ON
INTERMITTING DIABETES,
AND ON THE
DIABETES OF OLD AGE.

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It will be my object in the present paper, to point out some phenomena connected with Diabetes, which I do not find to be dwelt on by other writers; and as my facts bear on the theory of the disease, and indirectly on its treatment, they may be worthy of the attention of the Medical and Chirurgical Society.

Since the first part of this paper relates to the amount of sugar in the urine, I may be permitted to say a few words on the methods of determining the quantity that is present.

In the present state of our knowledge, no table whatever can be trusted; that is, it must never be considered sufficient to take the specific gravity, and thence to calculate the amount of sugar in the urine. It is no doubt true that this method may be employed in a single case, for the purpose of comparison, and that thus a distant approximation to the truth may be obtained; but for the comparison of different cases, this method is altogether worthless.

If diabetic urines were solutions of nothing but sugar in distilled water, such tables would give all the information wanted. But diabetic urines contain a multitude of other substances besides sugar, each of which is variable, and each

of which may cause the specific gravity to vary, whilst the quantity of sugar remains constant.

Hence, to be accurate, the amount of sugar must always be determined by direct experiment, and never calculated from the specific gravity. The following numbers will show to what an extent, in different diabetic urines of the same specific gravity, the quantity of sugar may vary; and also what different specific gravities may be found with a constant quantity of sugar.

In five cases I found the following numbers with Soleil's saccharometer.

	Urine, Specific Gravity.		Degrees of the Scale.	
1st Case.	1034.4	gave	6 =	about 6 grs. sugar in 1oz. urine
2d "	1034.8	"	16 =	" 16 "
3d "	1035.0	"	24 =	" 24 "
4th "	1034.0	"	16 =	" 16 "
5th "	1033.4	"	23 =	" 23 "

Again,

1st Case.	1042.0	"	30 =	" 30 "
2d "	1042.0	"	20 =	" 20 "
3d "	1043.4	"	13 =	" 13 "
4th "	1043.4	"	37 =	" 37 "

If examples are taken in which the quantity of sugar is nearly constant, the following variations in the specific gravity were observed:

	Urine, Specific Gravity.		Degrees of the Scale.	
1st Case.	1029.6	gave	5 =	" 5 "
2d "	1034.4	"	6 =	" 6 "
3d "	1033.0	"	7 =	" 7 "
4th "	1014.0	"	5 =	" 5 "
5th "	1027.8	"	5 =	" 5 "

Or again,

1st Case.	1031.0	contained	19 =	" 19 "
2d "	1034.8	"	16 =	" 16 "
3d "	1030.2	"	17½ =	" 17½ "
4th "	1035.0	"	17 =	" 17 "

Or again,

	Urine, Specific Gravity.		Degrees of Scale.	
1st Case.	1036·8	contained	24 =	about 24 grs. sugar to 1 oz. urine
2d „	1044·4	„	24 =	„ 24 „
3d „	1033·4	„	23 =	„ 23 „
4th „	1035·0	„	24 =	„ 24 „

With still more sugar,

	Urine, Specific Gravity.		Degrees of Scale.	
1st Case.	1042·0	contained	30 =	„ 30 „
2d „	1040·0	„	30 =	„ 30 „
3d „	1035·4	„	30 =	„ 30 „
4th „	1041·2	„	29 =	„ 29 „

Perhaps I shall show the false conclusions which would be drawn from calculating the quantity of sugar from the specific gravity, by the following numbers from two cases of diabetes. The analyses in the 1st case were made by Mr. Kemp, of Edinburgh, and the method of analysis was totally different from that which I used in the 2d case.

	Urine, Specific Gravity.		Grains of Sugar to the ounce of Urine.
1st Case.	1023	contained	2·2
	1025	„	2·1
	1026	„	4
	1027	„	2·3
	1027	„	$4\frac{1}{2}$
	1027	„	$4\frac{1}{2}$
	1028	„	$14\frac{1}{2}$
	1029	„	3·3
	1029	„	$2\frac{1}{3}$
	1029	„	3
	1030	„	3·6
	1030	„	$7\frac{1}{4}$
	1031	„	$14\frac{1}{2}$
	1032	„	17·5
	1033	„	6
	1034	„	8
	1035	„	10
	1036	„	$5\frac{1}{2}$
	1038	„	$7\frac{1}{2}$

	Urine, Specific Gravity.		Degrees of Scale.	
2d Case.	1013·8	gave	5 = about 5 grs. sugar to loz. urine.	
	1014·4	"	5 = " 5	"
	1023·2	"	14 = " 14	"
	1025·6	"	2 = " 2	"
	1028·5	"	4 = " 4	"
	1029·6	"	4 = " 4	"
	1030·0	"	15 = " 15	"
	1031·0	"	10 = " 10	"
	1031·2	"	2 = " 2	"
	1032·2	"	24 = " 24	"
	1032·4	"	16 = " 16	"
	1033·4	"	13 = " 13	"
	1034·0	"	16 = " 16	"
	1035·4	"	7 = " 7	"
	1035·4	"	17 = " 17	"
	1037·8	"	19 = " 19	"
	1037·8	"	20 = " 20	"
	1038·3	"	3 = " 3	"
	1039·0	"	20 = " 20	"
	1043·4	"	13 = " 13	"
	1044·4	"	24 = " 24	"
	1044·8	"	25 = " 25	"
	1045·0	"	13 = " 13	"
	1045·4	"	13 = " 13	"
	1045·8	"	25 = " 25	"
	1048·6	"	18 = " 18	"

I have stated the degrees of the scale, as well as the calculated amounts of sugar, because some question as to the value of each degree may arise. The diabetic sugar on which M. Clerget experimented certainly appeared to me to be unusually pure.

PART I.

On Intermitting Diabetes.

There can be little doubt that our knowledge of the nature of diabetes may be extended, by means of accurate determinations of the variations in the amount of sugar in the urine passed at different periods of the day, and under different circumstances.

It is not my intention at present to enter at any length into

this question, though in one case the results of such experiments will be given. My object now is to record some cases in which, whether from the medical treatment, or the regimen, or from the natural course of the disease, the variation of the amount of sugar is not from much to little, but from highly saccharine to total absence of sugar.

The state of the urine a few hours after the sugar has disappeared, and an hour or two before it reappears, is most especially worthy of attention, inasmuch as it may lead to a truer knowledge of the state of the system which precedes the commencement of the diabetes. In intermitting diabetes, the disease may be seen beginning and ending; and the explanation of the state of the urine which precedes the appearance of the sugar and follows its disappearance, must be included in the true theory of diabetes. Moreover, a better knowledge of the antecedent phenomena may enable us to ward off the disease, if not to treat it with more success.

CASE I.—A gentleman, 62 years of age, was sent to me by a physician, with a statement that sugar was present in the urine. February 18th, 1851, I examined the urine and found no trace of sugar by Trommer's test, nor by Liquor Potassæ test. I sent back the bottles to the physician, who in return said the secretion was in its reactions different from what he had tested on the 13th, when sugar was present.

We met in consultation March 22d, and on examination there was a reduction of the oxide of copper after long-continued boiling. The urine having just been passed, and being loaded with urates and containing an excess of urea, I considered that the reduction was probably caused by an excess of urates. He had lost two stone in three months; he had had considerable thirst, and a great appetite. Alkalies were recommended.

He wrote to me again in November, saying that his medical man in the North of England found no sugar, and that he was quite well.

Feb. 18th, 1852.—He came to me again saying that sugar had again been found; on examination none was present.

On the 29th of June I received by rail the urine passed on the 28th, specific gravity 1038, and it decidedly contained sugar. From the 18th of February he said he had remained very well, until within the last month, when "I found my old complaint returning. I have considerable thirst, and my mouth is occasionally parched, with a frequent desire to pass water; the quantity discharged is about two imperial quarts daily. I have lost no flesh and my appetite is almost too good. I feel very active on my limbs for the age of 63. I have a slight occasional pain above the right hip, but it is scarcely worth mentioning. My bowels are in a healthy state, and I go to the closet once daily."

He came to London on the 18th of August, and I found a small quantity of sugar.

Sept. 24th.—He wrote, I am very well, and my water stood not much above 1020 yesterday. My surgeon tested it before leaving home last week, and pronounced it free from sugar.

I heard nothing more of my patient until February, 1853, when his diabetic symptoms returned. The urine sent to me for examination on the 7th of February had a specific gravity of 1033·4, and gave 33 degrees of the scale = about 33 grs. of sugar in each ounce of urine. It was quite clear.

May 18th.—The urine collected in 24 hours, had specific gravity 1024; and with uric acid and oxalate of lime crystals, and some other crystals of unknown composition, contained an excess of urea, and gave no trace of sugar. The urine for several weeks has varied from 1016 to 1028.

CASE II.—A very fat farmer, æt. 45, weighing 19 st. 2 lbs., who always ate excessively, had increased thirst for two months. He came to me May 29th, 1852. The urine passed the previous night was clear, specific gravity 1030. It gave a slight but decided trace of sugar.

The following morning, urine specific gravity 1035. Less sugar, but decidedly saccharine; gave a deposit of urates. Passes in 24 hours from 3 to 5 pints of urine. Tongue dryish, furred. Thinks he has more weakness of the muscles

than he has had. Sweats often. Bowels regular. Five years since had most violent attack of erysipelas. He was advised to take Carb. of Ammonia, gr. xv; Carb. Potassæ, gr. xxx; quotidie: and animal diet.

June 28th.—Was weighed on the 26th, and was 19 st. 3 lbs. Tongue less furred, from 3 to 3½ pints of urine. The quantity never exceeded 4 pints since May 29th. It was decidedly saccharine.

Sept. 15th.—The urine contained no sugar, specific gravity 1026. Contained oxalate of lime, and excess of urea.

April 20th, 1853.—I again saw the urine; it had specific gravity 1026, and contained no trace of sugar. He said that since his last visit the specific gravity had never been above 1030. He had had some red gravel, but for the last few days the urine had been quite clear. His weight was 19 st. 1 lb. He had had no thirst, the bowels were regular, and he felt very well.

CASE III.—A clergyman, æt. 62, came to me January 20th, 1852, complaining of rather an increased flow of urine, which stained his clothes, and was sticky. He had lost flesh, and had drunk rather more than usual. He had no cough, and perspired very readily. He was red faced, and rather of a full habit. The urine had specific gravity 1036, and contained a little sugar. I restricted him to animal diet, and gave—Carb. Ammonia, gr. x; Carb. Soda, gr. x, ter die. Brandy and water only, to drink.

He came to me April 12th. Urine, specific gravity 1026·15, contains scarcely, if any, trace of sugar. I omitted the medicine.

May 18th.—Urine, specific gravity 1025, contains no trace of sugar. Has taken no medicine; has occasionally eaten a little more bread. Feels in every respect well.

CASE IV.—On the 12th of April I was first asked to see, with Dr. Quain, a gentleman, æt. 33, who had come from India. He gave me the following account:—"In November, 1852, I first observed a great increase in the urine. One day I observed

the utensil in my dressing-room covered with red ants; the daily repetition of this in my house, and in my office, convinced me that the urine attracted the ants. I looked for sugar, and found it by Trommer's test. I represented this to my medical man, and at his request the urine was analysed, and no sugar was found in the urine passed that day, which happened to be mail day, always one of great excitement, and on it I had observed that but little urine was passed. Two days afterwards a considerable quantity of sugar was found. The quantity was about 120 ounces in twenty-four hours. The specific gravity was occasionally 1038, once 1040, usually 1034; with Dover's powders, and afterwards 24 grs. of Carb. of Ammonia daily, the quantity was reduced to 70 or 80 ounces, and at one time the sugar vanished, or nearly so. At the end of January the stomach was disordered, with some feverishness, and it was determined that I should come to England. I sailed the 27th of February; the quantity of urine was about 80 ounces, and sugar was present. I improved on the voyage; but at Gibraltar I ate some oranges, which brought on a return of the symptoms. In not longer than twenty-four hours I passed 92 ounces of urine. The quantity generally was from 70 to 75 ounces until I arrived, April 6th."

April 9th.—I found the urine had a specific gravity 1038·4, and gave 27 degrees of scale = about 27 grains of sugar, to the ounce of urine. It contained oxalate of lime, urates, and an excess of urea. He was advised—

℞ Ammonia Bicarb., ℥iv;
 Potassæ Bicarb., ℥iij;
 Tr. Card. C., ℥j;
 Aquæ, ℥iij, cochl. j magnum ex aquâ ter die;
 Sodæ Phosph., ℥ss, primo mane;
 Pil. Hydr., gr. iij, hâc et crastena nocte.

On the 19th the urine was scanty, loaded with urea, and contained scarcely a trace, if any, of sugar.

℞ Potassæ Bicarb., ℥iiss;
 Ammonia Sesqui-Carb., ℥j;
 Tr. Zingib., ℥j;
 Aquæ, ℥iij, cochl. j amplum ex aqua bis die.

On the 29th the urine had specific gravity 1034·4, and gave 6 degrees of scale = about 6 grains of sugar to the ounce of urine. It was loaded with urates.

On the 28th the urine had specific gravity 1031·4, and contained no trace of sugar.

On the 29th :—

P.M.	Ounces.	Specific Gravity.			
2	10	1025·8	no sugar	much oxalate of lime	excess of urea.
4½	5	1027·4	„	much uric acid	„
8½	8	1029·3	„	„	„
10	4	1027·0	„	much oxalate	„

30th :—

5.45	13	1027·2	„	„	„
12	9	1025·8	„	much urate	„

On the 29th the breakfast consisted of fish, one egg, milk, brown bread. Lunch—Beef, lobster, small piece of brown bread, claret one glass (a small meal). Dinner—Fish, mutton, greens, cheese, claret (ate sparingly).

30th.—Breakfast. Eggs, herring, milk, bread.

May 1st :—

		Ounces.	Sp. Grav.	
Urine passed	12 noon	8	1025	a doubtful trace of sugar, excess of urea.
„	2.30 p.m.	7	1026	no trace of sugar, excess of urea.
„	4.30 „	6	1025	„ „
„	8.30 „	9	1030	„ acid.
„	10.30 „	10	1026	„ nearly neutral.
„	3 a.m.	11	1023	„ deposit of phos. lime.

2d :—

Urine passed	7	„	13	1025	„ highly acid.
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Breakfast—Ham, milk, brown toast. Lunch—Cold beef. Dinner—Fish, soup, hare, spinach, a little claret, bread and butter, tea, little milk.

May 8th.—Urine passed this day, on which more bread was eaten, specific gravity 1033·4, gave 4 degrees of scale = about 4 grains of sugar to an ounce of urine.

May 18th :—

	Ounces.	Sp. Gravity.	
Urine passed at 7 a.m.	10	1029	no sugar.
„ 9 „	4	1032	„
and at			
„ 5 p.m.	11	1030	„ excess of urea.
„ 12 „	3	1035	„ „

19th :¹—

„ 8 a.m.	15	1031	„ „
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CASE V.—A lady, æt. 50 (?), weighing about 14 stone, had always suffered from indigestion. She had felt at Christmas weaker than usual, and at the end of January she caught a severe cold. By this she was much exhausted. She had an aphthous state of the tonsils, and a great dryness of the tongue. “It was like a piece of wood.” At the same time excessive thirst came on. The bowels were excessively confined. She took quinine and acids. At the beginning of April the quantity of water attracted notice. It was probably at least ten pints in the twenty-four hours.

I first saw this lady on the 11th of April; she had much thirst, and great debility. The urine was highly acid, specific gravity 1042, and gave 30 degrees of scale = about 30 grains of sugar to the ounce of urine. It contained an excess of urea, and gave a deposit of uric acid crystals.

She was put on a strict animal diet, and was given Carb. Ammoniæ, Carb. Potassæ, ter die.

On the 18th the thirst was considerably less. The quantity of urine was less. It was not examined.

On the 25th the urine made the night previous had specific gravity 1029·6, and gave 5 degrees of scale = about 5 grains of sugar to the ounce.

The urine made the following morning had a specific gravity 1031·0, and gave 19 degrees of scale = about 19 grains of sugar to the ounce. This was accounted for probably by a small quantity of bread which was taken during the night. The thirst was very much less.

¹ On two occasions, in June and July, I again found sugar in the urine. He left London August 4th. In a letter dated October 8th he states that, by the most careful examination of the urine, he finds that sugar is absent except when he takes bread for breakfast.

On the 26th there was still a slight trace of sugar,	sp. gr.	1030
„ 27th there was no trace of sugar	„	1025
„ 28th a trace of sugar	„	1026
„ 29th, still trace	„	1028
„ 30th, morning, a trace of sugar	„	1030
„ 30th, night, no sugar	„	1010
May 4th, no sugar	„	1020
„ 9th „	„	1025
„ 10th „	„	1024
„ 11th „	„	1025
„ 13th „	„	1028·7
„ 14th, morning, no sugar	„	1026
„ 14th, night „	„	1025
„ 15th „	„	1026
„ 19th ¹ „	„	1028

CASE VI.—A very extensive farmer, æt. 37, came to me October 27th, 1852. Six years previously he had great irritation of the urinary organs, having to make water thirty times an hour. He never passed any blood. He first found an increased flow of urine from the 10th to the 20th of last August. The quantity was two gallons of urine daily. He had excessive dryness of the throat; and in five days, he lost 14lbs. The weight of the urine had been 1050. When he drank water the mouth was perfectly dry, as if he had taken nothing. This state lasted two weeks. Has been subject to violent bilious headaches.

The urine now is very thick from urates. Specific gravity, 1038. Contains decidedly some sugar, and an

¹ May 26th,	no sugar	sp. gr.	1026·6
„ 27th,	„	„	1033·4
„ 28th,	„	„	1026·0
June 9th,	„ red sand	„	1028·6
„ 10th,	„	„	1028·8
„ 11th, morning	„	„	1024·0
„ 11th, night	„	„	1016·0
July 7th, night	„	„	1026·0
„ 8th,	„	„	1022·0
Oct. 7th,	„	„	—

excess of urea, so that it crystallises out immediately with nitric acid. No albumen. No pus. Complains of very much flatulence. The bowels act regularly daily. Weight now 12 st. 1 or 2 lb.

Has been a great eater of common fruit puddings. Vegetables in great quantity. Always greens and much potatoes, with very little meat, twice daily, but little each time. For the last six years he has drunk no beer or port wine; they caused irritable symptoms. Takes brandy and water. Can walk three or four miles. Red faced and ruddy, but fallen away. For two or three years sexual desire has gradually decreased. Has taken excessive exercise.

December 25th.—He adhered most rigidly to dietetic directions, and to the treatment until the end of November, when he was passing only about 14 ounces a day. Specific gravity, 1040. His appetite failed him, and he was losing flesh and strength, and getting depressed in spirits, besides which, he was suffering very severely and constantly from excessive and most distressing irritability of the bladder. The urine being very acid, and densely loaded with lithates and excess of urea, he was given more fluid.

R Potass. Bicarb., ʒj;

Tr. Hyoscy., ʒj;

Inf. Buchu, ʒiv. M. Sumat ʒj ter die.

This was taken from November 30, with great relief to the irritable state and diabetes; he now passed 25 to 30 ounces, specific gravity varying from 1010 to 1020, and without sugar. The daily averages from the 18th were 1028, 27, 23, 21, 29, 30, 29.

The prostate was found enlarged on examination, and very painful to the touch.

The urine sent to me, December 25th, contained no sugar. Two specimens were examined.

January 31st.—Four specimens of urine passed this day.

Specific Gravity. Degrees of Scale.

5½ ounces at 3 p.m.	1031·4	gave 5 =	about 5	grs. of sugar per ounce.
6½ " 7 "	1035·4	" 7 =	" 7 "	" "
10 " 9 "	1032·4	" 16 =	" 16 "	" "
7 " 6 a.m.	1038·3	" 3 =	" 3 "	" "

"He has been going on much the same since last report. Sometimes passing water with little or no trace of sugar; and on one or two occasions, with evidence of a large quantity. The last few days he is weaker and much more depressed. Appetite good. Taking Inf. Buchu, Tr. Hyosey., and Acid. Nitro-Muriat., for large quantity of water (sic)."

March 27th.—The report was not so favorable. He said he had adhered most rigidly to the diet, not having eaten eight ounces of vegetables since October. His stomach, he said, detested animal food. Cream, he said, increased the thirst, and made the mouth foul. The usual quantity of liquid taken in twenty-four hours would not amount to one pint.

26th.—The water passed was sent to me.

		Urine. Specific Gravity.	Degrees of Scale.	Sugar to the ounce.
5	p.m. he took two eggs and a mutton chop.			
7	"	7 oz. 1045·4	gave 13 =	about 13 grs.
10	" mutton chop and lettuces.			
10.15	"	7 " 1045·8	" 25 =	" 25 "

27th :—

3.30 a.m.		9 "	1044·4	" 24 =	" 24 "
6	" wing of a guinea fowl.				
6.45	"	3½ "	1045·4	" 13 =	" 13 "
9	" 2 eggs and a chop.				
10.30	"	9 "	1043·4	" 24 =	" 24 "
1	p.m. boiled rabbit.				
1.15	"	6½ "	1044·8	" 25 =	" 25 "
3	"	2½ "	1048·6	" 18 =	" 18 "

In each of these specimens nitric acid caused an immediate crystallisation of nitrate of urea, and in all there was free uric acid and oxalate of lime.

May 13th.—For two days, nothing except milk was taken, no other food whatever. Last food was eaten at 9 p.m., May 12th.

Urine passed before

	Milk.	Urine.	Specific Gravity.	Degrees of Scale.	Sugar to the ounce.
6½ a.m.	22 oz.	. . .	1030·8	gave 1 =	about 1 grs.
8 „ bowels acted		4 oz.	1035·4	„ 17 =	„ 17 „
9¼ „ . . .	22 „				
9¾ „ bowels acted		4 „	1037·8	„ 20 =	„ 20 „
1¼ p.m. . .		7 „	1037·8	„ 19 =	„ 19 „
1½ „ . . .	22 „				
3 „ . . .	11 „				
6 p.m. . .	11 „	10½ oz.	1034·0	„ 16 =	„ 16 „
7½ „ . . .	11 „				
9 „ . . .	22 „				
9½ „ went to bed		6 „	1039·0	„ 20 =	„ 20 „
12¾ „ . . .	11 „	15½ „	1014·4	„ 5 =	„ 5 „
4¼ „ . . .	6 „	14 „	1013·8	„ 5 =	„ 5 „
	138 „	61 „			

Every specimen, except the last two, contained an excess of urea, and free uric acid and oxalate of lime.

14th :—

	Milk.	Urine.	Specific Gravity.	Degrees of Scale.	Sugar to the ounce.	Contained excess of urea, uric acid, and oxalate of lime.
7 a.m.	11 oz.					
7 „		8½ oz.	1023·2	gave 14 =	about 14 grs.	„
9¼ „	11 „					
1 p.m.	11 „	8½ „	1032	„ 24 =	„ 24 „	„
5 „	22 „					
5¾ „		5 „	1030	„ 15 =	„ 15 „	„
9¼ „	22 „					
9¾ „		4½ „	1028·5	„ 4 =	„ 4 „	„
4½ a.m.	11 „	8 „	1025·6	„ 2 =	„ 2 „	„
	88 „	34½ „				

So that at the end of two complete days, in which milk and nothing else was taken, only two grains of sugar existed in each ounce of urine.

15th.—For two days the diet consisted of fish only. Codfish either boiled or fried, eaten without bread, or vegetable, or sauce of any kind whatever.

	Urine.	Specific Gravity.	Degrees of Scale.	Sugar to the ounce.
7 a.m. fish	4 oz.	1031·0	gave 10	= about 10 grs.
8 „ fluid mag., $1\frac{1}{2}$ oz.; 3 oz. Bristol water.				
9 „ bowels acted slightly, fish . $5\frac{1}{2}$ „	lost.			
12 $\frac{1}{4}$ „ 5 oz. Bristol water.				
1 $\frac{1}{4}$ p.m. fish.				
2 $\frac{1}{4}$ „ 11 oz. Bristol water.				
3 p.m. bowels acted slightly	$10\frac{1}{2}$ oz.	1031·2	„ 2 =	„ 2 „
3 $\frac{3}{4}$ „ 11 oz. soda water.				
5 $\frac{1}{2}$ „ fish.				
5 $\frac{3}{4}$ „	$7\frac{1}{2}$ „	1029·2	„ $\frac{1}{2}$ =	„ $\frac{1}{2}$ „
6 $\frac{3}{4}$ „ 11 oz. Bristol water.				
9 „ fish.				
9 $\frac{1}{4}$ „	8 „	1029·6	„	no sugar

16th:—

3 $\frac{1}{4}$ a.m.	14 „	1028·9	„	„
6 $\frac{3}{4}$ „ fish.				
7 „ bowels acted slightly	$4\frac{1}{2}$ „	1030·1	„	„
8 „ 11 oz. Bristol water.				
9 „	$5\frac{1}{2}$ „	1026·4	„	„
9 $\frac{1}{2}$ „ fish.				
10 $\frac{3}{4}$ „ 6 oz. Bristol water				
11 „	4 „	1026·0	„	„
2 p.m.	$6\frac{1}{2}$ „	1029·1	„	„
2 $\frac{1}{4}$ „ fish.				
3 $\frac{1}{4}$ „ 11 oz. Bristol water.				
4 $\frac{3}{4}$ „ 11 oz. soda water.				
5 $\frac{3}{4}$ „ fish	$7\frac{1}{2}$ „	1030	„	„
9 p.m.	$8\frac{1}{2}$ „	1023·0	„	„

17th:—

	Urine.	Specific Gravity.	Sugar.	Excess of urea, uric acid, oxalates.
1 $\frac{1}{2}$ a.m.	$6\frac{1}{2}$ oz.	1030·0	none	„

For two days butcher's meat and nothing else was taken.

6 a.m. mutton chop.				
6 $\frac{1}{4}$ „	$5\frac{1}{2}$ „	1028·0	„	„
7 $\frac{1}{2}$ „ 11 oz. Bristol water				
9 „				
10 „	$5\frac{1}{2}$ „	1027·0	„	„

	Urine.	Specific Gravity.	Sugar.	Excess of urea, uric acid, oxalates.
12 $\frac{1}{2}$ a.m. 11 oz. Bristol water	4 oz.	1030·0	none	„
1 $\frac{1}{2}$ p.m. tripe.				
3 $\frac{1}{2}$ „ 5 oz. Bristol water	6 „	1030	„	„
5 $\frac{1}{2}$ „ mutton.				
9 „ lamb.				
9 $\frac{1}{2}$ „ 11 oz. Bristol water	10 „	1031	„	„
18th :—				
1 $\frac{1}{2}$ a.m.	9 „	1027	„	„
7 „ mutton chop.				
7 $\frac{1}{2}$ „	8 „	1029	„	„
8 „ 11 oz. Bristol water.				
9 „ mutton chop.				
11 „	5 $\frac{1}{2}$ „	1028	„	„
1 $\frac{1}{2}$ p.m. mutton chop.				
2 $\frac{1}{2}$ „	6 $\frac{1}{2}$ „	1029	„	„
2 $\frac{3}{4}$ „ 11 oz. soda water.				
5 $\frac{1}{3}$ „ mutton.				
6 „	5 $\frac{1}{2}$ „	1030	„	„
7 „ 11 oz. Bristol water.				
9 „ mutton.				
9 $\frac{1}{2}$ „	6 $\frac{1}{2}$ „	1029	„	„
3 $\frac{1}{4}$ a.m. ¹	10 „	1028	„	„

CASE VII.—A fat woman, who lived well, in the neighbourhood of Oxford, and was a patient of Dr. Jackson's for diabetes in the autumn of 1847.

“Nov. 15th.—Urine, specific gravity of 1043.

„ 22d. „ „ 1030.

„ 24th. „ „ 1026.

„ 26th.—The patient is much better in health and spirits. Diet, meat, eggs, port wine, greens, and a few mouthfuls of bread. The urine has changed so much in the last fortnight as to astonish me; what I send, when I first saw it appeared to have a quantity of grease floating on the surface, a thickish cloud at the bottom, and the middle clear.”

On examination, the sediment, which was very great, consisted of multitudes of uric acid crystals, oxalate of lime octohedra, and epithelium. The specific gravity was 1025·2,

¹ See Postscript.

and with sulphate of copper and liquor potassæ, it gave marked evidence of sugar.

Grains. Grains. Per 1000
 51,260 boiled with Ch. of Barium & Nit. Acid; Sul. of Baryta= $3.82=7.45$
 51,260 precip. by Ch. of Calium & Amm.; total Phos. of Lime= $2.02=3.94$

Nov. 16th, 1848.—I received another specimen of this urine, containing oxalate of lime and sugar. Dr. Jackson says, "She was a patient of mine this time last year, and then had all the symptoms of diabetes, and the urine contained sugar. Under treatment the health improved and the sugar disappeared. She was under treatment about four months, and seemed to have got quite well, and continued so all through the summer. About a fortnight ago she sent for me, with a return of all her symptoms, though nothing like the same extent as last year.

"The first specimen I examined contained a little sugar, specific gravity 1041, and the quantity was about six pints in twenty-four hours. The second was specific gravity 1036, and about five pints. The third I sent you (this had specific gravity 1041.3), it was passed just before going to bed. In those twenty-four hours she must have passed about four and a half pints. Her health has improved in the fortnight: last year I should think she lost two stone in weight, which to all appearance she has quite regained."

The disappearance of the sugar from the urine in the cases which I have related, is in itself a matter of some interest; but the state of the urine voided after the sugar has disappeared, is still more worthy of attention.

The remarkable excess of urea which was so frequently found before and after the sugar disappeared, might perhaps be attributed to the continued animal diet, but the occurrence of free uric acid, and the oxalate of lime in the urine, point most clearly to a state of indigestion which is so often to be found, without any sugar appearing in the urine.

The state of the urine appears to me to mark the passage of diabetic indigestion into acid indigestion, as distinctly as the change is sometimes stated by the patient himself. "I used to have excessive disorder of the stomach; I could

hardly eat anything in consequence of the acidity and uneasiness which I suffered, but now since the water has increased, the disorder of the stomach has disappeared. I can eat anything. I never suffer now from acidity, but I am losing flesh and strength.

The following theoretical contrast between ordinary acid and saccharine indigestion may suggest some questions for solution.

Ordinary indigestion shows itself in a want of action on the sugar and starch taken as food, in consequence of which excessive acidity is produced; that is, the changes in the non-nitrogenous food are imperfect. Imperfect changes also occur in the nitrogenous food; this is made evident by an excess of urates and urea in the urine, and perhaps also by the formation of oxalate of lime.

In diabetic indigestion the effect may be also traced on the two great classes of food. At first, from the non-nitrogenous food, sugar is formed instead of acids. Ultimately, if not simultaneously, sometimes the arrest of healthy changes extends to the albuminous food, and instead of an excess of urates and urea, other products are formed, one of which is sugar. It is possible that some of the other products may still be found in the urine.

Whether this theory be true or not, it is practically useful to remark the tendency to acidity and excess of urea in these cases of intermitting diabetes. In such cases, animal diet alone or with alkalies, may stop the formation of sugar. It follows also that when oxalate of lime, uric acid, and excess of urea are found in the urine, it is probable that the diabetes may be temporarily, if not permanently, removed.

The presence or absence of these substances in the urine may lead to the recognition of the stage of the disease, and they may thus guide us in prognosis and in treatment.

PART II.

I pass on now to the frequency of diabetes in old age.

In a paper on the habitual presence of sugar in the urine of old people, read before the Academie de Médecine

de Belgique, by M. Dechambre, it is stated that experiments were made by him on 20 aged women in the Salpêtrière, and that in 19 there was decidedly sugar in the urine.

The sulphate of copper test was chiefly used. Occasionally the fermentation test was employed.

M. Dechambre concludes, that sugar is habitually present in the urine of old people. Now though I cannot find any proof of this in the experiments which I have made on the urine of some aged persons, yet on referring to the notes which I had taken of some of my diabetic patients during the last three years, I was surprised to find in how many of the cases life was far advanced. It appeared to me still more worthy of note, that the symptoms were in almost all of these cases modified in intensity.

Among the notes of 29 cases of diabetes, I found 11 were above 60 years of age, and 6 of these were above 70 years old. Of these 11 cases—

In 2 the disease was intermitting; they are cases I and III in Part I.

„ 6 the quantity of urine was scarcely if at all increased in quantity.

„ 1 the quantity was increased, but the disease had probably existed for 16 years.

„ 1 albuminous urine was present, and the diabetic symptoms were very slight.

„ 1 above 74 years of age the disease existed in its intensity.

—
11 cases, in 10 of which the disease was so slight, that the general symptoms hardly declared it.

CASE I.—A gentleman, æt. 70, first consulted Dr. Prout in 1828, and again two years ago he went to him for diabetes. Has a very ruddy healthy look, stout, and has not lost weight; is now 13 stone. Complains of frequency and quantity in making water: 15th and 17th of January passed 4 pints and upwards of urine, drank 3 pints. Has been thirsty all his life. Tongue reddish. Pulse 84. Bowels regular. Always perspired a great deal. Does not know what bilious attack, stomach attack, or headache is.

Dr. Prout allowed him to drink Bass's ale.

The least particle of camphor causes irritation and redness of the skin, and the effect will not go off for several weeks.

The external use of a liniment of camphor, soap, and opodeldoc have caused it.

He was put on Carb. of Ammonia and compound soap and Opium pill. Strict diet.

April 8th.—Does not pass so much urine: considerably less. On the 6th and 7th he drank two pints and a half, and passed three pints and two pints and a half of urine. The urgency does not come on so violently. Appetite still very good, but the troublesome and intense thirst has gone off. Has not taken the pill. Very little sugar in the urine.

April 28th.—Took two grains of Pil. Saponis c. Opio, which caused violent irritation of the skin for twenty-four hours. The intense thirst is now gone.

August 13th, 1845, he weighed 12 st. 11 lbs.; October 10th, 1845, 12 st. 5 lbs.; August 2d, 1847, 13 st. 3 lbs.; February 5th, 1851, 12 st. 3½ lbs.; June 4th, 1852, 11 st. 12 lbs.

May 4th, 1852.—He made the following observations on the quantity of water drunk and the quantity of urine passed.

	Water.		Urine.	
January 15th, in 24 hours	Drank	2 wine bottles.	Passed	2½ bottles.
„ 17th, in 24 „	„	2 „	Nearly	3 „
April 6—7th, in 40 „	„	3 „	„	4 „
May 2d—3d, in 48 „	„	4 „	„	4 „

Complains of pain after a short walk in the muscles of the legs.

August 9th, 1852.—Two quantities of urine examined, specific gravity 1025 to 1030.

November 22d.—Urine specific gravity 1022, contains a trace of sugar. Went to Vichy, drank there three half-pint glasses of Grand Grille before breakfast, three glasses of Celestin afterwards. Bath for three quarters of an hour. Took Bordeaux wine with water. Still complaining of pain in the legs. Weighs 13 lbs. less than when he went away. The bowels were not confined by the Vichy water.

February 4th, 1853.—He came to me complaining, that yesterday the left foot became cold and numbed, and that he had excessive pain down the leg, so severe that he hardly

slept at all. He says the foot feels as if there was no life in it, and it is certainly paler and less sensitive than the other.

February 9th.—Says he found relief from the pain by getting out of bed. The quantity of urine is two pints and three quarters daily, and this is the exact quantity which he drinks.

February 15th.—Still very severe pain. The urine has specific gravity 1027·8, and gave 5 degrees of scale = about 5 grains of sugar to the ounce of urine. It gave a plentiful deposit of urates. The pain increased: the little and next toe on the left foot mortified. He lost his appetite. The urine became scanty, excessively loaded, and deep coloured, and I found no sugar in it ten days previous to his death, March 25th.

The disappearance of the sugar from the urine when the appetite failed, and the disease was hastening to its end, is very remarkable; but I have in many cases found, that when any feverish attack comes on, and the appetite is much diminished, the quantity of sugar in the urine is usually very much reduced, so that when the physician would say the patient was worse, the chemist would say he was decidedly better. As the fever subsides, and the appetite returns, the sugar increases, though no more vegetable food may be taken.¹

CASE II.—A physician, æt. 76, told me that he had consulted Dr. Prout, and had certainly had sugar in the urine for five years, and probably much longer. About four years since he confined himself to an exclusively animal diet, and in four or five months he lost 40lbs., but he considers that he has nearly regained his loss since. He now lives chiefly on animal food, taking a biscuit in two days. The

¹ A short and very remarkable case is mentioned in the 'Comptes Rendus,' Dec. 28th, 1848. A patient of M. Rayers, in the Charité,

Dec. 18th, had sugar . . . 18·5 degrees of scale.

„ 20th, attacked with pleuro-pneumony.

„ 22d, had sugar . . . 6 „

„ 27th, inflammation much increased; no sugar.

„ 28th, he died.

quantity of urine on the 1st of January, 1853, was about the average. The specific gravity was 1040. There was sugar decidedly.

I prescribed Carb. of Ammonia alone, in 10 grain doses thrice daily.

CASE III.—A gentleman, æt. 77, "tolerably active yet," has been affected with diabetes for six or seven years, though only in a moderate degree. The disease is still moderate, though rather on the increase. Usual specific gravity of the urine 1035. The urine contains "more uric acid than sugar, although twelve drops of liquor potassæ are taken every other day." The tongue is generally more or less white, and he has rather a tendency to costiveness. The liver being a little torpid, he takes vegetable aperients, and $2\frac{1}{2}$ grains of blue pill occasionally.

The urine contained sugar, and uric acid crystals.

CASE IV.—A gentleman, æt. 77, consulted me for diabetes. Thinks he has "had sweet water" for two months. All last summer he had thirst. For the last twelve or fourteen years he had occasional, but slight attacks of gout. His son has had the gout severely since he was fifteen; he is now nearly fifty. Complains now of thirst; urine saccharine, specific gravity 1033, contains also uric acid crystals; does not pass in 24 hours above a pint and three quarters. His face is florid. The pulse 80, soft. The tongue clean. He has fallen away, and has had a carbuncle lately on the face. Can eat anything, nothing ever disagrees with him.

In a few weeks he became drowsy, comatose, and died.

CASE V.—A gentleman, æt. 63, December 14th, 1847, under the care of Dr. Watson, who sent me the following note:

"He calls himself well, and *seems* eminently so. Stout fat, and ruddy. Eats and drinks heartily and indiscriminately, and has no dyspepsia. Perspires copiously. Makes much urine, and often by day and by night, *and has done so these forty years*. Says his pulse occasionally intermits, and has long done so. I found it steady and 80 in the

minute. His father died with diseased heart at 77. My patient had some bronchial trouble last winter. Had lately some redness of the toe for a day or two. Comes to me that I may see what he is when well, as he means to put himself under my charge whenever he is ill. He had noticed some floating substance (not sand) in his urine, and was curious to know what it might be." I examined the urine and found it light coloured, and it contained torulæ, specific gravity = 1032·0. It gave slight but decided evidence of sugar with the copper test.

February 10th, 1848.—Urine, specific gravity 1030·2, contained sugar.

Grains.
51·510 boiled with Ch. of Barium & Nit. Acid; Sul. of Baryta= $2\frac{17}{1000}=4\frac{21}{1000}$
51·510 precip. by Ch. of Calcium & Ammonia; Tot. Phosphates= $0\frac{47}{1000}=0\frac{91}{1000}$

18th.—Received yesterday, bottles marked 1, 2, 3, and 4. No luncheon was taken.

	Specific Gravity.
1, made just before breakfast, much mucus,	1027·6, sugar.
2, „ three hours after, little mucus,	1024·4, less sugar.
3, „ just before dinner, mucus,	1027·8, sugar.
4, „ three hours after, „	1027·7, „

May 10th, 1849.—More sugar in the urine.¹

CASE VI.—February 1850, I saw a gentleman 66 years of age who had passed many years in the East Indies. For six or seven years he had had more thirst than other people, and had passed an excess of water; the thirst had been more decided since Christmas twelvemonth; he had been wasting two years, and had lumbago with some fever since Christmas. For thirty years he had a remarkably good appetite. The urine was clear and pale, specific gravity 1027·4; it contained sugar and a trace of albumen.

Pulv. Doveri, grs. v, horâ somni omni nocte;

℞ Liq. Ammoniaë, ℥. xl;

Mist. Camph., ʒij;

Coch. iij magna, bis die.

	Specific Gravity.	Degrees of Scale.	Sugar to the ounce.
¹ July 28th, 1853, urine passed during the night .	1020·4	gave 3	= 3 grs.
„ 29th, on getting up .	1021·0	„ 5	= 5 „

On the 13th of March the urine was specific gravity 1031·8. Still contained sugar. No albumen.

On the 14th of March, before food, specific gravity 1018·2. Still sugar. Doubtful if any albumen.

He states that he has much less thirst and no more frequency than when in perfect health. In point of quantity he passes much less. Thinks that he is much stronger, and feels more healthy altogether. He takes no sugar, no vegetables, and a little bread, milk, butter, eggs, fish, and meat. Has continued the medicine. Weight now 14 stone; has weighed 16 stone 8 lb. A little perspiration yesterday.

July 10th.—The urine has specific gravity 1023·9, contains the slightest trace of sugar. The quantity of urine now is not more than one half what it was. Could not be absent two hours from home before, now never feels any urgency. Passes the night from eleven to four without being disturbed. Has continued to gain decidedly. Was near writing to ask whether he was not making too little water. Weighed a fortnight ago 14 stone 2 lb. Thirst gone, does not drink one-third what he used to drink.

Has continued the

Dover's powder, 4 grs.;

Also Liq. Ammoniae, ʒj;

Mist. Camph., ʒxij;

Coch. iij, bis die.

June 11th, 1852.—Has remained well, the urine is specific gravity 1024·5; contains the slightest trace of sugar. Has felt well, but was given the sulphuret of arsenic, which he took for a fortnight. At the end of this time he felt "something unusual," and he gave it up. The quantity of water was reduced by it; now the quantity is about 40 ounces. He drinks but little. He weighed 14 stone. Does not think that he has lost flesh lately. Has continued the ammonia off and on for two years.

CASE VII.—A gentleman, æt. 73, who had lived very freely in his youth, had been a patient of Dr. Prout's for diabetes for five years.

He had very little thirst. Passed in twenty-four hours six pints of fluid. He complained of much tenderness in the loins. He considered that he had been diabetic for sixteen years. All vegetable food was stopped, and the sugar entirely disappeared.

April 25th.—Specific gravity 1035. Has taken 10 grains of Carb. Ammoniæ after each meal. Thinks he is much better for it.

Sept. 30th, 1852.—Still says that he thinks all his symptoms have been the same for sixteen years. He has not lost flesh. The urine still contains sugar. He eats a good deal of bread, and drinks a pint of wine at least daily. He complains of pains in the thighs, worse he says after walking. In twenty-four hours he passed eight pints of urine, specific gravity, 1030.

CASE VIII.—A gentleman, æt. 62. For a year and a half had suffered from carbuncles, and during that time he had been falling away. He has had frequency in passing the water, rising four times at night. The bowels were confined, and he complained much of giddiness and pain in the head, for which he had a seton in his neck. The urine had specific gravity 1034. Triple phosphate crystals, albumen, blood-globules, and sugar, in small but distinct quantity, were present. *Torulæ* were evident in twenty hours.

April 29th, 1848.—Some œdema of the legs.

November 22d.—Urine more albuminous, specific gravity 1029. Still contains sugar.

December 14th.—Specific gravity 1028·9, albuminous and saccharine.

April 11th, 1849. — Urine, specific gravity 1016·6, contains albumen. With copper test, or with liquor potassa test, shows scarcely a trace of sugar. Gave a deposit of urates on standing.

April 16th.—Urine, specific gravity 1021, no precipitate of urates; gives evidence of more sugar; albumen as before.

May 1st.—Passes a pint and a half of urine in twenty-four hours. Specific gravity 1022·4. With the microscope multi-

tudes of uric acid crystals were seen, with very coarse fibrinous casts. There was much albumen and very little sugar.

The symptoms of Bright's disease increased, with cough and expectoration, and he died comatose on May 18th.

Examined 17 hours after death.—The body was much emaciated. The parietes of the chest and abdomen were thickly coated with yellow fat. There was no fluid in the abdominal cavity. The kidneys were very adherent to the fatty substance surrounding them. The surface of the right kidney was smooth, and mottled with deep depressions. Some cysts and some stellated veins were very marked. On section, the small arteries of the cortical structure were open, and the substance was not wasted. The left kidney contained more cysts and depressions of a darker colour, with blood streaks extending from them. No fibrinous deposits were visible in cutting through the depressions. The kidneys were markedly mottled.

The pancreas contained much interstitial yellow fat, and did not look healthy. The liver was healthy, with good looking bile. The stomach was large, and very thin at the larger curvature, but not pulpy; it did not break on pressure. The blood in the veins was dark; not so elsewhere.

There was an immense cavity as big as the fist in the apex of the right lung, and tubercles in all the upper lobe. The left lung was full of tubercles, with some small vomicae.

The heart was full size, with dilated cavities; not much, if at all enlarged. The aortic valves were slightly thickened, and the auricles contained an immense clot.

CASE IX.—A patient, æt. 74, said that thirteen weeks before his admission into St. George's Hospital, he was well. He had been working in ditches a few days, when he became very hungry and thirsty all day long, with pain in the loins. During the last week, the usual quantity of urine was ten pints in twenty-four hours. At present it is fourteen pints. He is much emaciated. Pulse regular, languid, 74. He tasted his urine, and said it was sweet as honey. During the

first week, the quantity of urine was twelve pints in twenty-four hours. At the end of the week after his admission he was seized with pain in the head and feverish symptoms. The urine decreased to five pints. At the end of another week the feverish symptoms were removed, and the urine again increased to thirteen pints in twenty-four hours. It continued about this quantity until the end of the third week, when he became dull and heavy and very tremulous, when the urine diminished to two pints. The quantity never increased; his tongue became dry, he remained in a state of muttering delirium, becoming at last comatose, ten days after the urine so suddenly decreased in quantity. There was considerable effusion of serum under the arachnoid, which was opaque, and there was much fluid in the lateral ventricles of the brain.

The pericardium and pleura on the right side were inflamed and coated with lymph. Both cavities contained a large quantity of yellow serum, with flakes of lymph. The kidneys were healthy.

I have mentioned the last case only to show, that in old age the disease sometimes exists in great intensity; still the other cases warrant the conclusion, that diabetes most frequently occurs in old age without the very marked symptoms which generally lead to the recognition of the complaint. It is very probable that this modified diabetes may sometimes be the cause of that debility which is attributed to old age alone; and perhaps by chemical examination of the urine in advanced life, this disease may be detected far more frequently than at any other period, and then possibly by an animal diet, the strength may be preserved, and the life prolonged.

The occurrence of diabetes in old age points also to the theory of diabetes, as an indigestion resulting from an arrest of healthy changes in the food. This, at present, imperfect and very general formula of the disease requires to be worked out by careful experiments. The most suitable cases for investigation, are those in which the disease is modified by old age, or so imperfectly established, that a

more healthy state of urine may be seen from time to time to occur.

In those more confirmed cases in which the sugar is most probably formed from the nitrogenous, as well as the non-nitrogenous constituents of our food, investigation may, perhaps with advantage, be directed to the discovery of the substances which are complementary to the sugar, and the variations in the amount of urea in these cases may give important results.

M. Bernard has based a theory of diabetes on his most remarkable experiments. According to him, an altered condition of the action of the nerves on the liver causes an excessive formation of sugar in that organ; according to another theory, in consequence of the altered action of the nerves, the sugar of the food is not changed in the liver into fat. These statements, though more precise, are not to me so probable as the theory that diabetes is an indigestion, or, in the language of Dr. Prout, an error in the converting power of the stomach. There can be no doubt that M. Bernard's experiments will be extended, and then a more exact theory of the disease may include an affection of the stomach as well as the liver.

As regards the treatment in almost all the cases mentioned in this paper, alkalies were used with benefit. Whatever is beneficial for excessive acidity is still more useful in diabetes. Small meals; free from sugar and acid, and the substances which can give rise to sugar and acids, constitute the best diet.

I have more than once been told by patients that potash could not be taken, and that soda and ammonia agreed perfectly. Vegetable acids with alkalies are unobjectionable.

I may here state the conclusion from some experiments which are yet unpublished, that porter contains from 20 to 40 grains of sugar in each ounce of liquid; ale from 12 to 130 grains; port wine contains much sugar; sherry, less sugar; claret, none. Also that the absence of all sugar, and the presence of little alcohol, causes claret to taste highly acid, whilst the quantity of acid in good claret is not

much more, and sometimes is less, than in other kinds of wines which have no acid taste, for example, most port wine.

The mixture of claret and Vichy water allays the thirst in diabetes better than any liquid that I have prescribed.

POSTSCRIPT; *October, 1853.*

CASE VI.—I again requested this gentleman to try the effect of an animal and milk diet.

May 22d.—The second day of an exclusively animal diet.

	Food and drink.	Urine.	Sp. Gr.	Sugar.	Appearance.
6 a.m.	4 oz. Bristol water	11 oz.	1024·8	none	red sand and excess of urea.
7 „	mutton				
7½ „	„	1 „			
9 „	mutton				
11½ „	11 oz. Bristol water	6 „			
1 p.m.	chicken				
2¼ „	„	4½ „	1024·0		
4 „	11 oz. Bristol water				
5 „	mutton				
7¾ „	„	9 „	1026·9		
8 „	11 oz. Bristol water				
10 „	„	4 „	1026·2		
	37 oz.	35½ oz.			

May 23d.—Exclusively milk diet.

5½ a.m.	„	13 oz.	1024·6		
6½ „	milk, 22 oz.				
10 „	„ 11 „				
10½ „	bowels moved	8½ „	1029·4	7 deg.=7 grs. to oz.	
11 „	milk, 11 oz.				
1¼ p.m.	„ 11 „				
3 „	fluid magnesia, 2 oz.				
3¼ „	„	7 „	1029·5	1 „ =1 gr.	
5½ „	milk, 22 oz.				
9 „	„ 11 „				
10 „	„	8½ „	1027·2	doubtful	

May 24th :—

1¼ a.m.	„	8½ „	1010·0	very doubtful	no red sand nor excess of urea.
	88 oz. milk	45½ oz.			
	2 „ magnesia				

	Food and drink.	Urine.	Sp. Gr.	Sugar.	Appearance.
6 a.m.	bowels moved	5½ „	1018·8	no sugar	no red sand
6¼ „	22 oz. milk,				nor excess
	2 „ fluid magnesia				of urea.
7½ „	.	8½ „	1009·2	2 deg.=2 grs. to oz.	„
10 „	11oz.milk; bowels moved				
12 „	.	11½ „	1014·8	½ „ = ½	„ „
1 p.m.	22 „				
3¼ „	.	7½ „	1014·4	no sugar	„
6 „	22 „				
7½ „	.	11 „	1010·8	„	„
9 „	22 „				
10 „	.	7 „	1009·8	„	„
1¼ a.m.	.	20 „	1004·8	„	„
99 oz. milk		71 oz. urine			
4 „ magnesia					

He said—"My kidneys and bladder are always most comfortable under milk diet, but I frequently have a little heartburn; but I do not feel the same morbid irritability of stomach that I do when living entirely on animal food." As I wished still further to try the effect of milk diet, he undertook to take nothing else for a week. The daily quantity was from 100 oz. to 130 oz., and on one day 149 oz. He passed from 50 oz. to 90 oz. of urine.

Urine passed at		Specific Gravity.	
June 17th, 7 a.m.,	before milk diet was begun,	1029	contained no sugar; red sand
„ 18th, 7 „	.	1016	contained no sugar
„ 19th, 7 „	.	102	11 deg.=1 gr. to oz.
„ 20th, 7 „	.	1020	under 1 deg.=1 „
„ 21st, 7 „	.	1016	trace
„ 21st, 12 midday	.	1005	„
„ 22d, 7 a.m.	.	1017·6	no trace
„ 23d, 7 „	.	1015·0	„
„ 24th, 7 „	.	1034·2	„

Animal diet only was taken on the 23d.

July 23d.—His pulse was 72; his tongue clean; he looked florid and well; had no irritation of the bladder; could take tolerable exercise; had gained 8 lb. in weight, being now 12 st. 10 lb. He said that, from the time of his first visit to me, all the flour he had eaten would not one quarter fill his hat, and he had not taken a pocketful of vegetables. The urine was perfectly free from sugar.