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PART I.
ORIGINAL COMMUNICATIONS.

ART. IX.—*Contributions to the Volumetric Analysis of Urine.*
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I. *The method employed.*—The urine has been carefully collected for twenty-four hours, and its quantity measured, except when some accident has happened, and it has been necessary to estimate the entire quantity; these cases are noted as “estimated.” In observations on his own person the writer has collected from half-past seven each morning to the same hour the next morning. The mode of living has been as regular as possible, but not restricted:—Breakfast at eight—coffee, bread, and an egg; dinner at two—mixed; tea at seven—tea, bread, and an egg; not much walking, but generally from three to six hours spent each day on an open car; sleep, from seven to eight hours.

The analyses have been performed according to the directions given in the treatise of Neubauer and Vogel. French weights and measures have been exclusively employed, for one reason—because calculation is so much simplified; and for another—the

French system is used by most observers, and therefore observations recorded according to it are more readily compared with others. It is a matter of no moment to the reader what system is used by any observer, as the value of the observations is entirely relative. The student learns nothing by being informed that on a certain day a patient passed 50 grains of sulphuric acid in his urine, although he knows that 480 grains make an ounce. But he has learned something if he has been informed that a patient passed 3.5 grammes of sulphuric acid a-day during an attack of rheumatic fever, and only 2 grammes a-day after his health was re-established, although he does not know how many grammes go to an ounce. In every case it is the *relative*, not the *actual*, quantity of the urine and its constituents which is of importance. It has been found a great saving of time to measure off half the amount of urine to be analyzed, and to add the test, first in quantities of CC 2.5, till the point of saturation has been passed; then to add the other half of the measured quantity of urine, and let the test fluid flow in until it is within CC 5 of the point of saturation; after that to add it in single centimètres until exact saturation has been obtained—*e.g.*, CC 15 of the mixture of baryta solution and urine is the usual quantity operated on in determining the amount of urea. Take CC 7.5 first, and add the mercury solution in quantities of CC 2.5. Suppose that CC 12.5 is found to be too little, and CC 15 too much. Add the other CC 7.5 of the urine mixture, and at once let CC 25 of the mercury solution flow in. Five testings more, adding CC 1 each time, are the most that can be required. Following this plan, the amount of urea can be determined to within 0.5 gme., or, at most, 1 gme., the sulphates and phosphates to within 0.05 gme.; and, after some practice, the amounts of the urea, SO_3 and PO_5 , can be determined in about an hour.

The writer has tried a variety of arrangements in estimating the quantity of SO_3 and PO_5 . For the former he finds the quickest way to be to heat the urine in a flask to 212° , and to add the chloride of barium solution; then to filter a little into two small test-tubes of equal size, and to add a drop of the barium solution to the one, and of the sulphate of potash solution to the other—repeating the test, after fresh additions of the fluid in the burette, until equal cloudiness is produced in both portions of the filtered urine. The student will find it a most troublesome analysis for a long time; but after awhile he will have learnt, from the amount of cloudiness in the test-tube, how much more of the chloride of

barium solution he ought to add; and three or four testings will probably bring him to the point of saturation. Uranic oxide solution should always be employed in testing for PO_5 ; and the nitrate is preferable to the acetate, as there is less trouble in preparing it. The uranic oxide is dissolved in the smallest quantity of dilute nitric acid that will take it up, and the solution diluted to a proper strength, exactly as Neubauer directs to be done with the acetate. The carbonate of soda uranic oxide can be used for making the solution; this is an oxide precipitated by carbonate of soda, and retaining some of the precipitant; it effervesces with acids; about 30 gmes. of it are required to make a litre of test solution.

II. *The objects kept in view.*—Little advantage would be gained by observations made at random; the work of Dr. Parkes on the urine has, therefore, been taken as a basis, and those points have been fixed on for study in which information was found to be deficient. The observations in this paper were intended to bear on the following points:—

1. The daily variations in the constituents of the urine in health, during a considerable period.
2. The alterations in their quantity, arising from taking various medicinal substances into the system.
3. The alterations in their quantity, arising from the presence of disease.

This last, as it is the most important to practical medicine, so is it also the most difficult subject of research. It is in many cases impossible to ascertain the normal amount of excretion in the individual, and it is difficult to ascertain how far a change in the amount excreted is due to altered conditions of diet and exercise, and how much to the disease itself. Finally, the observations hitherto recorded are so meagre in detail—no notes being given of the patient's weight or diet, and, especially, the per centage amount of the urinary constituents being only given, and not their amount in twenty-four hours—that it is impossible to use them for comparison with cases more carefully recorded. The cases reported in this paper are not put forward with a view to support any theory, but are trustworthy records, so far as they go, of certain diseased states, and the amount of urinary constituents found in them. Any sound theory can only be formed by a generalization from a large

number of such records. Those only who have tried it know the difficulty that exists in preparing careful records of cases, especially in private practice. It is impossible to pick out more than a very few cases in the course of many months; it is, therefore an investigation in which many ought to be employed, that so a mass of reliable material may be collected for the use of those who have time and ability to arrange and generalize it.

III. *Results*.—In treating of these it will be necessary to unite the first and second of the objects kept in view in the observations into one section. The reason of this is, that the author was not aware that the action of the substances he was experimenting on continued so long perceptible after one or two doses of them had been taken into the system; and at first he took successive doses too close on each other for the urinary constituents to return to their normal condition. The first five and the last four observations in the table were made at times when the system was certainly free from the action of any drug. The following are the results:—

	Urea Grammes		SO ₃ Grammes
Highest—March 12, . . .	39·8	June 2, . . .	2·772
Lowest—June 3, . . .	32·5	March 11, . . .	2·367
Mean of the 9 observations,	35·75	2·613

The mean quantity of phosphoric acid for the first five days during which observations were made on it was 2·308, and for the remaining fourteen days, during which medicinal substances were taken, it was 2·415; or, omitting two observations which were exceptionally high, evidently from some other cause than the action of any drug, it was 2·351. This is not a sufficient variation to found any conclusion on, especially in the case of phosphoric acid, which is liable to vary much with the quantity and quality of the food which is taken.

The observations on the action of the bicarbonate and the chlorate of potash lead to interesting results:—

1. The urinary water was increased after the first dose, generally to a considerable amount; a second or third dose did not keep up the diuresis. On one occasion (6th April) the water was less than usual, but there was some purging.

2. The urea was, in almost all cases, increased on the first dose of the medicine being taken. The mean of March 16th, 24th, April 5th, 22nd, May 7th, is 39·6; or, omitting April 22nd, it is 40·6. It would appear, therefore, that the primary action of the potash is simply to wash the urea out of the system; and that if the previous excretion has been considerable, as on some days previous to the 22nd April, the increase is not so remarkable, though even on that day there was an increase of more than four grammes above the previous day. After the surplus urea has thus been excreted the quantity generally falls for a day or two, as is seen on April 8th, which is the lowest in the whole table, although 2·5 gmes. of chlorate were taken that morning. Other instances of the same thing can be seen. There seems, next, to have been a secondary increased formation of urea from increased metamorphosis, which rapidly brought up the excretion to the mean, or even above it. This is not well seen in the first part of the table, because the successive doses were taken too close on one another; but in the latter part, where the intervals are wider, the numbers are such as to afford a strong presumption of the correctness of the supposition. The circumstance that the amounts of urinary ingredients have a tendency to run in cycles of a week or ten days makes it always a matter of doubt in how far an increased quantity is a co-incidence with, or a consequence of, any given state.

3. Even after giving its full weight to the remark just made, the presumption seems very strong, indeed, that the sulphuric acid is decidedly increased by the potash, particularly by the chlorate. It will be observed that a day or two after the ingestion of the potash there is a very marked increase in the quantity of SO_3 , and this increased elimination continues for several days, being generally higher than the highest normal amount noted, and also higher than the highest mean amount recorded by Parkes. The observation on the 14th May is remarkable; it is the highest recorded—3·195 gmes. Was it due to the continued action of the potash? or was it due to an accidentally lessened excretion on the previous two days, being followed by an excessive excretion on the third? In Case I., where the chlorate was administered in considerable quantity, the effect on the SO_3 must be considered very doubtful. Still the evidence, such as it is, which is afforded by this case is in favour of the increase of the acid by the action of the potash.

On the whole, therefore, these observations tend to confirm the conclusions come to by Parkes relative to the effect of liquor

potassæ and nitrate of potash on the tissues, and make it probable that the potash compounds generally have a similar action.

IV. *Effect of disease on the urinary constituents.*—It is natural to expect that if disease either retards or increases metamorphosis of tissue the result should appear in the altered quantity of urinary constituents. There are, however, a number of modifying circumstances which make it anything but easy to determine what the absolute effect of any disease is; for, in the first place, the mere presence of disease greatly alters the quantity of matters assimilated, and therefore, as a consequence, the quantity excreted; and, in the next place, there are no means of determining with certainty whether diminished excretion is due to diminished production of the ingredient, or to its being retained in the system, or got rid of some other way. In illustration of this, reference may be made to Cases I., II., and IV.; they are all characterized by a remarkable diminution of the constituents of the urine. In No. I. there seems little doubt that the increased severity of the head symptoms and the diminution of urea were somehow connected together; but which was the cause of the other? On review of the whole case, and taking into account the effects of treatment—observing that no measures intended directly to affect the increase of the urea produced any benefit, whereas a mild mercurial treatment appeared to benefit the head, and was followed by an increase of the urea—one is inclined to think that an altered state of the brain produced an altered state of metamorphosis. If this supposition be correct, it would account also for the diminution in the sulphates and phosphates. Case II. could be similarly explained. On the other hand, No. III. presents a case of very marked head affection, in which, taking into account the age, weight, and amount of nutriment, the urea SO_3 and PO_5 are above the normal amount. A mere per centage analysis would have made this a most telling case in favour of the theory that disease of the nervous system produced increase in the PO_5 , as it amounted to about three and a half per thousand; but even the excretion in twenty-four hours is larger than might have been expected, if diminished nervous action in all cases diminished metamorphosis. In Case IV. it was the excessive diminution in the urinary ingredients which led the author to consider the case of a very serious nature, at a time when the general symptoms were slight and obscure; and it is no doubt a good general rule to give a very guarded prognosis whenever

there is long-continued and marked diminution in the amount of secreted solids.

It has become the practice with some to give phosphates in cases of disease of nervous tissue, and the plan was followed at the commencement of the treatment of Case I. Farther reflection, however, led to giving up the practice. If the phosphates are wanting in the urine it is not because they are not supplied in sufficient quantity to the system, for there is always abundance of them in the food. Either they are not assimilated at all, and are passing off some other way—in which case there is no reason to suppose that phosphate of zinc or iron would be better assimilated than the phosphorus normally present in the food—or, possibly, they are being used up in the construction of some abnormal growth, as chloride of sodium seems to be in the hepatizing lung of pneumonia, and then an additional supply of them would be positively injurious if absorbed at all. It may, however, be well doubted whether it is possible to supply phosphorus or sulphur to the tissue of either nerve or muscle by putting phosphates into the alimentary canal. It is probable that the phosphorus contained in the phosphates which are in the blood is on its way *out of*, rather than *into*, the tissues, and that it is introduced into them as an elementary part of the albuminoid components which pass into the blood as chyle. If this be true, then the administration of phosphates, with a view to their being assimilated, is useless.

The author is inclined to consider the changes in the amount of the sulphuric acid as of great interest. It is more steady in its daily amount than the phosphoric acid, and is not so liable to sudden unaccountable variations. Its amount generally bears some relation to the quantity of urea, an increase in the latter being frequently accompanied or followed, sometimes at an interval of two or three days, by an increase of the SO_3 . The action of potash in increasing its amount makes it highly probable that its variations may be in many cases taken as a measure of the amount of metamorphosis, especially if corresponding variations take place in the amount of urea.

Finally, in the present state of our knowledge, it is easier to connect changes in the amount of urinary constituents with alterations in nutrition common to the whole system than with lesions of individual organs. In other words, the volumetric analysis of the urine will not help us to diagnose what particular organ is affected—that must be determined in other ways. But it may often very

much help us in determining how far disease has penetrated among the processes of secondary nutrition, and therefore how far it is likely to touch on the springs of life.

CASE I.—Mr. H., architect, aged thirty-two; weight about fifty-five kilogrammes. He had been complaining for some months of neuralgic pains in the head, for which he had been for some time under treatment. He was first seen by the author on 7th of last January. He complained then of sickness of stomach, white tongue from epithelium, sleepiness, shooting pains in the head. He was ordered 2 grs. of mercurial pill, and 2·5 grs. of dried soda every night. He continued to get worse till the 11th, stating that his head has a bursting feel. His mind wanders; he puts in one word in place of another, and is very drowsy. His mouth became slightly affected after the third pill.

13th.—To have three grains phosphate of zinc thrice a day, and four grains of James' powder every night, and a blister to the nape; a vapour bath every night. Diet to consist largely of milk, and some meat.

16th.—Feels much better. Wandering of mind gone, puts in his words right. He has no acute pain in the head, but a heavy pain across the vertex and back of the head.

21st.—Feels better and stronger; no wandering; tongue almost free from its coating of effete epithelium. Complained for a day or two of pain in the loins, for which he was rubbed with croton oil. The pain is now gone. He has little shooting pain in the head, but has dull pain across the forehead. Sleeps less in the day and better at night. The appetite is better. The urine has an indescribable sickening smell, is pale and opalescent. Albumen, a trace. The vapour baths, zinc, and James' powder, are continued.

February 2nd.—Continues better; urine pale, greenish, and generates vibriones when it has stood for some time. Discontinued medicine.

10th.—Appetite not so good for some days. Occasional forgetfulness. Drowsy, and sleeps a good deal in the day; bowels regular; pulse 96. Infusion of gentian.

13th.—Much as when last reported; urine slightly albuminous. A weak solution of sulphate of copper produces a precipitate. When this is re-dissolved by liq. potass, and boiled, the urine becomes brown, but not violet. Twenty drops of dilute nitric acid thrice a day.

March 5th.—Since last report tried tincture of the muriate of iron, with quassia, but it made his appetite worse; so he got carbonate of iron instead. He could sleep to any amount; appetite worse on some days than others: occasional weight in the head; appetite bad; puffiness under the eyelids; bowels regular; pulse 96.

23rd.—Decidedly worse; memory bad, and occasional wandering; great drowsiness. Other symptoms as before. He has been taking Griffith's iron mixture, and is to continue it, and take 5 grains of iodide of potassium with each dose.

26th.—Much worse; mind wanders; and he sleeps all day long; tongue covered thickly with white epithelium; pulse 96. Discontinue iron; continue iodide, and take 2 grs. blue pill and 2·5 grs. colocynth pill every night.

27th.—Wandering less. Urine becomes pink on the addition of nitric acid.

29th.—Much wandering yesterday and to-day; twitching of the hands; slept all the morning; 30 grains chlorate of potash twice a-day. Continue blue pill and colocynth.

30th.—Twitching gone.

He now went to Dublin, and remained about a week, taking no medicine. He returned, better, on the 11th April. On the 15th he began taking 30 grains of chlorate of potash every morning, and on the 23rd as much more in the afternoon.

3rd May.—Has been gradually getting worse since last report. Vision is double, and tongue loaded with epithelium. As no result had followed from the chlorate, and he was evidently getting into the same state as that reported on April 26, *et seq.*; it was changed to the iodide of potass. He was put on mercurial pill and dried soda as at the beginning of his treatment; and a constant blister was opened on his neck.

9th.—He is already better. Double vision gone; less confusion and drowsiness; appetite better; tongue comparatively clean.

From this time he continued to improve, the head symptoms being much less, except that he had some numbness and pricking in the right hand, and some unsteadiness in his gait. He was sent to the sea side on the 17th May, and is reported to be progressing favourably. He was continuing the iodide, and afterwards the bromide, of potassium, and the two-grain doses of mercurial pill, no effect being produced on the gums.

Analysis of Urine in Case I.^a

Date	Urine C.C.	Urea Gmes.	SO ₃ Gmes.	PO ₅ Gmes.†	NaCl Gmes.	
Jan. 13,	1,050	24.15	1.281	1.470	2.100?	Taking mercurial pill and soda.
„ 15,	980	20.58	0.980	0.980	4.900?	Taking phosphate of zinc and James' powder. Getting worse.
„ 19 & 20,	2,485	37.27	—	1.668	12.42	Getting better, and continuing medicine.
„ 31, & } Feb. 1, }	2,275	35.81	—	2.275	7.892	Continuing better.
„ 12,	2,275	34.12	1.706	1.896	9.100	Rather worse. Infusion of gentian.
„ 19,	1,680	27.72	1.596	2.016	6.720	Do. Nitric acid.
March 6,	2,000	34.00	1.500	2.000	—	Much as before.
„ —	2,100	31.50	1.260	—	—	Decidedly worse. Iron; iodide potass.
„ 27,	1,460	23.36	1.168	1.533	7.300	Worse, and tongue coating. Mercurial pill. Iodide.
„ 29,	—	—	—	—	—	Urea, &c., estimated same amount as 27th. Twitching. Chlorate of potash.
„ 30,	990	15.84	0.841	1.039	—	Rather better, and twitching gone.
„ 31,	1,350	21.60	1.135	1.485	6.75	Ibid.
April 13,	2,100	31.50	1.890	1.995	—	Much better.
„ 14,	2,000	30.00	1.900	1.500	—	Ibid.
„ 19,	1,630	24.45	1.500	1.467	—	Chlorate of potash since 15th; thirty grains a day.
„ 24,	2,070	31.05	1.811	1.552	—	Do. 60 grains a day. A change for the worse on the 23rd.
„ 29,	1,435	22.96	1.509	1.435	—	Getting worse.
May 6,	1,400	22.40	1.400	—	—	At the worst, and beginning mercurial pill.
„ 16,	1,870	29.92	1.916	1.855	—	Much improved.
Aug. 26,	1,550	24.80	1.860	1.627	—	Has returned from the sea, very much better.

^a The urine was more or less albuminous every time it was examined. On one occasion, when it seemed considerable, it was collected and weighed; the amount passed in twenty-four hours was 1.18 grammes. The presence of albumen is apt to interfere with the determination on the NaCl.

CASE II.—T. B.; age forty-five; weight, fifty-one kilogrammes; labouring man. He has been ill seven weeks, during which time he has suffered from severe pain in the right side of the head. He has had vomiting of food for the last three weeks. At present, 16th April, he complains of numbness of the right side of the face. He is deaf in the right ear; squints inwards with the right eye, and sees double; bowels constipated; appetite bad, and food rejected as soon as swallowed; tongue furred; pulse 93.

21st.—Put a seton in the nape. To have milk diet exclusively, and five grains iodide of potash thrice a day.

25th.—He is much better. Tongue cleaning; pain less; milk retained by the stomach; bowels regular without medicine.

May 28th.—He went to his home a day or two after the last report, and gained flesh. He is now stronger, but the numbness in the face continues. The double vision and the deafness, and the pains in the head, have returned lately. Appetite pretty good, and no vomiting; bowels regular; seton discharging; pulse 84. The urine is milky-looking, and the colouring matter very deficient. The milkiness is due to small granules, but whether they were introduced from without or not is unknown. To have iodide of potassium, blue pill, and dried soda.

17th June.—Is free from pain in the head, but the squint, double vision, &c., continue. His appetite is better.

Analysis in Case II.

Date	Urine C.C.	Urea Gmes.	SO ₃ Gmes.	PO ₅ Gmes.	
April 17,	885	14·16	0·903	1·150	High coloured; slightly albuminous.
„ 19,	600	9·60	0·780	0·660	Do. do.
„ 20,	800	12·00	—	0·760	Do. do.
„ 26,	850	10·62	—	—	Do. do.
„ 28,	1,270	12·06	0·952	0·307	Do. do.
May 28,	1,820	29·10	1·638	1·092	Very pale; rather more albuminous.

CASE III.—Mrs. G., aged seventy-one; weight, 55–60 kils. She was first seen on the 9th May. She had been complaining, for about a month, of shortness of breath on going up stairs, and had slight swelling of the feet. The pulse was 31, regular, and moderately full. Next morning the chest was carefully examined.

The heart's impulse was imperceptible, the sounds almost inaudible, no murmur; pulse, 29. Shortly after the examination she got an attack of screaming and panting, for which she had ammonia and brandy, and a sinapism over the heart; the attack went off in about twenty minutes. The tongue was loaded with white epithelium, and she complained of fulness of the stomach; bowels confined. She remained quiet all that day and night. On the 11th she suddenly again got an attack of screaming; she appeared to be insensible; the body was twisted convulsively backwards, and with each jerk a cry was uttered as in opisthotonos; the breathing was rapid, pulse more frequent, and the heart throbbed strongly; she could not swallow; turpentine was applied to the epigastrium. This state continued for nearly an hour. Cold water was then poured on the head, upon which the fit at once ceased and consciousness returned. She then got a turpentine enema; 10 grains of calomel were placed on her tongue; and she got 2·5 grains of James' powder and 2 grains of calomel thrice a-day. She remained free from any attack during the succeeding days, the pulse varying from 30 to 40, sometimes irregular; the bowels were relieved twice or thrice a-day; the dejections copious, semi-solid, light grey. She slept a good deal, but was restless; did not care for nutriment, but took about a pint of milk in the twenty-four hours. The tongue remained coated with epithelium. The calomel and James' powder were continued till the mouth was slightly affected; bicarbonate of potash was then given; a blister was opened on the vertex.

On the 20th she seemed going on well; but suddenly, without any cry or warning, she became insensible, with stertorous breathing; the pupils at first contracted, afterwards dilated, and hardly affected by light. She remained in this state about seven hours, when she became again conscious, but gradually sank, the pulse failing at the wrist, the extremities becoming cold, and consciousness remaining nearly to the last. She died early on the morning of the 21st. The urine was high-coloured and acid; it contained uroxanthin, and was slightly albuminous.

	Urine	Urea	PO ₅	SO ₃	NaCl
16th, . . .	CC 530	21·70	1·855	1·643	0·53
19th, . . .	485	16·97	1·214	1·115	—

CASE IV.—H., sergeant-major,* aged thirty-seven, tall and spare;

* The author is indebted to the courtesy of Dr. Jameson for an opportunity of reporting this case, and for a copy of the report of the autopsy.

weighed 77 kils. before his illness, but is now considerably emaciated (May 1st). He states that, for about a year, he has been suffering more or less from pain in the back; about three months ago, when going down stairs, he got a sudden attack of severe pain in the groin; it was relieved after some time, but he is now again suffering from it. It shoots down into the testicle; there is no hernia; pulse is frequent; there is loss of appetite; no sleep at night, but cold perspirations; the urine is high-coloured, and deposits a red sediment.

	Urine	Urea	SO ₃	PO ₅
1st, . . . CC	450	10·8	·765	·662
13th, . .	750	9·0	·375	·362—Albumen, a trace.

18th.—Is no better; the pain in the groin is worse; an obscure fulness can be perceived in the left iliac fossa; and there is dulness on percussion in the left lumbar region when he lies on his face, while percussion on the other side is clear.

28th.—He has been suffering from severe pain in the left groin and hip, shooting down into the testicle. There is great pain and tenderness in the left lumbar region, especially over the kidney; percussion is dull in the same part. When he lies on his back a slight fulness is visible in the iliac region and adjoining portion of the thigh; there is a feeling of resistance on pressing it, but percussion is clear. He does not sweat at night; appetite very bad; bowels regular; pulse 100.

Urine	Urea	SO ₃	PO ₅
CC 700	14·0	·560	·700—Albumen, a trace.

He was not again examined by the author, but Dr. Jameson reports that distinct pulsation became observable in the left lumbar region, but that no bruit was audible. When rising to wash himself, on the forenoon of June 14th, he suddenly expired.

Autopsy, twenty-six hours after death.—External appearance, spare but muscular. On opening into the abdomen both the solid and hollow viscera were found healthy. On raising the left kidney an aneurismal tumour, communicating with the aorta, and about the size of the closed fist, was observed immediately behind, and intimately connected to it and to the diaphragm. In the latter was a large opening, communicating with the adjacent pleura, which contained about a pint and a-half of dark blood, partly coagulated; there was also three-quarters of a pint in the cellular tissue behind the kidney. The left sides of the last dorsal and first lumbar

vertebræ, together with the intervening cartilage, were affected with caries. The substance of the kidneys seemed healthy. The heart was small, with much fat deposited on its surface; cavities normal, as also the semilunar valves of the aorta. Both lungs healthy.

Quantity of Urine and Urinary Constituents passed each day by the Writer of the Paper.

Date	Urine c.c.	Urea Gmes.	SO ₃ Gmes.	PO ₅ Gmes.	NaCl Gmes.	Observations
March 11	910	35.0	2.367	2.284	10.01	
" 12	1200	37.8	2.550	2.220	12.00	
" 13	1190	39.8	2.499	2.339	11.90	
" 14	1045	35.5	2.610	2.247	10.97	
" 15	1255	38.3	2.535	2.447	13.18	
" 16	1310	39.0	2.751	2.096	12.44	Took gmes. 3 of bicarbonate of potash.
" 17	1130	40.1	2.966	2.429	10.73	The same.
" 18	1080	40.5	2.700	2.214	11.34	The same.
" 19	1000	37.0	2.500	2.400	12.00	
" 20	990	36.7	2.673	2.574	9.90	
" 21-2	1000	38.5	2.775	2.700	10.00	
" 23	1090	39.8	2.943	2.834	13.62	Walked 3 miles, felt fatigued; drank more water than usual.
" 24	1560	43.7	2.808	2.418	12.86	Took gmes. 2.5 chlorate of potass.
" 25	1180	36.6	2.832	2.360	10.62	Taste of chlorate remained till 11, a.m.
" 26	1210	43.2	Mean 3.087	Mean 2.470	{ 11.49 11.12	
" 27	1390	41.5				
" 28	1060	36.0	2.650	2.279	10.07	
" 31	1070	Mean 39.6	—	Mean 2.467	Mean 12.62	
April 1	1225					
" 2	1100	35.2	Mean 2.575	2.420	—	Had pyrosis; took blue pill, 2 grs.; dried soda, 2.5 grs.; co. coloc., 2 grs.
" 3	975	34.6				The same.
" 4	900	35.1	Mean 2.646	—	—	The same. Bowels acted twice, as from medicine.
" 5	1000	39.0				2 gmes. chlor. of potash, taken in two portions, morn. & aftn.
" 6	890	35.6	Mean 2.681	—	—	The same. Some purging.
" 7	890	34.7				
" 8	830	30.7	2.365	—	—	2.5 gmes. chlorate in one morning dose.
" 9	880	34.3	Mean 3.128	—	—	
" 10	835	33.4				
" 11	965	38.6	2.991	—	—	7, a.m., 2.5 gmes. chlor. potash diluted.
" 12	835	34.2	2.505	—	—	7½, a.m., 2 gmes. chlorate of potash diluted.
" 13	910	34.6	2.411	—	—	Do., 2.5 gmes. do.

*Quantity of Urine and Urinary Constituents passed each day by the
Writer of the Paper—continued.*

Date	Urine c.c.	Urea Gmes	SO ₃ Gmes.	PO ₅ Gmes.	NaCl Gmes.	Observations
April 14	1020	36.7	3.034	—	—	
" 15	960	34.6	2.700	2.400	—	
" 16	940	36.7	3.055	—	—	
" 17	910	36.8	2.866	—	—	
" 18	1085	37.9	2.821	—	—	
" 19	1075	37.6	2.902	—	—	
" 20	950	34.2	2.517	—	—	
" 21	1015	31.5	2.385	—	—	
" 22	1190	35.7	2.737	—	—	2.5 gmes. of chlorate in the morning; same in afternoon.
" 23	875	31.5	2.966	—	—	
" 24	900	36.0	2.925	—	—	
" 25	970	39.8	2.958	—	—	
" 27	1080	37.8	3.132	—	—	
" 28	970	33.9	2.716	—	—	
" 29	1180	33.9	2.712	—	—	
" 30	1100	34.1	2.970	—	—	
May 1	1210	38.7	2.662	—	—	
" 2	1230	34.4	2.583	—	—	
" 3	1095	36.1	2.970	—	—	
" 4	970	36.9	2.813	—	—	
" 5	940	32.9	2.679	—	—	
" 6	1050	34.6	2.782	—	—	
" 7	1450	40.6	3.045	—	—	5 gmes. bicarbonate of potash in the morning.
" 8	1345	35.0	2.892	—	—	
" 9	1110	32.2	2.777	—	—	
" 10	1165	38.4	2.696	—	—	
" 11	1050	37.8	2.992	—	—	
" 12	845	33.0	2.408	—	—	
" 13	825	35.5	2.392	—	—	
" 14	900	34.2	3.195	—	—	
" 15	850	33.2	2.805	—	—	
" 16	1050	36.7	2.992	—	—	
June 2	1120	34.0	2.744	—	—	
" 3	880	32.5	2.772	—	—	
" 4	880	32.6	2.728	—	—	
" 5	930	36.3	2.700	—	—	