable when we consider the keenness and voraciousness of appetite the patient had, and the quickness of its returns. Can any thing be inferred from any supposed change in the condition of the gastric fluid? The peculiar nature of the gastric fluid is but little understood, it is known however to possess very active properties as is shewn by its effects on the dead stomach, and the experiments of Spalanzani, &c. and if these are admitted there can be no doubt, but that it is the most efficient fluid in the body, and may like other secretions be liable to morbid changes, producing singular and extraordinary effects, though at present altogether unknown.

We would on the whole say, that the cause of our diabetic disease, very probably consisted in the secretion of too great a quantity of the gastric fluid, with some alteration in its quality,
and

and in too great an action of the muscular fibres of the stomach, producing saccharine matter, and a certain defect in the powers of assimilation. And with this opinion we don't suppose the circumstance of food being thrown up unaltered interferes, as the great quantity so frequently eaten prevented the stomach from getting quit of all its contents unchanged, especially as it would no doubt act in preference on those matters suiting its peculiar morbid condition. A species of indigestion however might be allowed, as in this disease we suppose digestion to be totally changed, from the results of the peculiar process of the stomach being so entirely different from what usually occurs. Though at the same time the action of the stomach be morbidly increased, the salutary products are not formed or applied.

Anorexy, as depending on dyspepsy, has been alledged to consist in a diminution of the muscular action of the stomach, or in a vitiated state of the gastric liquor, or in a deficiency of it. In anorexy, remedies weakening the tone of the stomach or system in general always increase the disease; the most successful treatment being by remedies giving
tone

tone and action to the stomach. In our disease a keenness of appetite to voraciousness has always attended, except during the mere temporary disgust arising from absolute accumulation, and the changes for the better have been by those remedies diminishing the action of the system in general, and of the stomach in particular, as shewn by the effects of confinement, blood-letting, emetics and hepatised ammonia. At one time when the disease was apparently removed, there seemed to be, by the patient's narration, a tendency to anorexy, and on this account a bitter was given to prevent the stomach from running too speedily into an opposite state, likely to produce a new disease.

In the second order of the class Locales, of Dr. Cullen's Nosological Arrangement, we find the disease termed Bulimia, and the character of the third idiopathic species of it is, *Bulimia (emetica) cibum magna copia appetens, et mox per vomitum rejiciens*. And this is the *Bulimia Canina* of Sauvage, who gives the only distinct, tho' concise description of it we could find; there are however detached accounts of it in James's Medicinal Dictionary.

tionary. To both we beg leave to refer, as our present case bears a resemblance to it; especially in that part of it previous to the accession of diabetes. In those accounts of Bulimia nothing is mentioned with regard to urine. But the disease is said to terminate fatally in atrophy, dropsy, &c. Sauvage says, the Bulimia Canina is owing to an acrimony of the digestive juices, and an irritability of the stomach. Absorbents or alkalies, fat meats, oils, sedatives and narcotics, are the remedies pointed out. Doctor James observes, that in Bulimia, “such medicines as mightily relax and moisten the stomach, and correct the acidity of the humour, have a peculiar virtue in taking off the sense of hunger. Of this sort are all pinguious, and oleaginous things; as fats, oils, and the extremities of animals. Thus Villanovanus relates, that a certain man affected with this disorder, eat pot-bread dipt in lees of oil; and that a woman in the like case, drank twice the melted fat of beef, with a like quantity of hot oil; and that both these patients contracted so great a loathing of food, that neither of them eat any thing for five days, and so got rid of their distemper. Narcotics, by blunting the too exquisite sense of the

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stomach,

stomach, have a virtue of moderating the Flames Canina.”

Does not the Bulimia Canina resemble in its nature not only the state preceding the diabetic attack in our case, as we have related it; but also the disease itself?

Is it not probable that the urine of the Bulimia Canina would have been found sweet, or having saccharine matter?

At any rate, the Bulimia shews an affection of the stomach very different from what is supposed in anorexy; and it approximates to the nature of our disease. And to us it is of importance as exhibiting a disease of the stomach depending on great irritability, and requiring narcotic remedies. It also supposes a changed state of the gastric fluid, and a defect of the digestive process, wanting absorbents or alkalies, and food of the most highly animalised kind.

26th.

* Urine quite natural, and the quantity during the day and night not exceeding three half pints. My thirst quite allayed, not having even the desire to drink which I recollect to have had previous

vious to the attack of the diabetes. Drank three wine glassfuls of an infusion of quasia with mineral alkali; and I feel in every respect, except that of weakness in my limbs, in good health.

A portion of this day's urine was examined; it was found high coloured, very urinous in smell, having a bitterish and saltish taste without sweetness, and depositing a slight gritty reddish sediment. Mr. Wittman evaporated a portion of it, and he assured me no sensible saccharine matter was discoverable in the residuum, by either smell or taste.

The daily accounts which follow are also from the patient's own journal, and shew the same circumstances as those related; but being if possible more distinct, and more strongly corroborating our opinion of the nature of the disease, they are continued.

27th.

* Urine less in quantity than yesterday by half a pint—did not make any urine during the night as usual, made a half pint tumbler when I got up in the morning quite urinous. Drank during the twenty-four hours, two half pint tumblers of water, with

hepatifed ammonia. Had a good stool. Continued the bitter.

28th.

* Made three pints of urine during this day and night. Drank in the same time two tumblers of water with hepatifed ammonia. Had a good stool. I walked this day more than usual, went down to the Warren and was weighed (the result of which has been already given). In my return home purchased some apples, and eat a large one. Continued the bitter.

29th.

* My urine increased to very near a quart, and of a paler colour, (a portion of this was evaporated, and it yielded a saccharine matter resembling honey.) I went to London, drank some coffee, and eat a Shrewsbury cake, and returned to Woolwich to dinner. Drank two tumblers of water with hepatifed ammonia. Had a good stool. One of the fores on my loins healed up, the other healing.

It may be here remarked, that the progress of the case has justified our second primary inference, namely, that the saccharine matter proved a new
and

and peculiar stimulus to the kidneys, and increased their action. For it has appeared that the decrease of the quantity of urine has been in proportion to that of the saccharine matter, and hence a corresponding diminution of the action of the kidneys. But if, as we suggested in our fourth inference, a change of structure in the kidneys of a nature different from mere enlargement of vessels had taken place, perhaps the diminution of urine would not have been so speedy and determined. It remains however still to be ascertained whether any peculiar condition of kidneys has been formed by the disease. So far as we have as yet gone, it does not appear probable.

Besides the increase of kidney action from the saccharine matter, there may have been in our case an effect producing increase of action from sympathetic affection with the stomach, and which effect is not unusual in other cases of disease, and it even occurs in health where the stomach is under the influence of a stimulus, as of wine.

30th.

* Made only one pint of urine during the day and night; its smell urinous, but of a paler colour

colour and rather of a sweetish taste. Walked as on the 28th. Drank two half pint tumblers of water with the drops. Continued my bitter. Eat an apple.

The patient was strongly remonstrated with, and he was told the consequence of repeated deviations in probably fixing the disposition to the disease so firmly as not only to increase the difficulty, but to establish the impracticability of removing it. Fair promises were therefore renewed, and absolute confinement to the house, entire animal food, and the hepatifed ammonia as before, with the quasia infusion, were prescribed and agreed upon. The urine continued pale though salt and of a urinous smell; but on Sunday the 4th December, the urine had a doubtful smell, and some of it was evaporated, and it yielded a residuum evidently saccharine, though much less so than in the first experiment, the urinous salts being now more predominant. We were in some difficulty—it was suggested that a portion of the apples might be still in his stomach, as it had not been unusual for him to throw up matters unaltered several days after they had been taken in. It was therefore resolved to give him on the 5th an emetic.

On

On this being proposed to him an aversion was signified, and he acknowledged having taken vegetable matter in bread and small beer for the four days preceding. The emetic was however given in the evening, and the contents thrown up appeared to be chiefly what had been eaten the same day. So far the emetic marked a favourable change in the state of digestion. It was now judged necessary to point out in stronger language the impropriety of such deviations; and there is more reason to expect from the apparent result, that a correct steadiness will be the consequence.

Dec. 1st.

* Made one pint and a half of urine during the day and night; its taste quite salt, but of a pale colour. Drank in the same time only one tumbler of water with four drops of the hepatised ammonia. Took my alkali in milk, and the bitter medicine. Had a good stool.

Eat hare for dinner with some of its stuffing, and which consisted of bread and parsley.

2d.

* Made the same quantity of urine, and which had the same colour and taste as yesterday. Eat
bread

bread and cheese after dinner, and drank a tumbler of beer. Took the bitters and hepatised ammonia as usual.

3d.

* The same quantity of urine, and of the same sensible qualities as yesterday. I also eat bread and cheese and drank beer.

4th.

* Made a quart of urine of the same quality as yesterday. I eat bread which had been soaked under roast mutton; I also eat bread and cheese, and drank two small mugs of beer.

5th.

* My urine as yesterday. Eat animal food only; and took an emetic of ipecacuan in the evening, which made me very sick, and I brought up all I had eaten in the course of the day, and in the last puke the matter was very sour.

6th.

* Urine since last night not exceeding a pint and a quarter, high coloured, very urinous in smell, and depositing a reddish sand. Continued my bitter, alkali in milk, and the hepatised ammonia.

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The four matter thrown up by the emetic shews the strong disposition in the stomach to acidity (see the remarks following the 17th November), and the high colour and deposition in the urine shews probably the same thing, as it has been observed by others (Mr. Forbes on gout and gravel, and Dr. Wilson on gravel and dyspepsy) that such high colour and deposition was augmented if not produced by vegetable and acid diet, and that when sourness prevailed sensibly in the stomach, the deposition of sandy matter was always more abundant; hence the formation of calculous complaints, and even gout has been explained as depending on a dyspeptic state of the stomach. I have been told however by one individual who may be depended on, that when he is sensible of acidity in his stomach, his urine is always clear, and deposits no sand or reddish sediment.

The sourness or acidity discoverable in our patient's stomach, after so long an use of animal food, points out a condition of the stomach unfavourable to the putrefaction of animal food. Doctor Fordyce says in his *Essay on Digestion*,

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that

that in a stomach not in perfect force animal food will putrefy, although in a stomach in perfect force, not only putrefaction will not go on but will be even stopped, and the appearances of it destroyed. With a stomach therefore in perfect force, a Laplander may live on rein deer alone for the most part of the year without any portion of vegetable food. So may the inhabitants of Orange River, in Africa, on limpets, dead and putrid seals and whales, without tasting a particle of vegetable food excepting aromatics. And so might the inhabitants of this country live (as they did three centuries ago, at least six months in the year) on animal food without any other vegetable substance than farinaceous matter. And all be exempted from scurvy, or any other detriment.

Nine ounces troy weight of this day's urine was evaporated by Mr. Cruickshank, and it yielded (of a matter the same in consistence as that of the experiment of the 16th October, but not so tenacious) five drachms, which was of a urinous smell and taste, and did not impart any sensible impression of the existence of saccharine matter, and seemed to have very little difference in smell

or appearance, except in being more tenacious from the residuum of nine ounces of my own urine, which weighed three drachms and a half, a quantity less than the other by one drachm and a half. If therefore we multiply our patient's urinary residuum of to-day by four, it gives two ounces and a half as the result of thirty-six ounces, which is five drachms less than was afforded by the same quantity of urine in the experiment of the 16th October, and of course approached more nearly to the amount of the residuum of healthy urine.

A portion of the residuum of our patient's urine and mine were separately treated by Mr. Cruickshank with nitrous acid; but the honey-like matter formed in the experiment of the 16th October was not produced; the results of both being very sharply acid and bitter, and apparently containing nothing but phosphoric salts, and nitrate of lime; though in examining afterwards the small portions which remained after evaporation a little oxalic acid was detected in that of our patient; but this might have been produced by animal mucilage, and of course does not prove

the presence of saccharine matter or vegetable mucilage.

A portion of this residuum was treated in a different manner by being exposed to heat in a coated retort. The products obtained were much carbonate of ammonia, a little animal oil, and what remained in the retort had every appearance of animal coal, being difficult to incinerate, and leaving nothing but a very small quantity of the phosphats of lime and soda. Had there been any quantity of vegetable mucilage, or sugar, the syrurous or pyro-mucous acid would have been obtained, and the residuary coal afforded potash.

May not the high colour of our patient's urine, and its more urinous appearance this morning, depend on the operation of the emetic as well as on the correctness of eating yesterday? For it has been observed during the disease that the urine was always more urinous after any derangement of the stomach, and does not this with all the other striking phenomena which have been described as existing at the commencement of the treatment, or during its course, demonstrate that the primary seat of the disease is in the organs of
digestion

digestion and assimilation? We have avoided in these notes stating the opinion of others with regard to the nature and treatment of the disease as unnecessary, leaving it to those who favour them with an attentive perusal and experimental trial, to determine how far the remarks we have proposed are our own or otherwise; but we think it right here to say, that they have been formed by the mutual aid of Messrs. Cruickshank and Wittman, and to the former, besides the advantages of medical opinion, we refer the chemical experiments entirely.

We have also avoided as much as possible, except in very general terms, pathological reasoning on the nature of this complaint, though it affords important points in physiological as well as pathological investigation; for we feel the force of the impropriety of fixing opinions from one solitary case, however strong and illustrative, and than which we presume to alledge, there is not perhaps one instance of disease so striking as ours on the records of medicine.

7th.

* Made no urine during this day, except about a wine glassful, nauseously salt and urinous. By mistake I took a greater number of drops of the hepatifed ammonia, in a tumbler of water, than I was directed. The effect was instantaneous, in producing a severe pain and shooting in my head, which continued for three hours. Doctor Rollo called about eight o'clock in the evening, when my headach was nearly gone; but my pulse was only then sixty in a minute. On going to bed, and on getting up in the morning of the 8th, I made urine, at both times the quantity did not exceed a pint and a half, was of a strong urinous smell, high coloured, and deposited a great quantity of sandy matter.

My appetite is very good, and as my diet is confined to animal food, I never find myself satisfied after eating. I take my alkali, and bitter.

The patient's feeling of not being satisfied with what he eats, marking still a degree of the state of stomach which we have supposed to depend on increased secretion of the gastric fluid and muscular action of the stomach, the bitter was directed

to be discontinued, and not to be repeated unless symptoms of the opposite state arise, a state pointed out by anorexy.

Mr. Cruickshank evaporated nine ounces of the urine voided last night and this morning, and it yielded of a brownish residuum not tenacious, and of a highly urinous and animalised smell, three drachms, which is at the rate of one ounce and a half in thirty-six ounces of the urine, a difference of result when compared with that obtained from the same quantity of the urine of the 16th October, of one ounce and five drachms, and amounting to less than the weight of the residuum from the same quantity of my urine by two drachms,—the residuums had also as nearly as possible the same appearances.

Does not this great diminution of animal matter in the urine, when connected with the other changes marking the removal of the disease, shew that the assimilating powers are assuming, or have assumed a healthy action? This is rendered further probable, if not certain, by considering that the amount of animal and saline matter, formed and separated in twenty-four hours, by this day's
 experiment

experiment does not exceed an ounce, whereas at first he was forming and separating not less than twenty-nine ounces during the same time; and that from the increasing fullness of countenance and firmness of flesh generally, nutrition seems to be applied. It is intended to re-weigh him, and should there be an increase of weight the fact will be established.

8th.

* Made the last twenty-four hours one pint and a half of urine of the natural smell, taste and colour, and without any of the sandy like sediment. (Does not the want of which mark a more healthy urine and condition of stomach?) Continue the water and hepatised ammonia, and the alkali in my milk—the bitter has been laid aside.

The excoriation and soreness of the penis is entirely gone, but the prepuce cannot be completely retracted. The gums have lost their reddish appearance, and the teeth are firm and without the feel of being on edge. The penis affection was, previous to the treatment, occasionally very troublesome; it seems to have been owing to the very constant application of the saccharine matter,

as it ceased gradually on its disappearance. Both circumstances, though apparently trifling, we hold to be of consequence, as they assist in proving the absence of the disease. But the state of the mouth was considered of more importance than the other, as strengthening the opinion of the diffusion of the saccharine matter over the system and its removal,

9th.

Two portions of blood of about three ounces each were taken at eleven this forenoon from the same vein, and in a free stream. They were examined at two P. M. and both were found to have an uniform mass appearance. Each portion was covered with a very thin pellicle of coagulable lymph of a loose texture, resembling the white of an egg, and except which there was no other separation of parts exhibited. But in order to ascertain this more exactly, a penknife was plunged into different places of the portion in the second cup, or that which was last drawn, and it was found throughout of a loose texture, having no distinct separation of crassamentum and serum; indeed it appeared as one soft mass: the red part was of a dark colour. It may be necessary to observe, that the cups were placed in a window fronting the

north (the thermometer on the outside of a window in such an aspect was at the same time to-day 27). The cups after the examination were removed to the chimney-piece over a good fire, to be re-examined in the evening.

From the appearance of the blood, we think it not improbable an opposite state of system is likely to occur; though the account of the gums and teeth described yesterday don't point out any advance, yet the patient will be unremittingly watched. It may be also observed, that he felt very differently to-day after the blood-letting to what he did on the 18th October, then he became lighter and more chearful, whereas to-day he felt heavy and languid.

Nine o'clock P. M. re-examined the portions of blood—the surface of the blood in the second cup was found to be of a florid red, the pellicle thicker and of a tougher consistence, but without any further separation of parts, all being in one apparent connected mass. The portion of the blood first drawn, which was left untouched, was also found to be in an uniform mass without any separation of serum, the whole was however much firmer than

than at two o'clock, and the pellicle of coagulable lymph was thicker and tougher—the blood in both under the pellicles was very black. Therefore the cold may have had some influence, as the blood exhibited rather different appearances, though still it might be said to be in rather a dissolved state, and approaching to that of scurvy, the advance of which is rendered more probable by the languor following the operation. He is now however chearful, and satisfied his disease is removed. He has made no urine since the morning, nor has he any desire to void any this evening. He is directed to leave off the alkali, and also the hepatised ammonia; and he is to be allowed to walk out tomorrow. In a few days he will be permitted to ride gently, and to eat bread, should no circumstance intervene to prevent it.

FROM the whole then of this case, at least so far as it has proceeded, it is not unreasonable to draw a favourable prognosis; but as it now evidently depends on the patient's persevering in a very restricted plan for the accomplishment of a perfect cure, we may perhaps, from the experience of his instability, hold the issue to be still

doubtful. However, the suggested nature of the disease and the appropriated treatment, have by the result become so highly satisfactory, that it was thought expedient to make them known to those who were likely to meet with the same complaint, in order that a further trial might be made without any loss of time, and to solicit the result of such trials. On our part promising an account of the final termination of the present case, or any further trials we may have an opportunity of prosecuting.

We beg leave here to add, that should another case of Diabetes similar to this again occur, we would try confinement and animal food only, and if these did not succeed, gradually adopt the other parts of the treatment pursued in the present case. We would commence, where the general action was strong, by blood-letting, but in every instance by an emetic and a dose of castor oil. In the present case we gave ipecacuan only; but perhaps the tartarised antimony might be found preferable, as it induces a greater degree of nausea, and its debilitating effects probably continue longer. From the narcotic, independent of any other effects of the hepatised ammonia on this disease, and of the
 quiet

quiet nights produced by opium, we have no doubt that other narcotics, and medicines diminishing action may prove of real utility under certain circumstances of this disease. But the preference, for the reasons formerly stated, is to be given to the hepatised ammonia. Perhaps camphor might be entitled to a trial. From the commencement of the treatment and during its progress, we would recommend the quantity of solids and liquids daily taken to be more accurately ascertained than was done in the present case, in order to determine with more precision, by a comparison with the urine and its contents, the changes going on in digestion and assimilation, and so ascertain the return of those which are healthful.

N O T E S,

Miscellaneous and Supplementary.

The hepatised ammonia has been given in a case of extreme irritability with a local sore the product of the venereal disease and mercury with surprising good effect; also to the sore hepatic gas was applied. This case was under the charge
of

of Doctor Irwin, of the Artillery, who was very attentive to the exhibition. It has been also given in a case of pectoral complaint with advantage; and is likely to turn out a valuable medicine, of course the medical world will become greatly indebted to Mr. Cruickshank.

Hepatised ammonia, is very easily prepared by making a stream of pure hepatic gas pass through the aq: ammon. pur. (Ph. Lond.) until no further absorption is perceived, or until the alkali is saturated. The hepatic or sulphurated hydrogen gas should be obtained for this purpose from artificial pyrites and the muriatic acid.

The dose to an adult should not at first exceed three or four drops, to be given three or four times a day, and the dose to be gradually increased, so as to produce slight giddiness; but as it is a very powerful and in large doses a dangerous medicine, great caution should be used in its exhibition—for the want of which our diabetic patient two or three times experienced much distress.

The oxygenated muriatic gas has been applied externally by a very simple contrivance, to fores
arising

arising from morbid poison, and to sloughing and ulcerating sores unaccompanied with much pain and irritability.

The carbonic acid gas has been also applied in the usual cases by the same simple means with good effect—and with the same advantage in like manner the hydrogen and hepatic gases have been applied to painful and irritable sores.

The following is Mr. Cruickshank's manner of applying them.

The apparatus for the purpose is very simple, and may be had of Mr. Blades, a very ingenious glass manufacturer on Ludgate-hill (the value about 7*s.* 6*d.*) It is nothing more than a proof with an improvement for introducing the acid at pleasure, by means of a small bottle with a stopcock adapted to the proof in place of a common stopper. If a bladder with the bottom part cut off be fastened to the extremity of the tube, we can apply the gas to any part, and for any length of time we please: for by turning the cock more acid can be introduced whenever the effervescence ceases, and consequently the bladder be kept uniformly

uniformly distended with the peculiar gas we wish to employ.

But the oxygenated muriatic gas is simply applied by moving the end of the glass tube over the sore and without the bladder, as this gas can only be applied for a moment or two; indeed in this way it produces the effects desired, namely, some chemical decomposition, and a change of action in the part; for if longer continued it acts as a caustic and forms a slough.

The notes of the case of diabetes, the effects of hepatised ammonia in the case of irritability, and its favourable tendency in a pectoral complaint, with the good effects of different gases externally applied to sores in this Hospital, exhibit facts in support of the application of pneumatic chemistry to medicine.

For example, 1st. Our case of diabetic disease may be said to have depended on a singular oxygenated state of the system, formed by a peculiar condition of the stomach, peculiar combinations in it, and perhaps partly maintained afterwards by a certain condition of skin and lungs. Hence the
obvious

obvious remedies would be those abstracting oxygen from the system, removing the peculiar condition of the stomach, and its peculiar combinations, and changing the condition of the skin and lungs. Breathing a lowered atmosphere by confinement in a small room, abstinence from exercise, rubbing the skin with hog's lard, the use of a diet of animal food and as rancid as can be eaten, the internal exhibition of hepatised ammonia and narcotics, and we should perhaps add the employment of emetics with the occasional use of sulphur and castor oil when requisite, furnish the particular remedies.

2nd. In the case of extreme irritability with local sore, it was supposed to depend on a certain oxygenated state the effects of mercury, and from the almost immediate healthy changes produced by the hepatised ammonia and hepatic gas, that supposition was rendered extremely probably.

As connected with the application of the new doctrines of chemistry to medicine we embrace this opportunity of dispersing the knowledge of a fact illustrative of Doctor Trotter's idea of scurvy, a

fact to which he is as yet a stranger, but it is expected it will now reach him.

The scurvy appeared among the convicts off Woolwich on board of vessels moored in the Thames, about the 13th April, 1795, a disease which so far as I could learn, had not hitherto prevailed. The preceding winter was very severe, and the men were confined on board, as labour on shore was impracticable. Their diet consisted of boiled barley or oatmeal porridge for breakfast and supper; broth of ox-cheeks and shins of beef with a portion of the meat for dinner; a proper allowance of bread, and three pints of small beer daily. They had had no fresh or recent vegetables from the 12th October, 1794, to the 24th April, 1795. The scurvy as has been stated began to appear about the 13th April. On the 3d July I visited the ships with Mr. Hornsby, the Surgeon of the convicts, and Doctor Jameson, of the Artillery, and we found only three men with any symptoms of scurvy remaining. The disease was soon checked, as recent vegetables were supplied eleven days after its appearance.

During

During that winter and when the convicts were not allowed to be on shore, they were mostly kept on deck in the day-time, and the hatches and port-holes were daily open, and only shut when the weather absolutely required it: there were however grates to the hatches and port-holes which were used in bad weather, and by this means a succession of fresh air was always permitted.

In some of those unfortunate persons a depressed state of mind, in all, cold, want of active exercise and recent vegetables were the only circumstances which could be assigned as the causes of scurvy. But it is only the want of active exercise (perhaps principally and in which it may have been assisted by the other circumstances, producing a stomach of imperfect force, see the remarks under the 6th December), and fresh vegetables that appeared the immediate contributing causes, as the others had always prevailed in winter.

That the application of the new chemistry to medicine will in time prove of the greatest advantage there is not the least doubt. Not only the

nature of diseases, but their treatment will become more satisfactorily and successfully illustrated. We are however of opinion, that the progress to its therapeutic perfection must be chiefly by attention to the stomach. The conveyance by the lungs pneumatically is a mode of difficulty, and perhaps of uncertain effect. The same may be said of the skin, though probably in a certain way a more likely means of communication. By the stomach, by regimen generally the system may be hyper-oxygenated, may be de-oxygenated, and may be confined to its necessary oxygenated state. Our notes on the diabetic case illustrates this, but further trials and investigations will more certainly confirm the remarks; we would therefore recommend, that the principal attention in the application of the doctrines of the new chemistry to the removal of disease should be by the stomach, and general regimen. Time and industry will add to our present stock of agents. It is a great step to be enabled to say, that by a mode of conduct we can, not only produce something akin to scurvy, and affections of a directly opposite tendency, but also remove them—an advance of knowledge to
 which

which we have already arrived. Within this range of progress may be introduced the means of destroying contagion by the oxygenated muriatic acid gas. Mr. Cruickshank in March, 1795, took two portions of recent small pox matter from the same person, and exposed one portion to the gas for a few minutes, and with it inoculated the left arms of three drummers, while the right arms were inoculated with some of the other portion. The punctures of the left arms had no marks of inflammation except what simple puncture produces, and they entirely disappeared in a few days. But the right arms took on the variolous action, and in two of the persons there was a general eruption. This experiment has been once repeated and with the same success. In this Hospital, the oxygenated muriatic acid gas has been also used to destroy more general contagion, and not unfrequently the offensive smell of sores, &c. which it does very speedily and effectually, and we have found that it can be managed with perfect ease and safety, and being cheaper as well as probably more efficacious than any other, we are inclined to give it the preference. This subject however
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will be on a future occasion introduced and fully explained.

John Rollo, M. D.
Surgeon General Royal Artillery.

WOOLWICH,
Royal Artillery Hospital,
December 10, 1796.

POSTSCRIPT.

POSTSCRIPT.

CAPTAIN M. as has been related, left off the pure liquid alkali which he took in his milk ; and also the hepatised ammonia on the 10th of December—he was likewise allowed to walk out, and which he continued to do until the 12th, when he was permitted to ride on horseback, and no unfavourable change arising, but on the contrary decided marks of the removal of the disease, he was desired on the 18th to eat half a pound of bread as a daily allowance, and to persist in his exercise.

December 30th.—Since the 18th he has continued free of disease, and is now in high spirits and rapidly gaining flesh ; his urine does not exceed two pints, and it is often under that quantity in twenty-four hours, and perfectly urinous. To-day

day he weighed thirteen stone and one pound, which compared with the weight of the 28th November last, it will be found that he has gained one stone and a half, and which furnishes a convincing proof not only of the removal of the disease, but we trust of the disposition to it. Cautious steps are however for some time to be pursued, and as our patient seems now fully sensible how much depends upon himself, we have reason to hope there will be no return of the complaint. He is advised to eat rather less animal food, and more bread, but no other alteration as yet to be permitted.

January 4th, 1797.—Captain M. continues free of complaint; but a more particular account of his progress from the 10th of December, and any subsequent narration from this date, which may be deemed necessary to continue and report, will be at a future period detailed. At the same time the desultory notes (notes, written as they arose during the progress of the treatment) of the case, will be more distinctly connected and arranged; and from our present prospects we trust that we shall be able to give the results of more cases of the disease, coming immediately under our own charge;

charge; besides the expected results by others of cases treated in our way, and which we again earnestly solicit.

During the experiments on the diabetic urine, Mr. Cruickshank was led to examine by analysis more particularly than he had hitherto done the nature of sugar. He has gone through a series of experiments on the subject, but they are not so complete as to enable him to draw a satisfactory conclusion—however, in order that others may take up the subject, the following abstract of the most important of the experiments he has already made are communicated.

1. Sugar by simple distillation was found to yield more pyro-mucous acid than gum, in the proportion of 132 to 117, and more charcoal in the proportion of 7 to 6 nearly.

2. When a solution of sugar and water was mixed with the ^{phos} sulphuret of lime, in a jar inverted over mercury, a quantity of phosphoric gas was produced, and after some days the sugar was decomposed, being deprived of its sweetness, and converted into a substance in a great measure insoluble in alcohol.

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3. When

3. When a solution of sugar was mixed with the sulphuret of potash, and introduced into a vessel excluded from the air, after some time it was deprived of its sweetness, and converted into a substance insoluble in alcohol, and having the appearance of gum—a somewhat similar effect was produced by the hepatised ammonia and pure potash.

4. Sugar in solution introduced into a bottle filled with nitrous gas, after remaining for some days and being frequently agitated, was found to have an acid taste, and the acid being saturated with an alkali no sensible taste of sugar could be perceived.

5. A quantity of the red oxyd of mercury was boiled for some time in a thick solution of sugar, the oxyd gradually lost its colour, became grey, and at last globules of mercury could be perceived. The liquor being filtered had a rough taste, and shewed acid properties on the addition of tincture of litmus, a little potash being added, a precipitate of mercury in the form of a dark coloured powder took place.

From those experiments it would appear that sugar contains a larger proportion of oxygene
than

than mucilage or gum, and whenever it is deprived of this excess it loses its saccharine properties; that it contains a greater quantity of carbone; and that by the addition of a larger quantity of oxygene it is readily converted into an acid capable of dissolving the oxyd of mercury.

From those experiments may be also explained the reason of some of the good effects which were observed to follow the use in the diabetic case of the kali sulphuratum and hepatised ammonia; and as sugar contains such a large proportion of oxygene it may be seen why animal food, especially fats, and rancid meats, cannot readily be converted into that substance by the organs of digestion, and of course why, exclusive of any other supposed advantage, they are suitable to diabetic disease.

the number of grains and whether it is de-
parted of the extent of loss in the same pro-
portion, that it contains a greater quantity of
albumen; and that by the addition of a large
quantity of water it is readily converted into an
acid solution of dissolving the oxide of mercury.

From the experiments may be also explained
the reason of some of the good effects which were
observed to follow the use in the diabetic case of
the best albumen and highly diluted ammonia; and
as it contains both a large proportion of oxy-
gen and may be taken very easily, especially
in the form of a weak solution, cannot readily be con-
verted into that substance by the organs of diges-
tion, and of course *non*, exclusive of any other
supposed advantage, they are suitable to diabetic
disease.