ON A CASE
OF
CHYLOUS URINE.

BY
A. T. H. WATERS, M.D., M.R.C.P.,
PHYSICIAN TO THE LIVERPOOL NORTHERN HOSPITAL.

Received Jan. 11th.—Read Feb. 25th, 1862.

CASES of chylous urine so rarely occur in this country, our opportunities of observing them are so few, and our knowledge of the nature and pathology of the disease under which the secretion of the kidneys assumes the peculiar character which has given a name to the affection is so imperfect, that it is very desirable that in any instances which may come under our notice a careful record should be kept of the symptoms which present themselves, as well as of the effects produced by any remedial measures which may be employed. It is also desirable that the details of such cases, alike with regard to the characters of the urine, the nature of the symptoms, and the results of treatment, should be made known as widely as possible, in order that correct principles may be laid down with reference to the pathology and therapeutics of the affection. With these views, I have thought that a record of the following case, which affords a well-marked instance of the disease, and in which a steadily progressive improvement followed the use of the remedial measures which were resorted to, might be interesting to the Fellows of this Society no less than to the profession at large.

Edward Quillan, æt. 23, a seaman, was placed under my care in the Liverpool Northern Hospital, on October 10th,

1861. He had previously been in the hospital for four or five days, having been originally admitted into the surgical wards under my colleague, Mr. Hakes, for retention of urine. It was soon discovered that the cause of the retention was the coagulation of the urine within the bladder; it was also discovered that the urine was of a milky colour and appearance; he was accordingly transferred to the medical wards. The following is the history that was elicited from the patient.

He is a native of Bermuda, where he has always lived, except when he has been at sea. He entered the mercantile marine service when about twelve years of age, and has made voyages to the West Indies, to Europe, and to North America. He has always had good health, and has never taken medicine. His parents, natives of Bermuda, have also been healthy; they were alive four years ago, since which time he has not heard of them, as he has been away from his home.

He is an intelligent man, five feet five inches high, well-made, somewhat spare. He says he was quite well up to a fortnight before admission. He was, at that time, on his way from New York to Liverpool. The first thing that attracted his attention in connection with his present disease was the stoppage of his water. He took some spirits of nitre, and after that he noticed that his urine was of a milky appearance. He says he is quite sure that the urine became white all at once, and that it had not been changing its character for some time previous to the retention alluded to above. When he perceived the urine was milky, he observed that "little white pieces" came away with it. The urine has continued without any change in its appearance up to the present time. He has had retention of urine once since the first occasion, and before that, for which he sought admission into the hospital. He cannot attribute the attack to any cause; he has not been overworked, nor yet much exposed to cold. He thinks he has been getting somewhat thinner lately. He complains of no pain, and, with the exception of a little weakness, he feels well. He

passes a good deal of water, and has to get up frequently in the night to micturate. He has never known any one in his own country or elsewhere to suffer from a similar affection to his own.

By a careful physical examination of the chest and abdomen, no evidence of visceral disease can be discovered; the lungs are resonant on percussion, and the respiration good; the heart sounds are normal, although somewhat feeble. There is no tenderness over the abdomen, nor in the loins, nor any evidence, on percussion, of hepatic or splenic enlargement. The tongue is clean, the bowels regular, and the appetite good.

The following are the characteristics of the urine passed by the patient at the time of his admission into the hospital, and for several subsequent days.

When first passed, it is white, with rather a pink tinge. It resembles new milk in appearance, and somewhat in smell. It is perfectly free from urinous odour. After it has been passed for a short time it coagulates into a tremulous mass, which assumes the shape of the vessel which holds it, and exactly resembles *blancmange*. The coagulum sooner or later disappears entirely or in part, leaving the urine either altogether fluid or partly clotted. After the urine has been standing for some hours, a distinct deposit of florid blood is found at the bottom of the vessel, and the mass of fluid above assumes a perfectly white colour, showing that the pink appearance of the urine, when first passed, is due to the admixture of blood. There is, in addition to the blood-deposit, a deposit of a somewhat slimy character, having all the appearance of a mixture of pus and mucus. After standing some hours, a distinct, thin layer of white fluid, exactly resembling cream, generally forms on the surface of the urine; the layer being thicker in some specimens than in others. The urine remains free from odour for some time, but at the end of three or four days it has a slightly urinous smell.

When first passed, the urine is slightly acid, or neutral, and soon becomes alkaline. Heat causes a precipitate of

very fine particles. Nitric acid also produces a slight precipitate, but heat and nitric acid together cause a copious deposit. When boiled with liquor potassæ and sulphate of copper, there is no reduction of the latter salt to the condition of sub-oxide. If the urine be agitated in a test-tube with equal parts of strong sulphuric ether and left to stand, a thin layer of fatty matter is deposited on the surface of the urine, and below the ether. The urine then becomes quite clear, and if removed by means of a syphon and boiled with nitric acid, a copious deposit takes place.

When examined under the microscope, the urine is found to contain blood-, pus-, and mucus-corpuscles, with a large number of small fat-globules. Many of these last are very minute, whilst others are larger. No casts of the uriniferous tubes, nor any other abnormal matters than those already mentioned, can be found in the deposit from specimens of the urine allowed to stand one, two, or three days. The thin layer of cream-like fluid before alluded to is found to consist entirely of oil-globules.

During the whole period of treatment the urine passed by the patient at each evacuation of the bladder was kept in a separate vessel. The period at which each specimen was passed was noted, and at the end of every twenty-four hours an examination of the specimens was made, and the specific gravity and general appearance of each put down, together with the quantity that had been passed. The examination was made between one and two o'clock p.m. daily, and it embraced the urine passed in the twenty-four hours previous to one o'clock. The examination was conducted in most instances by myself, but in my absence by the junior house-surgeon of the hospital, Mr. Phelps.

The following abstract, referring to the number of times the urine was passed and the changes which took place in its character, will serve to show the manner in which the patient progressed towards recovery during the time he was in the hospital. The dates given include the period between one o'clock of the first day and one o'clock of the second.

October 11th, 12th.—Urine passed nine times. Every specimen was milky, and contained blood. The sp. gr. varied from 1010 to 1020; the quantity was three and a half pints.

12th, 13th.—No examination made. Quantity, three pints.

13th, 14th.—The number of times the urine was passed was not noted. All the specimens were milky, and contained blood; four contained clots. The sp. gr. of the whole was 1012; quantity, three pints sixteen ounces.

14th, 15th.—Urine passed twelve times. All the specimens were milky, and contained blood; two specimens contained clots. The urine passed at 6 a.m. of 15th was less milky than the others; sp. gr. 1010 to 1015; quantity, three pints fourteen ounces.

15th, 16th.—Urine passed thirteen times. All the specimens were milky, and contained blood; there was a clot in the specimen passed at 5.55 a.m. of the 16th; sp. gr. 1011 to 1016; quantity, three pints twelve ounces.

16th, 17th.—Urine passed nine times. All the specimens were milky, and contained blood, and all but two had clots in them. The urine passed at 12.30 of the 17th, about an hour before examination, was all coagulum. The sp. gr. of the whole was 1013; quantity, thirty-six ounces.

17th, 18th.—Urine passed eleven times. All the specimens were milky, and contained blood; six contained clots; sp. gr. 1010 to 1017; quantity, three pints three ounces.

18th, 19th.—Urine passed fourteen times. The specimens were milky, but some of them contained less blood than usual; seven contained clots; two, viz., those passed at 5.30 a.m., and 7.5, a.m. of 19th, were thinner than usual; more whey-like. There was an unusually thick, cream-like deposit on some of the specimens; sp. gr. 1013 to 1016; quantity, three pints six ounces.

19th, 20th.—Urine passed eleven times. The specimens were all milky, but contained less blood than before; ten contained clots; sp. gr. 1010 to 1015; quantity, three pints fifteen ounces.

20th, 21st.—No examination made.

21st, 22nd.—Urine passed eleven times. It was milky, but contained decidedly less blood; one specimen contained a clot; sp. gr. 1006 to 1014; quantity, four pints.

22nd, 23rd.—Urine passed eleven times. All the specimens were milky; three contained clots; some were almost free from blood.

23rd, 24th.—Urine passed thirteen times. All the specimens were milky; one was free from blood, the rest contained very little; one contained a clot, which was by no means firm; sp. gr. 1008 to 1013; quantity, four pints fifteen ounces.

24th, 25th.—Urine passed fifteen times. All the specimens were milky; some were free from blood, all were free from clots; sp. gr. 1007 to 1012; quantity, six pints.

25th, 26th.—Urine passed fourteen times. It was less milky, and contained but little blood and no clots. Some specimens contained a good deal of a somewhat greenish, slimy deposit, apparently a mixture of pus and mucus; sp. gr. 1005 to 1014; quantity, six pints. (Some urine passed at 1 p.m. of 26th was examined at 2.15 p.m.; it was coagulated, but the clot was neither firm nor large.)

26th, 27th.—Urine passed twelve times. Some specimens were free from blood; one was very milky, some were thin, more limpid than usual, and more of an amber colour. Generally, the urine was less milky than heretofore; sp. gr. 1004 to 1016; quantity, four pints ten ounces. (Two specimens examined to-day, viz., those passed at 6.30 p.m. of 26th, and 6.30 a.m. of 27th, contained a large quantity of albumen.)

27th, 28th.—Urine passed eleven times. All the specimens were more or less milky; three only contained blood, two contained clots; sp. gr. 1009 to 1017; quantity, four pints eight ounces.

28th, 29th.—Urine passed twelve times. Two specimens, passed in the middle of the night, were opalescent, the rest were more or less milky; one contained blood in very small quantity. Reaction of the mass of urine acid; sp. gr. 1009 to 1017; quantity, four pints ten ounces. (The pa-

tient was kept in bed all day, except when he got up to take his bath and to pass water.)

29th, 30th.—Urine passed twelve times. Of the twelve specimens, seven were milky; two only contained a small quantity of blood; one was clotted; two specimens were whey-like; three, viz., those passed at 6:20 a.m., 8 a.m., and 10:15 a.m. of the 30th, were opalescent; sp. gr. 1010 to 1017; quantity, three pints fifteen ounces. Reaction acid. (Patient in bed all day, except when he went down stairs to be weighed, got up for his bath, &c.)

30th, 31st.—Urine passed thirteen times. All the specimens were free from blood and clots; that passed at 6 a.m. of 31st was the most like healthy urine of any passed since admission. Reaction acid; sp. gr. 1005 to 1020; quantity, four pints ten ounces. (Patient in bed.)

October 31st to November 1st.—Urine passed nine times. All the specimens were more or less milky, and free from blood and clots; they all contained albumen; sp. gr. 1013 to 1017; quantity, three pints two ounces. (Patient in bed.)

November 1st, 2nd.—Urine passed six times. Free from blood and deposit. Three specimens were milky, two turbid, one was almost natural in appearance; sp. gr. 1015 to 1020; quantity, two pints six ounces. (Patient in bed.)

2nd, 3rd.—Urine passed five times. There was no blood and no deposit. Three specimens were cloudy, two opalescent; sp. gr. 1015 to 1025; quantity, two pints five ounces. (Patient up.)

3rd, 4th.—Urine passed six times. One specimen was milky, four were turbid, one was opalescent; there was neither blood nor clot; sp. gr. 1012 to 1025; quantity, two pints five ounces. (The patient says that for the last three days the urine has not coagulated at all after being passed.)

4th, 5th.—Urine passed five times. Free from blood and clot; sp. gr. 1012 to 1020; quantity, two pints five ounces.

5th, 6th.—Urine passed seven times. One specimen slightly milky, two turbid, four opalescent; sp. gr. 1007 to 1019; quantity, two pints nine ounces.

6th, 7th.—Urine passed six times. Five specimens turbid, one opalescent, but consisted almost entirely of coagulum. It resembled in colour and appearance slightly opaque jelly; it was passed at 8.30 a.m. of the 7th; sp. gr. 1010 to 1022; quantity, two pints ten ounces.

7th, 8th.—No examination made.

8th, 9th.—Urine passed six times. One specimen slightly milky, four turbid, one opalescent; sp. gr. 1016 to 1023; quantity, two pints eight ounces.

9th, 10th.—Urine passed four times. One specimen was quite milky, and one clearer than any passed since admission; sp. gr. 1018 to 1025; quantity, one pint six ounces.

10th, 11th.—Urine passed six times. Three specimens were very clear; sp. gr. 1012 to 1023; quantity, two pints.

11th, 12th.—Urine passed five times, as follows:—11th, 6.30 p.m., clear, natural; sp. gr. 1015: 8.30 p.m., turbid; sp. gr. 1030.—12th, 3 a.m., slightly turbid; sp. gr. 1020: 8 a.m., slightly turbid; sp. gr. 1018: 12.20 p.m., nearly natural, slightly opalescent; sp. gr. 1010; quantity, two pints. The urine passed at 6.30 p.m. of the 11th contained no albumen; that passed at 8.30 p.m. of the 11th contained a large quantity of albumen; that passed at 12.20 p.m. of the 12th contained a small quantity of albumen. (This was the first day on which the patient passed urine of a perfectly healthy character.)

12th, 13th.—Urine passed five times, viz.—12th, 4.30 p.m., slightly opalescent; sp. gr. 1015: 13th, 1.40 a.m., perfectly clear; sp. gr. 1015: 5.50 a.m., perfectly clear; sp. gr. 1019: 8 a.m., perfectly clear; sp. gr. 1015: 12 noon, perfectly clear; sp. gr. 1025. All the specimens were *free* from albumen; quantity, one pint eight ounces.

13th, 14th.—Urine passed six times. Natural in appearance, and free from albumen; sp. gr. 1015 to 1025; quantity, two pints eight ounces.

14th, 15th.—Urine passed six times. Clear, free from albumen; sp. gr. 1011 to 1023; quantity, two pints sixteen ounces.

15th, 16th.—Urine passed six times. Natural; sp. gr. 1017 to 1024.

16th, 17th.—Urine passed six times. Natural ; sp. gr. 1017 to 1026.

17th, 18th.—Urine passed six times. Natural ; sp. gr. 1022.

18th, 19th.—Urine passed six times. Natural ; sp. gr. 1020.

19th, 20th.—Urine passed six times ; sp. gr. 1021. There was a deposit of lithic acid in one specimen.

20th, 21st.—Urine passed six times. Natural ; lithic acid in one specimen.

From this time up to the date of the patient's discharge the examination of the urine was not conducted regularly, as before ; the general appearance of the urine was, however, noted daily, and the secretion was tested almost every day for albumen. On all occasions the urine was clear, natural in appearance, and free from albumen. On several occasions there was a deposit of lithic-acid crystals, but these disappeared as soon as the gallic acid which the patient was taking was omitted. The patient left the hospital on December 17th, 1861, the urine having been perfectly healthy for the period of five weeks.

The following is an analysis of the urine, as furnished me by Dr. Baker Edwards, of this town. The analysis was made soon after the patient's admission into the hospital, and before any change had taken place in the general characters of the urine.

Sp. gr. 1012.

Water	967·3
-----------------	-------

Solid matter, viz.—

Fat	9·9
---------------	-----

Urea	6·0
----------------	-----

Albumen, with traces of uric acid	6·0
---	-----

Vesical mucus	4·5
-------------------------	-----

Animal extractive, with a trace of ammoniacal salts	4·1
---	-----

Fixed alkaline salts	2·0
--------------------------------	-----

Earthy salts	·2
------------------------	----

32·7

1000·

The following is an analysis of healthy urine of sp. gr. 1012, as given by Simon :

Water	956.00
Solid matter	44.00
viz.—	
Urea	14.57
Uric acid	0.71
Extractive matters and animal salts	12.94
Fixed salts, 13.77. { Chloride of sodium	7.28
Earthly Alkaline salts. { Sulphate of potash	3.50
{ Phosphate of soda	2.33
{ Phosphate of lime and magnesia	0.66
Silica	a trace.

It will be seen, by a comparison of the two analyses, that in the chylous urine the following substances were largely present, viz., water, fat, albumen, mucus; and that the following constituents of the urine were deficient in quantity, viz., urea, extractive matters, the alkaline and earthy salts.

Treatment.—The following statement will serve to show the medicinal and other therapeutic means which were employed in the treatment of the case.

October 10th.—Warm bath.

12th.—Quinæ Disulph. gr. jss, Acid. S. dil. ℥x, Inf. Quassia ʒj, ter die.

13th.—Port wine, 6 ounces daily.

15th.—Wine omitted.

16th.—Quinæ Disulph. gr. ij, Ferri Sulph. gr. ij, Acid. Sulph. dil. ℥x, Inf. Quassia ʒj, ter in die.

17th.—A grain of opium, at bedtime, every night. 6 ounces sherry wine daily.

18th.—Iron and quinine omitted. Gallic acid 10 grs., three times a day.

19th.—Gallic acid increased to 36 grs. daily.

22nd. " " 45 "

24th. " " 60 "

26th. " " 75 " A vapour

bath every night.

29th.—Gallic acid increased to 90 grs. daily.

31st.—Wine and opium omitted.

November 1st.—Gallic acid increased to 120 grs. daily.

9th. " " 135 "

14th.—Vapour bath omitted.

16th.—Gallic acid diminished to 120 grs. daily.

18th. " " 90 "

19th. " " 75 "

20th. " " 60 "

21st. " " 45 "

22nd. " " 30 "

25th. " " 20 "

28th. " omitted.

He took no medicine from this date up to the time of his discharge.

The total quantity of gallic acid taken from the 18th of October to the 28th of November was 7 ounces 48 grains.

Diet.—Liberal diet was allowed during the whole of the time the patient was in the hospital, and, as will be seen from the subjoined account, he gained flesh rapidly from the moment the disease began to yield to treatment. The diet consisted of meat and potatoes, eggs, bread, arrow-root, milk, tea, and butter. From the 18th of October to the 2nd of November he took two eggs daily with his breakfast, and from November 2nd to the 30th four eggs daily with that meal. He was allowed no malt liquor, but wine was given from October 13th to the 31st. It was then stopped, and he drank nothing but toast-water in addition to his milk, tea, &c.

		WEIGHT.				
Date.					st.	lbs.
Oct. 20th. ¹ —5 p.m.	.	.	.	.	8	6
22nd.	"	.	.	.	8	7
24th.	"	.	.	.	8	10 $\frac{3}{4}$
26th.	"	.	.	.	8	13
29th.	"	.	.	.	9	5
Nov. 1st.	"	.	.	.	9	7 $\frac{1}{2}$

¹ Ten days after admission into the hospital, but five days after he came under medical treatment.

Date.				st.	lbs.
Nov. 5th.—5 p.m.	.	.	.	.	9 7
10th.	„	.	.	.	9 9 $\frac{1}{4}$
14th.	„	.	.	.	9 10
17th.	„	.	.	.	10 0
23rd.	„	.	.	.	10 1
26th.	„	.	.	.	10 4
Dec. 3rd.	„	.	.	.	10 5
7th.	„	.	.	.	10 5
11th. ¹	„	.	.	.	10 6

During the time the patient was under treatment, he was allowed to get up and go about his ward, with the exception of the period between midday of the 28th of October and midday of the 2nd of November, when he kept his bed. During the latter part of his residence in the hospital, after the urine had become quite healthy, he was allowed to go out and walk about the town almost daily. His appetite was throughout good, he complained of no pain nor any other uneasiness from the medicine he took, his bowels acted regularly, and he required no aperients. He was very thirsty as long as the disease lasted, and used to drink largely of toast-water. He was not limited in the quantity of fluid he took, but was advised to drink moderately.

The following observations were made with reference to the general characters of the urine at different periods of the day. It was most milky soon after food, and thinnest and most whey-like early in the morning before breakfast.

The longest periods after the urine had been passed at which fibrinous clots were found in it undissolved were on the following days, viz.—

October 13th.—There was a clot 17 hours after the urine had been passed.

16th.	„	16 $\frac{1}{2}$	„
18th.	„	19	„
19th.	„	24	„
25th.	„	19	„
22nd.	„	19	„

¹ A week before his discharge.

Pathology. What is the pathological condition of the kidneys, or of the system at large, under which this disease occurs? Our knowledge on this point is very imperfect; that there is no organic affection of the kidneys seems to be proved by the case recorded by Dr. Prout of a patient who died of some other disease whilst suffering from chylous urine, and in whom the kidneys were found, to all appearance, perfectly healthy.

Two views have been more specially entertained of the proximate cause of the disease. The first, that the cause lies partly in the assimilating organs and partly in the kidneys; the second, that the disease is the result of congestion of the kidneys. The first of these views was entertained by Dr. Prout, the second has been advanced by Dr. Bence Jones. I must refer my hearers to the works of the physicians I have quoted for a detail of their opinions, as any lengthened consideration of the arguments which have been adduced in favour of one or the other theory would here be out of place. I may remark, however, that, as far as I have been able to form an opinion of the nature of the disease from the observation of the single case I have recorded, I have been led to entertain the view which I refer to below. I was at one time disposed to consider, not only that there was an abnormal condition of the kidneys in the affection, but also that there was some fault in the assimilative processes of the body; but seeing the manner in which the disease was influenced by the therapeutic means, more especially the powerful astringent, employed, I have come to the conclusion that the affection is one in which the main pathological feature is *a relaxed condition of the capillaries of the kidneys*; that, as a consequence of this condition, the albumen, the fibrine, the fat and the blood-corpuscles are filtered from the blood-vessels, and make their appearance in the urine. The results which followed the treatment adopted in the foregoing case appear to me to bear out the conclusions at which I have arrived. The recovery was steadily progressive, and the changes which took place in the urine were of such a cha-

racter as might be fairly anticipated from the action of an astringent on the capillaries of the kidneys. The effects of the treatment were—first, to diminish the quantity of blood-corpuscles, and subsequently to cause them to disappear; secondly, to decrease the amount of fibrine, fat, and albumen; and lastly, to bring about the entire removal of those substances, so as to leave the urine perfectly healthy.

Such are the changes which actually occurred in the progress of the case, and such, I may repeat, are the changes we might expect would follow as the result of the action of a powerful astringent on the relaxed capillary blood-vessels. The absence of constitutional disturbance, except that of general weakness, and of all those symptoms some of which are so constantly associated with organic disease or even congestion of the kidneys, appears to me to indicate that no structural disease was present, a view which is strengthened by the fact that the urine returned to its natural state, and continued so as long as the patient was under observation. It is true that the patient was not under notice for any lengthened period, and, knowing the tendency which exists for the affection to return, we may fear that the cure in this case may not be permanent. At all events, however, the results show the value of the medicine that was used and its power of controlling the affection, and should encourage us to make a trial of the remedy in all cases that may come under our care. Further, if we wish to derive from the gallic acid its full therapeutic value, we must not be content to administer it in small quantities, but must give it in large and gradually increasing doses. At the same time I believe that, in the case I have reported, the persistent use of the vapour bath had a decidedly beneficial effect, and I should recommend its adoption in all future cases.

APPENDIX.

On the 8th of April, 1862, nearly four months from the date of his discharge, the patient presented himself at the hospital. On leaving the hospital in December he went as a sailor to New York, and at the date given above had just returned with his ship. He had continued in good health, and the urine, he said, had not become milky again. He looked well, complained of nothing, and was quite stout. He passed some urine, which was clear, free from albumen, and had a sp. gr. of 1022.