PROVINCIAL MEDICAL & SURGICAL JOURNAL.

CLINICAL LECTURE ON DIABETES.

Delivered at King's College Hospital,

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(Reported by S. J. A. SALTER, Esq., M.R.C.S., A.K.C.)

Gentlemen,—To-day I have to trouble you with the remaining particulars and termination of the cases of our two diabetic patients, Hardy and Bowles, both of which have come to a conclusion, as far as our clinical study is concerned; the one patient having left the hospital, is consequently removed from our observation, and, to a great degree, from our treatment also, though we still occasionally see him as an out-patient; the other having terminated fatally, in consequence of inflammatory disease of the kidneys, having been produced by the patient's violation of the rules of diet laid down for him, and his too liberal use of spirituous liquors. I shall, therefore, in addition to the clinical remarks, be able to communicate to you some interesting points on the morbid anatomy of diabetes.

You are aware that these men have been subjected to the most rigid dietetic treatment, and that the plan which I proposed has been carried out to the fullest extent that was possible. I will explain to you what this mode of treatment was. The patients were both put into a separate ward; it was sufficiently large, airy, and light, and in this room they were locked up; they went into this ward on the morning of the 22nd of November, and remained there until the 18th of January, a period, both days being included, amounting to about two months, being fifty-eight days. The door was kept constantly locked, and no one was allowed access to the patients, except the house-physician, the clinical clerks, and the nurse; and I chose the nurse to attend on these men, whom I believe to be a thoroughly efficient and trust-worthy person,—indeed, the most so of those in the hospital. Occasionally they took exercise, at first in a cab, and afterwards, when they were strong enough, on foot; but on these occasions they were always accompanied either by the nurse, who was sent with them to prevent them from taking any improper food or drink, for had they done so, it would have upset all our calculations, and we could not have arrived at any definite conclusion, as to the effect of the dietetic mode of treatment we had been pursuing. By this, I believe we precluded every means of imposition; and I think

there certainly can be no doubt, but that we knew everything our patients were taking. It is quite necessary to observe all these precautions, for the appetites of diabetic patients are so enormous, and their craving for just those kinds of food which are most improper for them, is so great, that if any possible opportunity of getting such diet be given, they are sure to take advantage of it; their cravings for saccharine and amylaceous food are so great, that they almost deceive themselves, and though they may wish to obey the injunctions of their doctor, their impulses are so strong, that, have they a chance, they will in this particular, disobey him.

I am quite sure that my friends, the house-physician and my clinical clerks, have been too anxious to further my wishes, in the treatment of these patients, not to have exercised due vigilance over them, to prevent them from procuring any food, that I had not ordered them; and if the nurses under whose surveillance they took their exercise, have done their duty, as indeed, I believe they have, then, any inferences to which we may come, relative to the effect and value of the mode of treatment we have adopted, that suggest themselves, will be without fallacy on that score. I am, myself, quite satisfied with our security.

On the morning of the 22nd of November, 1847, they were removed into their solitary ward; but it was not till the next day, that the strictly animal diet was adopted.

I will first, gentlemen, call your attention to Hardy's case. On the day of his admission into the new ward his diet was the following:—

For Breakfast—Milk, 1½ pint
Tea, 1 pint,
Bread, 8 ounces.
Dinner—Meat, 14 ounces
Eggs, 2
Porter, 2 pints.
Supper—Meat, 8 ounces
Tea, ad libitum.

At this time Hardy was in extremely low condition; he was much emaciated, he suffered greatly from thirst, and was often disturbed in the night by the urgency of his thirst, and the necessity for frequent micturition; he was excessively weak and languid; and could hardly walk up stairs. Three days previous (the 19th,) he was weighed, and it was found that his weight was only 128 pounds, it having been 127 on the 14th, and 129 on the 6th. On this day he drank nine pints of fluid, and passed eleven pints of urine, the specific gravity of

which was 1.034, and which, to all the ordinary tests, yielded unequivocal evidence of holding a large quantity of sugar in solution.

Being anxious to ascertain what amount of sugar might be found in the matters ejected from his stomach, I ordered him an emetic, consisting of twenty-five grains of sulphate of zinc, to be taken on this evening, (the 22nd.) This emetic, however, did not make him vomit, (the same was the case with Bowles,) but made him feel slight nausea for about one hour.

On the 23rd the report states that he was rather weaker; he had had no sickness from the emetic, but it had occasioned profuse diaphoresis in the night, which had materially interfered with his rest. During this day he had no sweet taste in the mouth, less thirst, the saliva not so acid, the tongue cleaner, and the mouth more moist. The quantity of liquid drunk was nine pints, and that voided was eight pints, of specific gravity 1.038. His diet for this day was—

At Breakfast—Eggs, 2
Beef tea, $1\frac{1}{2}$ pint.
Dinner—Meat, 14 ounces
Beef tea, 1 pint.
Tea—Meat, 6 ounces
Eggs, 2
Beef tea, $1\frac{1}{2}$ pint.
Supper—Meat, 8 ounces
Beef tea, $\frac{1}{2}$ pint.

On the 24th he had passed a good night, having been disturbed only twice to make water,—this was a great and rapid change in this particular symptom. Very early in the morning he was attacked with a violent itching of the skin, accompanied by an eruption resembling urticaria, which was probably produced by the very different diet he was then taking, from what he had previously. The patient stated that he felt unusually well, and differently from what he had at any time previously, during his residence in the hospital. The skin was slightly moist; the saliva abundant; tongue clean; pulse 90; urine six pints and a half, eight pints of liquid having been drunk; it was acid, and the specific gravity ranged, during the day, from 1.030 to 1.032; one specimen was passed of 1.021.

The following diet was fixed for him—

Breakfast—Meat, 1 pound
Water, *ad libitum*.
Dinner—Meat, 1 pound
Water, *ad libitum*
Greens.
Tea—Meat, 6 ounces
Eggs, 2
Water, *ad libitum*.
Supper—Meat, $\frac{1}{2}$ pound.

He was also to have two bottles of Carrara water during the day.

On the morning of this day he also took an emetic, (Zinci Sulphatis, gr. xxv.) it did not make him vomit, but produced slight nausea. About 9 o'clock, p.m., he had another attack of cutaneous itching, but it was less intense than the previous one, and only lasted half an hour.

On the 25th the patient felt still better, he had passed a comfortable night, the sulphate of zinc having caused only very slight diaphoresis; he had been disturbed

but twice to pass water; the tongue clean and moist; skin damp; thirst less. The urine, which was in quantity eight pints and a quarter, had totally changed, it now contained *no trace* of sugar, and this was the first instance of a specimen of this man's water being destitute of that substance; its specific gravity was 1.028.

From this time his general symptoms underwent a decided change, constantly and steadily improving. The urine became much less abundant; and I would here draw your attention to some of the most striking instances of its diminution in this table, and in showing you this I would also remind you, that on the 19th of October he drank* ten pints ten ounces of liquid, and passed seventeen pints eight ounces of urine; and on the 22nd of November nine pints were drunk, and eleven pints passed; and three days before twelve were passed, while nine were drunk; and I say, remembering how large was the quantity of fluid drunk and passed just previous to this patient entering the new ward, and how fixedly it kept at that high amount, the immediate diminution, and steady decrease, which it subsequently underwent, are very striking:—

Date.	Quantity drunk.	Quantity voided.
Nov. 10 - -	144 ounces	- - 192 ounces.
" 22 - -	144 "	- - 176 "
" 24 - -	128 "	- - 104 "
" 26 - -	120 "	- - 92 "
" 29 - -	104 "	- - 92 "
Dec. 5 - -	80 "	- - 68 "
" 9 - -	48 "	- - 80 "
" 10 - -	48 "	- - 64 "

During the whole of his sojourn in this ward, the quantity of urine passed kept very steadily to about five pints, (80 ounces,) the thirst also became much less, and, as you see in the above table, he did not drink half the quantity of fluid he had at one time; three or four pints would often satisfy him. The saliva was much more abundant, and was less acid; the pulse too had greatly lessened in frequency, and the diminution in its rapidity seemed to keep pace with the improvement in his other symptoms: thus, on November 24th, the pulse was 90; on the 30th, 80; on the 3rd of December, 84; on the 5th, 70; on the 6th, 72; and on the 8th it was 72 likewise. I shall presently show you that a retrograde course in his health, and a partial return to his former mode of life, had the effect of rendering his pulse more frequent and permanently so. The patient at this time (that is, during December,) was much less often troubled to pass his water; he was obliged to get out of bed, during the night, once—more rarely twice, sometimes not at all. Occasionally he suffered from a violent itching sensation of the skin; this occurred chiefly at night, when warm in bed, and generally when he perspired freely; it was unattended by any cutaneous eruption, and did not appear to be connected with any obvious cause.

Early in December, Hardy took walking exercise along the corridor in the hospital, under the surveillance of the nurse; subsequently his exercise consisted in a ride in a cab, on which occasions he was

* The pint spoken of in these lectures is sixteen ounces.

also accompanied by the nurse. He gained strength so rapidly, that by the 18th or 19th of the month he could take walks of two miles daily, and accompanied by comparatively little fatigue. This change is truly remarkable; for when first he went into the separate ward, he could hardly walk up stairs.

Another very important improvement which occurred in this patient was, that he gained flesh and consequently increased much in weight. I have already told you, that when he went into the new ward, or, what amounts to pretty much the same, three days previous to that, he was weighed, and his weight was 128 pounds; fourteen days after that he was again weighed, and he had then increased half a stone in weight. The following table shows the progress he made in this particular:—

Date.	Weight.
Nov. 19 - - - -	128 pounds.
Dec. 7 - - - -	135 "
" 23 - - - -	136 "
Jan. 6 - - - -	138 "
" 13 - - - -	140 "
" 25 - - - -	144 "

Thus, you see, in about two months he gained a stone and two pounds in weight.

From the 24th of November up to the 25th of December, his diet was very nearly what was fixed for him on the former of those dates, with these exceptions, that he has occasionally had a small quantity of water cresses, and, at other times, he has had no vegetable at all for several days together, not even greens. His meat consisted of roast beef, roast mutton, mutton chops, beef steaks, veal, and occasionally fish. This was the case from the 15th to the 24th of December.

On the 25th of December, (Christmas day,) Hardy pleaded very hard for me to allow him some pudding, and I could not refuse him any longer, so he accordingly had one slice of pudding. This change in diet produced some alteration in his general symptoms; the pulse became quicker, and he was more thirsty, but there was no increase, either in the quantity or specific gravity of the urine. The most remarkable of these changes was the greater frequency of the pulse; it rose from that time, and never, on any subsequent day, while he remained with us, did it fall as low as it had been for many days before. On the 25th of December, the pulse was 76; on the 28th, 90; on the 29th it was 92; on the 30th, 94; on the 1st of January it rose to 96; and on the 4th to 100. During this time (from Christmas-day to the 4th of January,) he had daily a slice of pudding; but I then interdicted it, and substituted for it a little arrow-root, which he did not like, and he ate very little of it; the result was, that on the 5th of January the pulse fell to 90, on the 7th to 86, and on the 8th to 80. On the evening of this day, being very hungry, he ate all his arrow-root; and not only his own, but also that of his companion; and the next day (the 9th,) his pulse rose to 98, on the 10th it was 96, and it ranged, ever afterwards, between that number and 104, never sinking below 96, and generally much above it, averaging 99 or 100.

During the time our patient was subjected to this mode of treatment, the specific gravity of his urine

fell very considerably, (you will bear in mind that its healthy range is from 1.015 to 1.025;) it once reached as low as 1.018. The following are some of the records which have been kept by my clinical clerk:—

Date.	Specific Gravity.	
	Night.	Morning.
Nov. 10	1.036	1.037
" 23	1.038	1.025
Dec. 2	1.029	1.032
" 13	1.026	1.028
" 23	1.026	1.026
Jan. 2	1.019	1.024
" 3	1.026	1.026
" 14	1.021	1.023
" 15	1.018	1.025
" 18	1.019	1.028
" 19	1.023	1.028
" 23	1.026	1.026

On the 18th of January, as the room in which my patients had been confined was wanted for other purposes, Hardy and his companion were removed into Rose Ward. For a few days previous to his entering the common ward I had allowed him a little bread, which he had taken without any alteration of his symptoms, but he now took it in larger quantity, and this produced an increase in the amount of his water, from five pints, which it had been previously, to seven pints; there was scarcely any increase in its specific gravity; the pulse was quicker.

I was anxious to ascertain what was the amount of sugar existing in the urine, relatively to its other constituents, and the quantity of liquid that kept it in solution; and whether it underwent any variation in proportion to the quantity of the urine, or the severity of the other symptoms. This could only be known by a careful *quantitative* analysis, made from time to time. The process, by which the sugar is separated from the other principles in the urine, especially from urea, is tedious and difficult, and the task has been kindly undertaken for me by Mr. John Bowman, and was prosecuted in the laboratory at King's College. I will now read the quantities of sugar, *per cent.*, which he found in the several specimens of urine he examined.

Date.	Amount of sugar in the urine, <i>per cent.</i> *	Date.	Amount of sugar in the urine, <i>per cent.</i> *
1847.		1848.	
Nov. 30 - - -	3.50	Jan. 10 - - -	3.60
Dec. 1 - - -	4.53	" 13† - - -	2.85
" 6 - - -	4.07	" 18 - - -	3.40
" 8 - - -	4.60	" 19 - - -	3.39
" 15 - - -	3.80	" 24 - - -	3.39
" 17 - - -	3.10	" 21 - - -	3.41
" 21 - - -	4.00	" 31 - - -	3.36
" 24 - - -	3.91	Feb. 10 - - -	3.35

* The urea was never more than 0.1 to 0.2 per cent.

† For the analysis on the 13th of January I am indebted to Mr. Beale; he further examined the urine quantitatively, as to the amount of its other matters. The following is the result:—

Diabetic Urine—(Hardy.)

Reaction, acid.	Specific Gravity, 1.031†
Water	94.600
Urea	
Uric Acid }	2.154
Extractives }	
Sugar	2.850
Fixed Salts	.876
Loss	.020
	100.000

You must observe that, for the most part, there was but slight difference in the per-centage amount of sugar, which the urine contained, and what little difference did occur appeared quite irrespective of the quantity of urine passed, or liquid drunk, or of his condition and symptoms generally. Remember, I am speaking of the *per-centage*, and not of the absolute amount of sugar voided.

And now, gentlemen, that I have troubled you with such lengthened and elaborate details, I will make some general deductions from them. I have come to the following conclusions:—

1st. That the change to an exclusively animal diet was very well borne. It produced no fever, as from common prejudice we might have been led to anticipate, and especially taking into consideration the large quantity taken,—about 3lbs. a-day; but, instead of fever, the pulse steadily and regularly lessened in frequency, and did not again rise till he had violated the strict law as to his diet which I had laid down for him, and partially returned to his former mode of feeding. Primary digestion was very well performed—wonderfully so, when we consider the large quantity of food taken in, and the peculiar character of that food.

2ndly. That the most marked effect upon the secretions, and upon the symptoms generally, was produced *immediately* after the change of diet. If you compare his condition at two or three days after we commenced our new mode of treatment, with what he was at a fortnight, (excepting his increased weight and strength, which of course must be gradual,) you will see little difference. Three days after his admission into the separate ward, the urine diminished from 176 to 92 ounces; his skin, which had previously been dry and harsh, was moist and soft, and at night he had abundant perspiration; his mouth, before dry and clammy, was now moistened by plentiful saliva, and this, too, was of a more natural character, for it was less acid. All this occurred in the first two or three days. The increase of weight which the patient underwent must necessarily occupy some time; but still, it is to be remembered, that in the first fourteen days he gained 7 pounds, while he only gained 9 pounds in forty-eight days afterwards. This shows what a marked effect this mode of treatment had upon the disease immediately upon its establishment.

3rdly. The next deduction that I would make from the details of this case, is relative to the quantity of sugar which Hardy voided in his urine. Now, while the *per-centage* amount of that substance underwent but a trivial alteration, so that any given quantity of his water may be said to have contained nearly as much sugar on any one day as the same measure did on any other day; still, it must be remembered that the urine diminished greatly in the amount daily passed, and consequently the aggregate mass of sugar eliminated; and probably, also, generated, must have diminished in the same direct proportion. Take, for instance, these examples:—On the 22nd of November, 11 pints (176 ounces,) of urine were passed, and they contained 6.07 ounces of sugar; on the 30th of

the same month, 6 pints and 12 ounces (108 ounces in all,) of urine were voided, containing about 2.60 ounces of sugar; and on the 15th of December, 4 pints 8 ounces (which equal 72 ounces,) of urine were evacuated, containing little more than 2 ounces of sugar. We conclude, then, that while the urinous solution of sugar has been of pretty much the same strength, and with little variation, still, the amount of that solution has greatly varied.

4thly. And lastly, I would say, that the addition of a little amylaceous food to Hardy's diet appeared to produce but little unfavourable effect; there was, however, a slight increase of urine, and the pulse was more rapid; but the extreme comfort he derived from a small quantity of vegetable food more than counterbalanced the trivial consequences it produced.

I will now call your attention to Bowles's case, which, unfortunately, is not so favourable as Hardy's; it was always more confirmed, and the remedies which we used had not so marked an effect upon him; his case, moreover, was complicated with a phthisical tendency, which caused a rapid development of tubercles, of which he at last died. But though this case does not show as distinctly all the points which we have observed in the other, still, as far as it goes, it does not in any degree militate against the inferences deducible from the results of the treatment in Hardy's case.

Bowles entered the separate ward at the same time with Hardy, (Nov. 22nd,) and was subjected to nearly the same treatment, and always had the same diet.

When Bowles entered this ward he was very weak indeed; it fatigued him to walk about the room; all his symptoms, thirst, dryness of mouth, sweet taste, craving appetite, parched skin, great diuresis and constipated bowels, were urgent. Two days before his admission he weighed 111 pounds. He was ordered the same diet as Hardy, and, like him, took twenty-five grains of sulphate of zinc on the evening of this day. This emetic produced not the slightest effect upon the stomach; he did not vomit, neither was he nauseated in the least, but it occasioned a profuse diaphoresis during the night, and for the whole of the next day the skin was moister.

On the evening of the 24th he took another emetic, similar to the first; this, however, caused a good deal of nausea, but not vomiting; afterwards he passed a good night, but without sweating; the next day his skin was very slightly moist. The difficulty of exciting vomiting in diabetic subjects has been previously noticed by other observers; it is, perhaps, due to a diminished sensibility of the mucous membrane of the stomach.

On the 30th of this month he had a third emetic, consisting of Zinci Sulphatis, gr. xxx.; Pulveris Ipecacuanhæ, gr. xv. Soon after taking this he felt nausea, and in ten minutes he vomited about an ounce of mucus and water; after this he took some tea, and the nausea immediately left him; he sweated more during the subsequent night than on any previous occasion; he slept well, and was only disturbed once to pass water. The next day the skin was moister.

These matters which were vomited afforded us the only opportunity we had of ascertaining whether sugar might be found in the contents of the stomach; Mr. John Bowman analysed them for me, and he found them to contain diabetic sugar.

The change of treatment which Bowles underwent in this ward produced the same immediate effect upon his symptoms as we have noticed in Hardy. Take, for instance, the quantity of the urine:—

On November 22	- -	192 ounces were voided.		
" 23	- -	92	"	"
" 24	- -	96	"	"
" 25	- -	84	"	"
" 26	- -	80	"	"
" 27	- -	76	"	"

His other symptoms likewise improved; the skin was soft, and often moist; the mouth was also moist; the thirst less; the sweet taste vanished from the palate; the urine lost its diabetic odour; the saliva was abundant, and less acid; he was now seldom disturbed more than once during the night, and on the 29th not once, to micturate.

On the 1st of December, in compliance with his urgent request, I allowed him five ounces of bread, to be continued daily; the result was, that his urine, which amounted to ninety-six ounces on that day, rose to 116 ounces on the 2nd, 112 on the 3rd, 118 on the 4th, 124 on the 5th, and continued thus high till the 11th, on which day the bread was ordered to be discontinued. This produced a diminution to 88 ounces on the 11th, the same on the 12th, and 80 on the 13th of December. His pulse, which was 88 on the 1st, when he began to take bread, rose to 94 on the 2nd, and kept high for some days; his thirst also became greater; the saliva, however, was now alkaline. All the unfavourable symptoms improved when the bread was left off.

I would here point out to you a feature in this case, which was less manifest in Hardy's,—namely, that the per-centage of sugar in the urine seemed to bear somewhat of a direct relation to the other symptoms; that when they increased in severity, it increased in quantity; and, moreover, that the diet appeared to exercise a distinct influence on the amount of sugar.

These are some of Mr. Bowman's analyses of Bowles's urine:—

Date. 1848.		Amount of sugar* in the urine, per cent.
November 30	- - -	4.46
December 1	- - -	4.60
" 6	- - -	6.46
" 8	- - -	6.06
" 14	- - -	3.00
" 15	- - -	4.70
" 17	- - -	3.50
" 21	- - -	4.10
" 24	- - -	4.10

Now you will observe in this table, that while our patient was in an improved state of health, which includes the dates of the 30th of November, and the 1st of December, on which the urine was analysed,

* The amount of urea was the same as in Hardy's urine.

then the per-centage of sugar was comparatively low; but after he took the five ounces of bread daily, the sugar increased to 6.46 on one day, and to 6.06 on another, thus rising two per cent. Again, the bread being discontinued on the 11th of December, and from that time forward, (as far as I have yet given you the analyses,) the quantity of sugar again diminished as low as before. Thus, you see the per-centage of sugar increased and decreased, *pari passu*, with the general symptoms, and the farinaceous character of the diet.

From the 11th to the 25th of December, the patient continued to progress very favourably. I will read to you the report from the case-book of the 20th, which describes his condition pretty much as it was during the whole of that interval.

"Feels stronger; can now walk some distance without feeling tired; has no sweet taste in the mouth; tongue clean and moist; bowels regular; the urine is still rendered of a dark colour by heat and Liquor Potassæ; sleeps well at night, but is generally disturbed *once* to make water; says he formerly had to pass water as many as eight or ten times during the night; skin moist; does not complain of thirst; pulse 80; urine 76 ounces; specific gravity, 1.031."

The urine varied, during this period, from 72 to 92 ounces *per diem*, its specific gravity averaging about 1.033.

On the 25th of December, I was obliged to allow Bowles some pudding, and he always had pudding, or something equivalent to it, every day afterwards. The result of this was, that the subsequent reports were unfavourable; I will read you that of the 28th as an example.

"Has passed a bad night, owing to severe headache and nausea; perspired very profusely; he did not take his tea last night, but his appetite is better this morning; tongue furred; skin hot and dry; does not feel thirsty; bowels not open; saliva acid; pulse 120."

I was obliged to allow Bowles some farinaceous food every day; he would no longer submit to the exclusive diet of animal food; so, on the 1st of January, I fixed the following for his daily diet, distributed through the day, as might best suit his own inclination.

Meat, 4 pounds.
Brown bread, 5 ounces.
Light pudding.
Carrara water, two bottles.
Water, 4 or 5 pints.

After this the general symptoms continued not so well; the pulse was never again below 90, and it was only once as low as that; 98 was its general frequency, and it once or twice reached 120.

The specific gravity of the urine now rose to 1.037, 1.040, and 1.042, and kept high always afterwards.

The per-centage quantity of the sugar also underwent a great increase. You will remember that on the 24th of December, when the patient was so much better, and whilst he was taking no bread or pudding, the sugar was 4.1 per cent. The following table shows how it had augmented during the month of January, when a different diet was being taken:—

Date. 1848.	Amount of sugar in the urine, per cent.
Jan. 10 - - - - -	6.20
" 18 - - - - -	6.12
" 19 - - - - -	6.10
" 24 - - - - -	6.31
" 28 - - - - -	5.90
" 31 - - - - -	5.86

It is remarkable that there does not appear to have been any increase in the amount of water passed by Bowles, notwithstanding the augmentation of his other symptoms, and the larger quantity of sugar which he generated. I am inclined to believe, however, (at least, after the 18th of January, when he was admitted into the common ward,) that he made away with some of his urine, after passing it when he went to the water closet.

There is one more item that I wish to notice, which I have not yet referred to, and that is, the patient's weight at different periods. The following are the records which have been kept on that subject:—

Date.	Weight.
Nov. 19th - - - - -	111 pounds.
Dec. 23rd - - - - -	112 "
" 30th - - - - -	115 "
Jan. 6th - - - - -	112 "
" 13th - - - - -	109 "

These figures show that, at the early part of the treatment, when Bowles was getting so much better and stronger, and whilst he was using a diet almost destitute of vegetable matter, he gained in weight; but that after these measures had been laid aside he again lost weight. The only peculiar circumstance is, that the increase of weight went on after the 25th of December for a few days; but that soon changed, for a fortnight after, we find he had lost six pounds.

I had all along noticed that Bowles appeared more gravely affected than Hardy; but it was not till the 11th of January that the phthisical symptoms made their first appearance. On that day we noticed cough; this was at first slight, but the next day it was more severe, and troubled him greatly. He was then ordered some Vin. Ipecacuanhæ and Tinct. Hyoscyami; this appeared to benefit the cough, for the next day he was rather better; however, it soon became a good deal worse, and disturbed his rest at night; it was unaccompanied by expectoration.

On the 18th of January he was removed from the private ward into the Rose Ward; and from that time the cough and diabetic symptoms grew more severe. He now became very feverish; the pulse was 112 on the 18th, 116 on the 19th, and 120 on the 20th. Upon examination of the chest we were unable to discover any particular dulness on percussion, or deficiency of respiratory murmur, but we noticed a prolonged expiratory murmur on both sides.

During the last few days of January, Bowles got rapidly worse; he became much thinner and very weak; the tongue was furred, and the appetite much diminished; his cough became still more troublesome, especially at night, and his pulse kept up at 116 or 118; the thirst was greater than before.

On the 5th of February the report states, that, added to the prolonged expiratory murmur, there were

observed slight dulness under both clavicles and the supra-spinal fossæ of both sides, roughness of breathing, and increased resonance of voice; the pulse this day was 122. He was ordered ammonia and wine.

From the 5th he rapidly sank. On the 6th he was very low and weak, felt a total disregard for all food and was more feverish; the pulse was 132; he lay in bed in a dozing state, groaning and muttering to himself in a sort of low delirium. He remained in the same condition during the 7th, but on the 8th he became still worse; he was then almost comatose; the breathing was hurried, respirations 48 in the minute; pulse 134, thready and very compressible; he passed his water unconsciously in bed; he could not be got to swallow any nourishment. On the morning of the 9th of February he died. The urine, during the last two days, contained fibrinous casts of the tubes of the kidney, a trace of albumen, and also a considerable quantity of fat. The comatose state which appeared just before Bowles died, arose, in all probability, from a poisoned state of the blood, the kidneys failing to some extent to remove the sugar or the urea, or perhaps both.

You will observe that it was about the middle of January that Bowles got so much worse; and I am informed that about that time, having been allowed one day to go out for a walk with Hardy, unaccompanied by the nurse or porter, he went to visit one of his relatives, and had what, to them, was a sumptuous repast of bread and butter, gin, beer, and apples. It would have been difficult for them to have chosen anything which could have been more improper for them; and I believe that this must have hastened Bowles's death, by producing an inflammatory state of the kidneys, which materially impaired their eliminative power.

We had a *post-mortem* examination of the body about twenty-four hours after death, and I will now give you the particulars of it, for it was one of unusual interest.

Post-mortem.—The body was much emaciated, and on cutting through the skin, very little subcutaneous adipose tissue was seen.

Head.—The brain appeared shrunk; there was an unusual quantity of cerebro-spinal fluid in the sub-arachnoid space, and there was much serum in the ventricles.

Thorax.—The serous cavities of the chest were dry; there were no pleuritic adhesions.

The *lungs* partially collapsed when the chest was opened; they were of a brighter red than natural, and were dotted all over with very numerous white spots. On cutting into the substance of the organ, they were found studded throughout with thousands of minute tubercles, about the size of a pin's head, and remarkably uniform in size; they were scarcely more plentiful in the upper than in the lower lobes of the lungs. These tubercles were white, opaque, and soft. When the lungs were cut into, they exhaled very powerfully the peculiar sweet odour so characteristic of the breath of diabetic patients, and some portions which were kept for three or four days out of spirit, exhaled this smell to the last. The lungs were everywhere pervious to air; crepitated under pressure, and floated in water. At the anterior part of the root of the right lung was a cyst, containing

about two drachms of pus, apparently formed by the suppuration of a lymphatic gland in this locality.

Abdomen.—The stomach was unnaturally large; it contained about two ounces of thick fluid, consisting principally of mucus. The mucous membrane had an unusual quantity of rugæ. Upon a microscopical examination of the membrane, I found the stomach tubes wonderfully well marked; the same was the case with the cells, and they contained an abundance of epithelium—in fact they were stuffed with epithelium. This highly developed state of the mucous membrane no doubt was connected with the activity of the digestive functions in the stomach.

I may here mention that I subjected some starch to artificial digestion, with the mucous membrane of the stomach, and found that it was converted into sugar. You are aware that the healthy gastric mucous membrane does not possess this power.

In the *duodenum* the tubes of Lieberkühn, and Brunner's glands were also found largely developed, and containing a similar abundance of epithelium.

The *colon*, throughout its entire length, was full of hardened fæces.

The *pancreas* was large, and exhibited the same exuberance of epithelium that I noticed in Brunner's glands and the tubes of the mucous membrane.

The *liver*, from the hosts of miliary tubercles with which it was studded, exhibited a more speckled aspect than the lungs; the tubercles were, some of them, smaller and some larger than those of the lungs, (they were all very small,) but they had the same physical characters, and their white colour contrasted remarkably with the dark parenchyma of the liver: their presence had caused no inflammation of the hepatic peritoneum. Under the microscope the cells of the liver were found to contain scarcely any fat or biliary matter. The *bile* which was found in the gall-bladder was analysed for me by Mr. Beale, and he found that it contained diabetic sugar.

The *spleen* contained a large number of minute tubercles, but presented no other peculiarity.

Being unable, from various engagements, to give my immediate attention to the *kidneys*, I requested Dr. Johnson to examine them carefully for me, and I have since seen portions of them with him. Dr. Johnson has kindly drawn up an account of the appearances, which I shall read to you.

"The kidneys were slightly above the natural size, vascular; in the cortical portion there were numerous small tubercles. On a microscopic examination the uriniferous tubes were found of a yellowish colour, from an abundance of granular matter and oil in the epithelial cells. The appearance of the renal cells contrasted remarkably with that of the liver cells, the latter being very transparent and colourless, and containing scarcely any biliary particles or oil; they had the appearance of being starved and emaciated, while the kidney cells were over-fed and plethoric.

"The urine passed about two days before death contained a small quantity of albumen, and some fine granular cylindrical moulds of the tubes. The albumen and the casts were probably connected with the tubercular deposit. The tubercles in the kidney had the

same microscopic characters as those in the lung."

The existence of an unusual quantity of fat in the kidney has not only been shown microscopically, but also chemically, for Mr. Beale has made for me the following analysis:—

Kidney—(Bowles.)			
Water	-	-	76.800
Animal matter	-	-	18.792
Fatty matter	-	-	3.016
Fixed salts	-	-	1.392
			100.000

The amount of fat here found is triple that of a healthy kidney, for in health one per cent. is about the quantity it contains.

Not a trace of sugar could be discovered in the substance of the kidney.

I may here remark, that this is not the first case of diabetes in which I have found fat in the tubes of the kidney. The kidneys of a woman who died here last year of diabetes, contained fat in considerable quantity.

And now, in conclusion, I will call your attention to some inferences which the cases we have been considering suggest.

1. The first of these is, that the azotized dietetic plan of treatment is efficacious; that the patients were more benefited by it than by any other means; and that the admixture of a small quantity of vegetable food did not very materially interfere with its favourable operation.

2. The evidence furnished by these cases is opposed to Bouchardat's theory, that the sugar is wholly derived from amylaceous food, and is little, if anything, short of a refutation of it. Take, for instance, Hardy's case: when he was put into the solitary ward he was deprived of all amylaceous food, and yet he still continued passing from two to three ounces of sugar daily. But it may be said that this was furnished by the greens, which he then took; this, however, could not be the case, for they would hardly weigh as much as the sugar that was evacuated; but there was one period in which he did not even take greens; he took no vegetable food whatever, but lived entirely on meat, and that deprived of fat as much as possible. This period was from the 15th to the 24th of December; notwithstanding, however, this total exclusion of all vegetable matters from his diet for nine days, he evacuated in that time from twenty-five to thirty ounces of sugar, and his own bodily weight was all the while increasing. Whence, I would ask, could all this sugar have been obtained? The same circumstances occurred in Bowles's case, though not, perhaps, to so striking a degree.

3. The great increase of the power of the stomach is truly remarkable; these men found no difficulty in digesting four pounds of meat, besides several eggs, in one day, a task twice as great as any ordinary stomach could perform. The highly developed condition of the mucous membrane of the stomach was, no doubt, associated with this exalted power of digestion, and probably exists in all these cases.

4. The fact, that sugar could not be detected in the substance of the kidney, goes to show that it is not

there secreted, that it does not enter into any organic connection with the elements of the kidney, but merely percolates in solution through it; hence the disease of the kidney must be secondary. The sugar doubtless reaches the kidney in solution in the blood, and there acts upon that organ as a diuretic, passing possibly dissolved in the water that filters through the Malpighian bodies, and not being attracted from the blood through the walls of the tubes."

5. The comparative conditions of the epithelium of the liver and kidneys are very singular, and I am not aware that a similar observation has been previously made; it would tend to shew with what avidity all carbonaceous matters, fat as well as sugar, are directed to the kidney, in this disease. Most probably, to some extent, the fat of the liver goes, in common with fat from other parts of the body, to the formation of sugar; but this does not account for the deposition of fat in the epithelium of the kidneys.

Lastly, these cases justify the conclusion that this disease is essentially one of the primary organs of digestion, whereby all substances readily convertible into sugar are quickly so converted; and that sugar is not digested, but passes into the blood unchanged, whence it is rapidly eliminated by the kidneys. We must not forget that this was, in fact, the view taken of this disease by Dr. Rollo, an English physician, who was the first to suggest the plan of treatment, which all experience proves to be the most beneficial.

SHORT NOTES ON THE OPINIONS AND PRACTICE OF THE LATE JOHN PEARSON, ESQ., F.R.S., ON SYPHILITIC DISEASE.*

By W. S. OKE, M.D., Physician to the Royal South Hants Infirmary.

Phlegmone Testis.—This term implies inflammation of the testis, connected with gonorrhœa; but as the appearance of the swelling in this case does not differ from the swelling of the testis from any other cause, it is necessary to obtain a correct history of the disease. It is preceded by darting pains in one or both testicles; the scrotum is red and projecting, and pain is felt also in the loins; and sometimes before the local symptoms are developed, the constitutional disturbance is severe; the patient feels ill and faints, perhaps vomits, and has a frequent pulse, with general uneasiness.

Cases occur in which the constitution is remarkably low—in a state similar to that which precedes typhus fever—for a day or two prior to the accession of the inflammation, after which there are frequently the general symptoms of inflammation present, with pain in the lower intestines, and even delirium, particularly if the spermatic cord be involved as high as the abdominal ring.

The disease is situated in the body of the testicle, and extends to the tunica vaginalis and cord, producing, perhaps, a little hardness in the pubic region,

but it does not primarily proceed down the cord to the testis.

When the disease proceeds unchecked by appropriate treatment, the tunica vaginalis testis contracts adhesions to the scrotum, and these often become the seat of abscess.

The testis seldom suppurates, but when it does, great attention is necessary lest the tubular portion protrude, or be pushed out in mistake for pus. This has occurred. These cases are tedious and difficult of cure.

It seldom happens that both testicles are simultaneously inflamed from gonorrhœal causes, although each may be affected in succession; and the left testicle, perhaps, is more frequently inflamed than the right.

A patient subject to rheumatism, who has had phlegmone testis, may, by exposure to cold, be severely attacked by rheumatic inflammation of the testicle, producing violent pain in the gland, extending down the thigh, and attended with spasmodic action of the external muscles of the thigh and leg.

Inflammation of the testicle most frequently attacks those who are recovering from gonorrhœa, where the discharge is very trifling, and where the symptoms are apparently favourable. It may be the result of taking cold, or may come on even without any evident cause.

It scarcely ever arises when the inflammatory symptoms are running high, and the discharge is profuse; but at the conclusion of these very cases, it is likely to take place, especially when they have been of long standing.

It has been said that phlegmone testis is frequently produced by the long use of irritating injections. This does not appear to be the fact; but it is to be admitted, that injudicious applications to the urethra, in the early stage of the disease, to check the discharge suddenly, will often produce inflammation of the testis.

The opinions of writers as to the *rationale* of phlegmone testis are various; some think that the inflammation is propagated down one of the vasa deferentia to the testicle, whilst others think the disease is caused by metastasis. Neither of these opinions is correct; the simple explanation is, that it is an inflammation of one part communicated to another, in close and natural relation to it.

Hence inflammation of the testis may be produced when the discharge from the urethra has ceased; and on the other hand, the return of the discharge may carry off the inflammation of the testicle.

The suppression of an accustomed discharge in one part of the body may produce a disease in another part. This is exemplified in certain affections of the head, from the healing of an ulcer, or the suppression of an hæmorrhoidal flux.

Phlegmone testis is not the cure of gonorrhœa; it causes only a cessation or diminution of its symptoms,