RESEARCHES ON GOUT.

PART I.—THE URINE IN THE DIFFERENT FORMS OF GOUT.

PART II.—THE INFLUENCE OF COLCHICUM UPON THE URINE.

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Received June 7th.—Read June 8th, 1858.

PART I.—THE URINE IN THE DIFFERENT FORMS OF GOUT.

CONSIDERABLE discrepancy of opinion at present exists with regard to the characters presented by the urine of patients labouring under the different forms of gout, and statements of a conflicting nature have been often put forward, in works devoted to the consideration of this disease. Such discrepancies have arisen, partly from the urine presenting great varieties of appearance in different subjects and at different periods, and partly, also, from the imperfect methods which have been adopted for the examination of this fluid. The errors, however, have not usually been caused by any defect in the methods of analysis,

but have arisen rather from the mode in which the estimations have been afterwards made.

In the present examination, one of my chief objects has been to give the actual results arrived at by the clinical investigation of the urine in cases of this disease, carried over a period of several years.

The points most dwelt upon are the amount of uric acid eliminated in the twenty-four hours; in some cases, the quantity of urea also; and I may here mention that the following very simple methods of examination were adopted.

Every care was taken that the entire quantity of urine passed in the twenty-four hours should be collected and measured. After the specific gravity, reaction, and other points regarding the physical characters were ascertained, a portion, usually from 10 to 20 fluid ounces, was acidulated with hydrochloric acid, by the addition of about one twentieth of its bulk of that acid, the urine having been previously filtered, and any deposit, if present, made soluble; the mixed fluids were then set aside for at least forty-eight hours, and the deposited uric acid carefully collected, washed with spirit, dried, and weighed.

The urea determinations were made either by Liebig's or by Dr. Davy's process, the same method being always employed in the examinations throughout the investigation of each case.

It should be observed that, in the uric acid determinations, the weighed quantities are always under the real, as a minute portion of uric acid is soluble in the acidulated urine. This slight error, however, does not in any way alter the deductions drawn from the results obtained.

On referring to some of the works on gout usually looked upon as of authority, it will be seen that the uric acid is often considered to be thrown out in great excess, and the facts appealed to, in support of such opinion, are the appearance of a copious deposit of urates, which not unfrequently occurs during and after an acute gouty attack; also the common phenomenon of the brick-dust sediments in the urine of gouty individuals; and lastly, the occasional

alternation of nephritic gravel and gout, and the liability to the occurrence of gout and calculus in the same patient.

In speaking of the constitutional symptoms of gout, the late Sir C. Scudamore, in his treatise, remarks: "The urine is of a deeper colour than natural, is secreted scantily with relation to the quantity of the patient's drink, and, on cooling, deposits a pink or brick-dust sediment, with much mucus. Its specific gravity is much increased beyond the healthy standard. During the most urgent symptoms of the paroxysm it is usually passed with considerable irritation, both as to frequency and sense of heat. The pink or lateritious sediment appears, more or less, in every portion of the urine during the inflammatory symptoms." This description of the urine is intended to apply to the genuine acute affection, and in patients not suffering from the chronic forms of the disease. In another part of the same work, we find it remarked: "It is very commonly found, upon inquiry, that the patient has noticed a very deficient secretion of urine a short time before the occurrence of the paroxysm, and consequently it has been of a deeper colour than natural. It also now and then certainly occurs that, for a day or two before the fit, the urine is passed copiously, and of a pale colour; but this seldom happens, except in persons of the nervous temperament, and whose constitutions have been much weakened by gout." And again: "A deposition of pink or brick-dust sediment, on the cooling of the urine, is of such ordinary occurrence when any active symptoms of gout are present, that its connexion becomes forcibly impressed on the mind of the patient, and he gives it the name of gouty urine." These statements agree, in the main, with those of other writers who have noticed the condition of this fluid; but, on the other hand, it must be observed that the same author further asserts: "In several examples of chalk stones, both in the hands and feet, I have found, by repeated experiments, a deficiency, and sometimes almost total absence of uric acid in the urine. I must add, however, that even in patients of this class, during the paroxysm, this principle has existed in the

urine in considerable quantity, and in some cases to the extent of a copious deposit of pink sediment."

These statements of Sir C. Scudamore, as to the physical appearances of the urine in different forms of gout, are, I believe, essentially correct; and it will be seen, from the present communication, that the results now arrived at in no way militate against them; they will, however, prove, as before stated, that the deductions which have usually been drawn are in a great measure erroneous.

I shall divide the cases of gout, in which the examinations have been made, into three classes.

1st Class.—Cases of acute gout occurring in patients, most of whom, in the intervals of the attacks, enjoyed pretty good health. I may here remark the great difficulty of procuring cases of this kind in hospital practice. In the first place, but few, suffering from a simple attack, enter such institutions; and, among the labouring classes, there is a greater tendency for the disease to assume, at an early period, a chronic and asthenic character, than in the higher walks of life—a fact doubtless much depending upon the different modes of living in the two classes. This renders the examinations of the urine, in the acute disease, less numerous and satisfactory than those made in chronic forms of the affection; and it still remains an interesting point to determine the exact condition of the urinary secretion in genuine acute and sthenic gout occurring among the higher classes of society. The difficulty of such an investigation, when the analysis of the twenty-four hours' urine is desired, is by no means small.

2d Class.—Cases of chronic gout occurring in patients, the majority of whom were not suffering from any very urgent symptoms, but many were afflicted with some of the sequelæ of the affection, as shown by the concretions of urate of soda upon different parts of the body, and the stiffened condition of the joints.

3d Class.—Cases of individuals, hospital or private patients, who were free from all symptoms of the disease when the examinations were made, and who, at the same time, were not troubled with any of the sequelæ so commonly found after repeated attacks of gout.

CLASS I.—Urine of subjects suffering from Acute Gout, but in whom the general health had been pretty good during the intervals of the paroxysms.

Besides the great difficulty already alluded to in procuring the urine of the whole day in private practice, many little circumstances are likely to occur which interfere so much with the results as not to allow of the analysis being depended upon; and, as before observed, in hospital practice, where the investigations can be so much more readily carried out, the number of these cases is limited, patients seldom applying for admission to such institutions till the disease is advanced, and has assumed more or less of a chronic character.

The examinations of the urine in this class are thirty-two in number, and in seven different individuals.

CASE 1.—W. R—, male, æt. 32; suffering from acute gout of right foot and ankle, likewise of some of the smaller joints of hands, and accompanied with much febrile disturbance of system, and redness, swelling, and pain of affected parts. In the first attack, seven years before, the balls of both great toes were specially affected. No deposit of urate of soda observed either on ears or any other part of the body.

March 24th, 1853.—Urine of twenty-four hours, 35 fluid ounces, clear, sp. gr. 1019; total quantity of uric acid in the day = 5·95 grains.

The blood of this patient was found to be rich in uric acid, and crystals were also obtained from the serum of a blister applied to the knee. No medicines administered at the time.

CASE 2.—W. B—, male, æt. 46; acute gout, with inflammation of ball of great toe; no deposits of urate of soda; taking no medicine at the time of examination of urine; had no meat, and fish only during the last two days.

February 20th, 1853.—Urine of twenty-four hours, 42 fluid ounces; sp. gr. 1012·5, acid; uric acid in twenty-four hours = 0·84 grain.

21st.—Urine of twenty-four hours, 46 fluid ounces; sp. gr. 1015, acid; uric acid = 1·84 grain.

22d.—Urine of twenty-four hours, 63 fluid ounces; sp. gr. 1012, acid; uric acid = 2·52 grains.

After this time, took some colchicum for a day or so, which purged somewhat. Had discontinued it before the next examination.

26th.—Urine of twenty-four hours, 18 fluid ounces; sp. gr. 1023, acid; uric acid = 2·30 grains.

27th.—Urine of twenty-four hours, 36 fluid ounces; sp. gr. 1015, acid; uric acid = 2·76 grains.

From the 20th till the 22d the symptoms gradually subsided; after that time little more than tenderness of the previously affected parts remained.

The blood of this patient contained uric acid in abundance.

CASE 3.—B. F—, male, æt. 38; had suffered, during the last two years, from five or six attacks of gout, commencing in ball of great toe. No deformity of joints or deposits of urate visible in any part; the serum of blood rich in uric acid. From the 15th of January to the 19th of the same month was suffering considerably from inflammation of many large joints, besides the great toe; the urine was uninfluenced by medicines during the days the examinations were made.

January 15th.—Urine, 25 fluid ounces; sp. gr. 1012 at 60° Fahr., acid. No albumen. Uric acid eliminated in twenty-four hours = 1·30 grain.

16th.—Urine, 30 fluid ounces; sp. gr. 1010, acid; uric acid in twenty-four hours = 1·95 grain.

17th.—Urine, 26 fluid ounces; sp. gr. 1012, acid; uric acid in twenty-four hours = 2·73 grains.

18th.—Urine, 39 fluid ounces; sp. gr. 1011, acid; uric acid in twenty-four hours = 2·14 grains.

19th.—Urine, 47 fluid ounces; sp. gr. 1009, acid; uric acid in twenty-four hours = 3·05 grains.

The blood of this patient was rich in uric acid.

CASE 4.—T. C—, male, æt. 57; gouty patient; had a few nodules of urate of soda in ear; suffering, when the urine was examined, from acute gout in the great toes and several other joints, both of upper and lower extremities; blood loaded with uric acid.

May 2d, 1856.—Urine, 20 fluid ounces; sp. gr. 1024 at 60° Fahr.; turbid from urates, but clearing with moderate heat, containing a distinct trace of albumen. Uric acid excreted in twenty-four hours = 3·76 grains. Urea excreted in twenty-four hours = 320 grains.

CASE 5.—J. P—, male, æt. 46; has had several attacks of gout during last ten years; no deformities of joints produced by the disease; one small deposit of urate of soda seen on helix of one ear. Blood contains abundance of uric acid. Suffering from slight, but increasing, gouty inflammation of both ankles and some other parts. During the first three days no medicine was taken; on the fourth had commenced taking colchicum, which was continued during the fifth and sixth days; the inflammation rapidly subsided under its influence.

Feb. 15th, 1858.	—58 fl. ounces,	sp. gr. 1020,	uric acid in 24 hours =	8·12 grs.
" 16th,	" 58	" "	" "	8·12 "
" 17th,	" 43	" not determined	" "	3·44 "
" 18th,	" 50	" "	" "	4·00 "
" 19th,	" 59	" "	" "	2·95 "
" 20th,	" 42	" "	" "	0·17 "

No albumen in urine, acid in reaction.

CASE 6.—T. D. M—, a male patient, about 50 years of age; gout of more than twenty years' standing; tophi of urate

of soda in ears, and many joints affected with chalk-like deposits around them. When the urine was first examined, January 8th, 1853, many joints were red and swollen from acute gout. The note of that day was as follows: swelling, heat, redness and tenderness of dorsum of right hand, and also of smaller joints of fingers, also of left wrist; considerable pitting of dorsum of hand on pressure; right knee swollen, red, and tender; left knee less affected; pulse 100, rather full and hard; skin somewhat hot and moist. January 11th, the gouty pains were almost gone; and the patient could move his joints. Pulse 72.

January 15th.—Quite free from pain. Pulse 64.

18th.—Discharged cured.

This patient was ordered, on the 8th, to take, three times a day, 20 minim doses of Vinum Colchici, ʒss of Magnesia, usta, and ℥xv of Tinctura Opii; the opium was omitted on the 11th, after the subsidence of the pain.

The blood of this patient, examined during several attacks, always contained abundance of uric acid.

The urine dated January 9th was that passed from 10 a.m. January 8th, to 10 a.m. January 9th, and so on for the other days.

Date.	Quantity of Urine.	Sp. gr.	Reaction.	Appearances.	Uric Acid in 24 hours.
1853.					
Jan. 9th.—fl. oz. 10½		1016·5 at 60° F.	. Acid	Dark claret red, no deposit.	0·5 gr.
„ 10th.	26	1014	„ . Acid	Dark red, no deposit.	1·7 „
„ 11th.	32	1013	„ . Acid	Lighter colour, clear, with uric acid deposit.	5·3 „
„ 12th.	36	1013	„ . Acid	Clear pale yellow, no deposit.	5·5 „
„ 13th.	28	1016	„ . Acid	Clear.	5·5 „
„ 14th.	14	1016·5	„ . Acid	Clear.	4·0 „
„ 15th.	18	1019·5	„ . Acid	Clear.	3·3 „
„ 16th.	18	1019	„ . Acid	Clear.	3·6 „
„ 17th.	25	1016·5	„ . Acid	Clear.	3·4 „
„ 18th.	36	1015·5	„ . Acid	Clear.	2·9 „

The same patient's urine, examined at the commence-

ment of another attack, before taking medicine, gave the following results :

Quantity, 17 fluid grains ; sp. gr. 1021, acid ; uric acid in twenty-four hours = 0.425 grain.

The patient's urine, during acute attacks of gout, gave distinct evidence of albumen, but this principle could not be discovered in the intervals.

CASE 7.—W. F—, a male patient, æt. 41 ; has had, during the last ten years, several attacks of gout ; many small deposits of urate of soda seen on the palmar surface of left index finger, but none on ears. An acute attack now passing off.

March 27th, 1858.—Urine, 24 fluid ounces ; sp. gr. 1024, acid in reaction, of an amber colour, and depositing a yellow urate sediment on cooling. Uric acid passed in the twenty-four hours = 5.20 grains. Urine gave an abundant crystallization of nitrate of urea on the addition of nitric acid.

April 8th.—Has been free from all acute symptoms for some days. Urine, 48 fluid ounces ; sp. gr. 1017, acid, clear, no deposit. Uric acid in the twenty-four hours = 1.36 grain.

From these cases it will be seen that in acute gout, as far as hospital patients are concerned, the daily excretion of uric acid is by no means necessarily increased, nay, often notably diminished ; for we can fairly take the normal average amount of uric acid at about eight grains in the twenty-four hours, although either much larger or considerably smaller quantities may be eliminated in conditions of perfect health.

In the seven cases given above the highest amount was only 8.12 grains ; the lowest, 0.425 grain ; the average of the analyses in each case being 5.95 grains, 2.05 grains, 2.58 grains, 3.76 grains, 4.46 grains, 3.28 grains, and 3.28 grains ; and the average of the analyses in all the cases, 3.62 grains. In some the urine was of a high colour, in

others turbid from urates ; and again, in certain specimens there was a deposition of crystalline uric acid ; lastly, in many cases the urine was clear and free from all deposit.

It should be remembered that the appearance of any given specimen of urine is by no means a certain criterion of the quantity of uric acid contained in it ; many urines which remain perfectly clear on cooling are richer in this acid than others which are exceedingly turbid, circumstances other than the mere amount of uric acid determining its precipitation, either in the free form or in that of a urate.

The cause of the very prevalent idea, that there is always an excess of uric acid thrown out of the system by gouty patients, and especially in the acute disease, may, I believe, be explained by the fact, that when the febrile disturbance is great, the renal secretion usually becomes scanty in quantity, its acidity is often increased, and almost the whole of the uric acid is thus rendered visible to the eye. The precipitation of the colouring matter with the uric acid increases greatly the appearance of excess.

Having now established the fact, that patients suffering from acute gout do not necessarily excrete an excessive amount of uric acid, but in fact that the reverse often occurs, it next becomes an interesting question to determine whether this defect depends on any diminution in the formation of this principle in the economy, or on its imperfect excretion by the kidneys. This point is readily settled by an examination of the blood, which was performed in every instance, and proof was afforded by such analyses that in all there existed a considerable quantity of uric acid in the serum of that fluid ; at once proving that the renal organs were unable to excrete the whole of the uric acid formed in the system : and as the elimination of this acid was shown to be under the average amount, demonstration was afforded that the kidneys had lost, at least for a time, some of their usual power. In many diseases where an abnormal formation of uric acid takes place, such as in cases of diseased spleen, liver, &c., although the production of uric acid may be greatly increased, still the kidneys retain the power of

fully eliminating it, and the blood is kept, as far as this principle is concerned, in a pure condition; such, however, as we have now seen, and as I have demonstrated in former papers published in the 'Transactions' of this Society, is not the case in gouty subjects, and during the continuance of this affection the circulating fluid is always contaminated by the presence of a large quantity of uric acid, whatever may be the amount thrown out by the kidneys. This point is one of considerable importance, and not generally fully understood, for it is frequently assumed that the appearance of a large quantity of uric acid in the urine indicates that the blood is contaminated with the same body, although, on reflection, it will be seen that such an occurrence rather favours the opposite view, for if the kidneys excrete freely, the blood has a much greater chance of being kept pure.

It will be observed, in reviewing the results obtained from the above analyses, that in acute gout the quantity of uric acid eliminated in different days is liable to much variation; as a rule, when the examinations are made in the early stages of the attacks, the excretion is small, it then gradually becomes augmented, and afterwards returns to a lesser quantity. In Case 5 the quantity was largest during the two first days that the analyses were made; but in this instance the examination was not undertaken until the disease was about to become alleviated. My present experience on the subject appears to show that, in the earlier stages of acute gout, the urine, as a rule, is small in quantity, and the uric acid, measured by the twenty-four hours' excretion, likewise diminished; that this acid is thrown out in much larger quantities as the disease is becoming mitigated, and then amounts, even far above the patient's daily average, may be passed, forming frequently the so-called critical discharges; and lastly, the acid again becomes lessened, although not to the extent which occurs either just before or at the commencement of an attack.

In one case only (of patients in this class) was the amount of urea estimated, and then 320 grains, a fair

average quantity for a patient under low diet, was found. The elimination of urea was therefore shown not to be affected, in the same degree as that of the uric acid; although from repeated experiments I have ascertained, as I first pointed out in my communication to this Society in 1848, that the blood usually contains a slight abnormal amount of this latter principle in the acute forms of the disease, a circumstance which may possibly account for œdema being so frequently an accompaniment of this form of inflammation.

Sometimes a very distinct trace of albumen is found in the urine in acute attacks of gout; such was the case with the fourth and sixth patients. I may here remark that this phenomenon is not very frequent in early gout, but when the patient's disease has assumed a more chronic form, and especially when deposits of urate of soda are found, then, during the fit, albumen in traces is of very frequent occurrence, although in the intervals not the slightest evidence of the existence of this body may be obtained.

CLASS II.—*Cases of Chronic Gout. The majority of the patients were not suffering from any very urgent symptoms at the time the analyses of their urine were made; but many were afflicted with some of the sequelæ of the affection, as shown by the concretions of urate of soda on different parts of the body, and the stiffened condition of the joints.*

In this class the examinations were made upon fourteen different patients, and the results of more than sixty analyses are given.

CASE 1.—J. H—, male, æt. 45; a sufferer from gout for fourteen years; has a deposit of urate of soda in one ear, but the joints are not deformed. At the time the urine was examined he was suffering in feet and ankles, also in right knee; no medicine was administered; the blood was rich in uric acid.

March 30th, 1853.—Urine, 56 fluid ounces; sp. gr. 1011;

clear, yellow; no deposit; very slight trace of albumen. Uric acid thrown out in the twenty-four hours = 5.78 grains.

CASE 2.—J. M—, æt. 85; a gentleman, having suffered from gout for fifty years, with concretions of urate of soda in many parts, and gouty abscesses of fingers, discharging chalk-like matter.

June, 1856.—Urine passed at 3 p.m., sp. gr. 1017, pale, clear; gives evidence of a small amount of albumen. Mere traces of uric acid thrown down by hydrochloric acid. Urine passed during the night, pale, sp. gr. 1018, acid; distinct traces of albumen. A few microscopic crystals of uric acid thrown down by hydrochloric acid.

CASE 3.—W. L—, æt. 61; a gentleman, much deformed in the joints of the hands and feet from large deposits of urate of soda.

May, 1857.—Urine three or four hours after dinner, sp. gr. 1015, pale yellow, acid in reaction; decidedly, though slightly, albuminous. Acidulated with hydrochloric acid, it gave only a few microscopic crystals of uric acid, not sufficient to collect and weigh.

CASE 4.—A. H—, æt. 52; gout for many years; deposits of urate of soda in both ears, but not noticed elsewhere. No active symptoms; blood rich in uric acid; urine always pale and clear.

October 22d, 1849.—Urine, 72 fluid ounces; sp. gr. 1010.

27th.—Urine, 56 fluid ounces; sp. gr. 1612 at 60° Fahr.; uric acid eliminated in twenty-four hours = 0.38 grain.

November 4th.—Urine, 52 fluid ounces; sp. gr. 1009 at 60° Fahr.; acid in reaction; uric acid in the twenty-four hours = 0.20 grain.

CASE 5.—R. H—, male, æt. 41; patient with chronic gout of several years' standing; some nodules of urate of

soda in the ears and on the palmar surfaces of one or two fingers; no active gout present when the urine was examined; blood rich in uric acid.

June, 1847.—Urine, 42 fluid ounces; sp. gr. 1015, acid, pale in colour, slightly albuminous; uric acid in twenty-four hours, only a few microscopic crystals.

This patient's urine was often examined, and with similar results.

CASE 6.—D. R—, male patient, æt. about 45, with deposits in ears and distorted hands, having suffered from gout during ten years. Urine, 65 fluid ounces; sp. gr. 1014, clear, acid; no trace of uric acid exhibited. A very small quantity of albumen contained in the urine.

CASE 7.—W. B—, æt. 52; a patient having very extensive deposits of urate of soda, in the form of chalk stones, and with considerable deformity of the joints; often suffering more or less from pain and tenderness in some of the articulations. Several examinations of urine were made at different periods; blood rich in uric acid.

September, 1848.—Urine, 50 fluid ounces; pale, acid. Uric acid obtained from the urine of twenty-four hours = 0.50 grain.

December 9th.—Urine, 36 fluid ounces; sp. gr. 1014, acid. Uric acid in twenty-four hours, a few microscopic crystals.

1849.—Urine, 60 fluid ounces. Uric acid in twenty-four hours, not sufficient to weigh.

February, 1850.—Urine, 60 fluid ounces. Uric acid in twenty-four hours, a mere trace.

This patient's urine always gave indications of the presence of a minute quantity of albumen.

CASE 8.—D. M—, a female, æt. 39, spare habit, extremely gouty, although the first attack came on but three years since. She is covered with chalk stones, which have caused the greatest deformity both of hands and feet.

1848.—Urine, quantity in twenty-hours not ascertained; pale; sp. gr. 1010; slightly albuminous; contained no trace of uric acid.

CASE 9.—W. M—, æt. 52; a patient having suffered from gout many years; considerable stiffness of joints, and deposits of urate of soda in ears and elsewhere. No active symptoms present.

March 29th, 1853.—Urine, 35 fluid ounces; sp. gr. 1016, clear, yellow; no distinct evidence of albumen. Uric acid in twenty-four hours = 2.5 grains.

At various periods this patient's urine was examined, and often gave but a mere trace of uric acid; the albumen, however, was always present. The blood, examined several times at intervals, was always found charged with the acid.

CASE 10.—W. F—, male, æt. 38; has had several attacks of gout, at first affecting ball of great toe, afterwards implicating other joints, both of lower and upper extremities. A few points of urate deposit seen on palmar surface of left index finger. At the time of examination of the urine no symptoms of active gout were present, and no medicine taken; blood rich in uric acid.

May 11th, 1854.—Urine, 33½ fluid ounces; sp. gr. 1024, acid; no deposit; no albumen. Uric acid eliminated in twenty-four hours = 1.34 grain. Urea eliminated in twenty-four hours = 306 grains.

12th.—Urine, 32 fluid ounces, acid. Uric acid in twenty-four hours = 0.76 grain. Urea in twenty-four hours = 333 grains.

13th.—Urine, 30 fluid ounces; sp. gr. 1025, acid. Uric acid in twenty-four hours, too small to weigh. Urea in twenty-four hours = 344 grains.

15th.—Urine, 39½ fluid ounces; sp. gr. 1018, acid. Uric acid in twenty-four hours, too small to weigh. Urea in twenty-four hours = 358 grains.

Nearly four years after the above date, namely, in March

and April, 1858, this patient's urine was again analysed. At the time the first examination was made the attack was just passing off. When the second analysis was performed he was free from all active symptoms.

March 28th, 1858.—Urine, 24 fluid ounces; sp. gr. 1024, acid, of an amber colour, depositing yellow urates on cooling. Uric acid in the twenty-four hours = 5·20 grains.

April 8th.—Urine, 48 fluid ounces; sp. gr. 1017, acid, giving rise to no deposit. Uric acid in the twenty-four hours = 1·36 grain.

CASE 11.—C. F—, male, æt. 38; a man subject to gout for ten years. Attacks very numerous, first few confined to foot. Has concretions of urate of soda in left ear, and also a semi-fluid collection of urate of soda in left foot; some deposits also on finger; blood rich in uric acid.

For fourteen days in January, 1854, the patient's symptoms being very chronic in character, the urine, when examined, gave the following results:

Date.	Quantity.	Sp. gr.	Reaction.	Physical Appearance.	Uric Acid in 24 hours.
Jan. 4th.—57 fl. oz.	.	1012	. Acid	. Clear	. 0·50 gr.
" 5th.—44 "	"	1013	. "	. "	. 0·05 "
" 6th.—44 "	"	1013	. "	. "	. 0·00 "
" 7th.—37 "	"	1012	. "	. "	. 0·14 "
" 8th.—46 "	"	1011	. "	. "	. 0·00 "
" 9th.—44 "	"	1011	. "	. "	. 0·00 "
" 10th.—44 "	"	1012	. "	. "	. 0·71 "
" 11th.—34 "	"	1014	. "	. "	. 0·09 "
" 12th.—61 "	"	1013	. "	. "	. 2·40 "
" 13th.—55 "	"	1012	. "	. "	. 0·00 "
" 14th.—87 "	"	1009	. "	. "	. 0·00 "
" 15th.—81 "	"	1011	. "	. "	. 0·00 "
" 16th.—73 "	"	1015	. "	. "	. 0·00 "
" 17th.—84 "	"	1014	. "	. "	. 0·00 "

The experiments on the urine were again repeated in February, as will be seen below:

February 18th, 1854.—Urine, 57 fluid ounces; sp. gr. 1012·5 at 60° Fahr., acid; no albumen. Uric acid eliminated in twenty-four hours = 1·22 grain. Urea eliminated in twenty-four hours = 411 grains.

19th.—Urine, 51 fluid ounces; sp. gr. 1014 at 60° Fahr. Uric acid in twenty-four hours = 0.71 grain. Urea in twenty-four hours = 392 grains.

20th.—Urine, 74 fluid ounces; sp. gr. 1010 at 60° Fahr. Uric acid in twenty-four hours = 0.67 grain. Urea in twenty-four hours = 356 grains.

21st.—Urine, 50 fluid ounces; sp. gr. 1015 at 60° Fahr. Uric acid in twenty-four hours = 3.650 grains. Urea in twenty-four hours = 384 grains.

When taking colchicum the urea and uric acid was examined on one day.

January 26th.—Urine, 38 fluid ounces; sp. gr. 1017 at 60° Fahr. Uric acid in twenty-four hours, no trace. Urea in twenty-four hours = 288 grains.

CASE 12.—C. F—, male, æt. 35; a patient having had several attacks of gout, and having nodules urate of soda in the ears and also around some of the joints of the fingers. No acute gouty symptoms at the time of the urinary examination, and no medicine taken; blood rich in uric acid.

Jan. 21st, 1854.—57 fl. oz., sp. gr. 1012 at 60° Fahr.	} None of these specimens gave any deposit of uric acid crystals, when treated with hydrochloric acid and allowed to remain for above 48 hours.
„ 22d, „ 51 „ „ 1013 „	
„ 23d, „ 59 „ „ 1014 „	
„ 24th, „ 59 „ „ 1013.5 „	

CASE 13.—F. P—, male, æt. 43; subject to frequent attacks of gout for eleven years; two small urate of soda deposits in ears; no active symptoms at the time; no medicine; blood contains much uric acid.

Jan. 24th, 1854.—70 fl. oz., sp. gr. 1012	} These three specimens, acidulated with hydrochloric acid, gave a mere trace of uric acid.
„ 30th, „ 52 „ „ 1011	
„ 31st, „ 58 „ „ 1011	

CASE 14.—F. P—, æt. 45; the same patient as Case 13, but the examination of the urine made at a different date,

and after recovery from a slight attack of gout; no active symptoms of the disease present, and no medicine administered.

The quantity of urine and the amount of urea were as follow :

Feb. 23d, 1856.—fl. ounces ...	.	Urea in 24 hours, 286 grs.
" 24th, "	"	" 213 "
" 25th, "	"	" 304 "
" 26th, "	"	" 299 "
" 27th, "	"	" 359 "
" 28th, "	"	" 315 "
" 29th, "	"	" 302 "
March 2d, "	"	" 312 "
" 3d, "	"	" 264 "
" 5th, "	" 63 .	" 262 "
" 6th, "	" 58 .	" 234 "
" 7th, "	" 57 .	" 287 "

On several days the urine was tested to ascertain the amount of uric acid, but only a few microscopic crystals could be detected, too small in quantity to collect and weigh. The blood was rich in uric acid.

CASE 15.—T. C—, male, æt. 57; gout of about twelve years' duration. Many large concretions of uric acid in the ears and other parts of his body; urine pale, gave a mere trace of uric acid, but a little albumen. The blood was rich in uric acid.

CASE 16.—R. W—, a male patient, æt. 53; suffered from gout for fourteen years. The first and two subsequent attacks were confined to the ball of the left great toe; other joints subsequently became affected. Has noticed deposits in his ears for about seven years. These are now very large and numerous; spots of urate of soda are also seen on the left lower eyelid. Considerable chalk-like masses exist about the hands and elbows, which are thereby much deformed and crippled.

June, 1858.—Urine passed at noon; sp. gr. 1011, distinctly albuminous; when treated with hydrochloric acid it gave no trace of uric acid.

CASE 17.—T. F—, a gentleman, æt. 64; has had gout for twenty years, at first confined to the ball of one or other great toe, and, in course of years, gradually travelling upwards; is now suffering from chronic pains and slight enlargement of some of the fingers, and one of these, on being punctured, gave exit to a creamy fluid, consisting of crystallized urate of soda; no deposits upon the cartilages of ears. Urine 80 fluid ounces, of a pale yellow colour; sp. gr. 1013; acidulated with hydrochloric acid, gave no trace of uric acid. On another occasion the urine gave a moderate deposit of uric acid.

From a review of the foregoing analyses it will be at once observed, that the diminution of the uric acid in the urine of these patients is most marked. In no case did it amount to more than 5·78 grains, and this only on one day; the next highest number representing the elimination of uric acid in grains is only 3·67, and such appeared to be a very exceptional instance, the excretion being usually even under one grain. The total average of all the analyses in this second class of cases is exceedingly low, far under a single grain per diem. Several *urea* determinations were likewise made—four in Case 10, where the quantities were found to be 306 grains, 333 grains, 344 grains, and 358 grains, giving an average of 335 grains for the daily elimination of this principle; and it will be noticed, on looking at the details of these analyses, that, although the quantity of *urea* remains nearly fixed and of about the normal amount, the uric acid is exceedingly deficient, and subject to great fluctuations, varying, in the four days, from 1·34 grain, to a quantity too small to collect and weigh. Again, in Case 11, four determinations of the *urea* give the daily average of 385 grains, with but slight differences between the mean and extremes; the quantity of uric acid during the same time exhibiting the same violent fluctuations as in Case 10, varying from 3·65 grains to 0·71 grain and from 2·4 grains to 0·0 grain in the previous month. In Case 14 twelve *urea* determinations were performed, on twelve

successive days (with one exception), and the average quantity found to be 286 grains, the extremes being 213 grains and 359 grains. On several of the above days the uric acid was sought for, but in no analysis was a sufficient quantity found to collect and accurately weigh.

From these observations, therefore, it is evident, that the function of the kidney for excreting *urea* from the blood, often remains intact in cases of chronic gout, where the power of the same organ for eliminating *uric acid* has become most seriously impaired.

An examination of these cases will also show the extreme prevalence of a small amount of albumen in the urine in chronic gout. In ten out of the seventeen cases it is asserted to be present, and it is possible that in some of the remaining seven it might have existed, as it is not always specially noted that it was absent; as a rule, the quantity of this principle is not large, but still sufficient to give a marked haziness when the fluid is boiled with the addition of nitric acid, and also a notable precipitate after the tube is allowed to remain at rest for a short time.

I may remark here that I have observed this phenomenon, in very many cases of the disease; in the present communication notice is only taken of its occurrence where quantitative examinations of the urine have been made, and these have been performed only in a small per-centage of the patients who have come under my care.

To sum up, the more common appearances and characters of the urine in chronic gout, as shown by these and other examinations, are as follow: It is usually rather light in colour, decidedly paler than the average tint of the healthy secretion, of lower density, and often increased in quantity. The amount of *urea*, except in extreme cases, about the same as in health (due account being taken of the diet of the patient at the time); the *uric acid* very much diminished, and subject to excretion in very varied quantities at different periods; and lastly, the presence of a small amount of albumen is exceedingly frequent. Deposits are not

of common occurrence in the urine of these subjects, but they occasionally occur on the cooling of the fluid, sometimes in the form of urate of soda or ammonia, at other times as the crystallized, and more or less coloured, varieties of uric acid.

CLASS III.—Urine of individuals who had suffered more or less frequently from attacks of Gout, of varying degrees of intensity, examined at the time of complete freedom from any symptoms of the disease.

CASE 1.—The first three analyses were made on the urine of a gentleman, æt. 40, rather tall and stout, subject to occasional slight attacks of gout in the great toe, but having had no other joints affected; general health very good.

January 16th, 1852.—Urine, $41\frac{1}{2}$ fluid ounces; sp.gr. 1024 at 60° Fahr.; clear, amber coloured, acid, contains no albumen, and gives rise to no deposit on cooling. Uric acid secreted in the twenty-four hours = 4.72 grains.

17th.—Urine, 43 fluid ounces; sp. gr. 1022 at 60° Fahr., and on cooling, a light pinkish-coloured deposit of urates is seen thrown down. Uric acid in twenty-four hours = 6.50 grains.

21st.—Urine, 47 fluid ounces; sp. gr. 1023, clear, amber coloured; no deposit. Uric acid in twenty-four hours = 3.85 grains.

CASE 2.—A gentleman, æt. 56, having suffered from gout many years, but with no external deposits; has often latterly had the large joints affected as well as the great toe. No symptoms present when the examination of urine was made.

February 12th.—Urine, 60 fluid ounces; sp. gr. 1014 at 60° Fahr., acid; no albumen. Uric acid thrown out in the twenty-four hours = 4.26 grains.

In this case a small blister, applied to the ball of the

great toe, which had become stiffened, yielded a fluid containing a considerable quantity of uric acid.

CASE 3.—A lady, æt. 38, of a gouty family, has suffered from an atonic form of gout for many years, but without any deformity of joints or external deposits of urate of soda. When the urine was examined no active symptoms were present, and no febrile disturbance. Urine, 42 fluid ounces; of a pale colour, no albumen; sp. gr. 1019 at 60° Fahr. Uric acid, no trace. Urea = 373 grains.

CASE 4.—J. Z. R—, a male, æt. 48; this patient has suffered from about three fits of gout, the great toe being in each attack especially affected; no deposit of urate visible in ears or any part of body. During last attack, the blood had been examined, and found rich in uric acid. At the time the examinations of the urine were made, the patient was convalescent, and free from all joint affection.

February 21st, 1854.—Urine, 58 fluid ounces; sp. gr. 1015 at 60° Fahr. Uric acid in twenty-four hours' urine = 2·93 grains.

23d.—Urine, 88 fluid ounces; sp. gr. 1010 at 60° Fahr. Uric acid thrown out during twenty-four hours = 1·23 grain. Urea in twenty-four hours = 385 grains.

24th.—Urine, 60 fluid ounces; sp. gr. 1014 at 60° Fahr. Uric acid in twenty-four hours = 1·83 grain. Urea in twenty-four hours = 335 grains.

25th.—Urine, 77 fluid ounces; sp. gr. 1011 at 60° Fahr. Uric acid in twenty-four hours = 1·69 grain. Urea in twenty-four hours = 370 grains.

27th.—Urine 64 fluid ounces; sp. gr. 1013. Uric acid in twenty-four hours = 0·19 grain. Urea in twenty-four hours = 338 grains.

During the time this patient's urine was being examined quantitatively it was clear and free from deposits, but at the time of the attack, which was very severe in character, the urine became turbid on cooling, from the deposition

of pink and red urates. No albumen was present at any time.

CASE 5.—T. B—, male, æt. 54, having no visible deposits of urate of soda in any part of body, but who has had numerous attacks of gout, with special great-toe affection; at the time of examination of the urine was free from all symptoms; had omitted medicines for some time, but had a return of symptoms a few days after the analyses were made; he was taking a moderate quantity of meat; the serum of blood was found, during the attack, to be rich in uric acid.

May 11th, 1854.—Urine, 60 fluid ounces; sp. gr. 1019, acid, clear. Uric acid in twenty-four hours, too small to collect and weigh. Urea in twenty-four hours = 372 grains.

12th.—Urine, 54 fluid ounces; sp. gr. 1017, acid. Uric acid in twenty-four hours, too small to collect and weigh. Urea in twenty-four hours = 441 grains.

13th.—Urine, 74 fluid ounces; sp. gr. 1015. Uric acid in twenty-four hours, too small to collect and weigh. Urea in twenty-four hours = 569 grains.

CASE 6.—S. N—, male, æt. 68; has suffered for many years from attacks of gout, chiefly in great toe; other joints have also been occasionally affected; at the time of examination of urine was free from all symptoms; during attack the blood had been examined, and found to contain much uric acid.

February 21st.—Urine, 55 fluid ounces; sp. gr. 1013. Uric acid eliminated in twenty-four hours = 1.93 grain. Urea eliminated in twenty-four hours = 317 grains.

22d.—Urine, 50 fluid ounces; sp. gr. 1014. Uric acid eliminated in twenty-four hours = 2.28 grains. Urea eliminated in twenty-four hours = 312 grains.

23d.—Urine, 44 fluid ounces; sp. gr. 1014. Uric acid eliminated in twenty-four hours = 1.60 grain. Urea eliminated in twenty-four hours = 275 grains.

24th.—Urine, 29 fluid ounces; sp. gr. 1016. Uric acid

eliminated in twenty-four hours = 1.48 grain. Urea eliminated in twenty-four hours = 234 grains.

25th.—Urine, 40 fluid ounces; sp. gr. 1014. Uric acid eliminated in twenty-four hours = 2.72 grains. Urea eliminated in twenty-four hours = 269 grains.

This patient had taken small doses of the acetic extract of colchicum, in the form of pill, for several days previous to the 21st, and was ordered to omit it on the 22d, on account of slight diarrhoea coming on, which continued, more or less, to the 25th. From his own statement, there was no loss of urine during this period.

It will be seen, from these analyses, that in no one of the six patients' urine did the amount of uric acid excreted in the twenty-four hours reach the quantity usually considered to be the average in health; in most it was very far below; and, from these and many other partial examinations, I am inclined to think that in individuals who have suffered frequently from gout the kidneys lose, at least to some extent, their power of readily excreting uric acid; and moreover, I am convinced, from the result of several trials, that the blood is often kept in an impure state by the presence of this principle. This is probably one cause of the extreme liability of such patients to periodic visitations of the painful malady, and also of the great difficulty of effecting a radical cure of the disease.

It is interesting, again, to observe that in these cases, as in those patients suffering from acute and chronic gout, the urea-eliminating function of the kidneys appears to remain almost if not completely intact.

PART II.—ON THE ACTION OF COLCHICUM UPON THE URINE.

Upon this subject I believe there exist in the medical profession, at the present day, opinions which are extremely erroneous and without the slightest foundation; opinions

which have arisen from the wrong interpretation of phenomena occurring in disease, from mistaking, in fact, the natural effects of the progress of a malady for the results of the administration of remedies.

That colchicum, administered in its various forms, has a most powerful influence upon the progress of gouty inflammation is, I am sure, undeniable; whether for good or evil in its ultimate effects may perhaps, be still a subject for inquiry. The fact, however, of its powerful influence being admitted, it becomes an interesting and important question to ascertain in what manner the effects are produced; and one method will be to find out, if possible, its action upon the renal secretion, that is, upon the quantity and composition of the urine.

Before, however, giving the results I have arrived at from my examinations, it may be as well to notice, in a few words, the principal views which have been held by different observers upon the action of this medicine. Certain of the effects usually attributed to this drug are easily demonstrated. When given in large quantities or in moderate doses frequently repeated, it purges, and not uncommonly produces nausea and vomiting; its influence upon the liver is also usually very readily recognised in the appearance of the fæces and of the vomited matters. It is also generally regarded as possessing a diuretic action, but this latter property, namely, to increase the renal secretion, will be found to be by no means constant or well marked.

Besides being supposed to act as a diuretic, colchicum has been thought to influence the composition of the urine. Dr. Christison found that after giving colchicum to a patient for two days, the quantity of urea was nearly doubled; that before taking the drug the urine had a specific gravity of 1020, and 2 per cent. of urea was contained in the fluid; it was also free from any urate deposit; but that during the first and second days after commencing the medicine the urines were turbid from urate of ammonia, of the densities 1033·5 and 1034, and the second specimen, on analysis, gave at least 3·5 per cent. of urea.

It appears, however, that Dr. Christison took specimens of urine for examination without regard to the quantity passed in the twenty-four hours, so that although, after the administration of the colchicum, a given sample might have been richer in uric acid and urea, still no proof was afforded that the total elimination of these principles was augmented; in fact, so far as these results indicate, they might have been decreased, as a notable diminution of the urinary secretion often occurs from the action of colchicum upon the alimentary canal. Dr. J. M'Grigor MacLagan seems to have made experiments in the same manner as Dr. Christison, and to have arrived at similar results, the analyses having been made only on specimens of urine passed at particular times, and no attempt made to show the real daily averages of these principles. Dr. Graves, on the other hand, regards the action of colchicum as tending to prevent the formation of uric acid, not as causing an increased elimination.

Professor Chelius, of Heidelberg, also made some observations, the results of which have been most extensively copied in different works; he considered that colchicum possessed the power of causing the kidneys to throw out uric acid in greatly increased quantities, so that in the course of a few days it was nearly doubled; but his observations were made upon a gouty subject and one recovering from an attack of the disease, and this, as we have already seen, must vitiate the whole of his experiments.

The following are some of the observations I have made on the action of the drug upon the urinary secretion :

CASE 1.—The first patient, W. L—, a man about 30 years of age, suffering from a slight chronic eczematous eruption, but whose general health was good, was put upon a regulated diet, and his urine carefully collected and examined.

Before taking colchicum—

Oct. 30th.	—urine 56 fl. ounces, sp. gr. 1016; uric acid 8·73 grs.
" 31st.	" 64 " " 1014 " 7·93 "
Nov. 1st.	" 88 " " 1012 " 8·09 "
" 3d.	" 66 " " 1016 " 8·18 "
Mean.....	68·5 " 8·24 "

When taking vinum colchicum—

Nov. 4th.	—urine 56 fl. ounces, sp. gr. 1015; uric acid 6·05 grs.
" 5th.	" 56 " " 1016 " 8·51 "
" 6th.	" 46 " " 1020 " 8·00 "
" 7th.	" 56 " " 1016 " 6·61 "
" 9th.	" 54 " " 1021 " 9·18 "
Mean.....	55·6 " 7·67 "

CASE 2.—The next case, C. W—, a young man, æt. 19, suffering from some chronic affection of the upper lip, but whose general health was pretty good. During the time the analyses were performed the diet remained fixed, and every precaution was taken to ensure accuracy of results.

Without medicine—

1854.

Jan. 13th.	—Urine 55 fl. oz., sp. gr. 1017; uric acid in 24 hours 7·61 grs.
" 14th.	" 28 " " 1027 " 4·48 "
" 15th.	" 30 " " 1027 " 3·00 "

Under colchicum—

Jan. 16th.	—Urine 47 fl. oz., sp. gr. 1015; uric acid in 24 hours 1·34 grs.
" 18th.	" 23 " " 1024 " 7·55 "
" 19th.	" 24 " " 1025 " 7·24 "
" 20th.	" 13 " " 1031 " 5·00 "
" 22d.	" 19 " " 1027 " 5·34 "

The colchicum was continued three times a day for two days, when purging was produced; it was then repeated night and morning only. The action of the bowels continued to be kept up by the medicine, but the urine said to be carefully preserved.

The average results before and when taking the medicine are as follow :

Without medicine.—Quantity of urine, 37·7 fluid ounces. Uric acid in twenty-four hours = 5·03 grains.

When taking colchicum.—Quantity of urine, 25·2 fluid ounces. Uric acid in twenty-four hours = 5·29 grains.

CASE 3.—B. F—, the same man as in Case 3 of Acute Gout, during an attack of acute gout, and without medicine, passed, during the five previous days, 1·30 grain, 1·95 grain, 2·73 grains, 2·14 grains, and 3·05 grains. The wine of colchicum was then administered in half-drachm doses, with calcined magnesia, three times a day, and an almost immediate and marked effect upon the joint affection was produced.

January 20th.—Urine, 43 fluid ounces ; sp. gr. 1011, acid. Uric acid eliminated in twenty-four hours = 2·58 grains.

21st.—Diarrhœa from medicine caused loss of much urine.

22d.—Urine, 35 fluid ounces ; sp. gr. 1012, acid. Uric acid in twenty-four hours = 3·32 grains.

23d.—Urine, 47 fluid ounces ; sp. gr. 1011, acid. Uric acid in twenty-four hours = 3·99 grains.

On 21st took but two doses of medicine, and on the 22d but one, then discontinued it altogether.

26th.—Urine, 74 fluid ounces ; sp. gr. 1011, acid. Uric acid in twenty-four hours = 4·07 grains.

27th.—Urine, 56 fluid ounces ; sp. gr. 1011, acid. Uric acid in twenty-four hours = 3·08 grains.

Average of uric acid in twenty-four hours before taking colchicum = 2·23 grains.

Average of uric acid in twenty-fours when taking colchicum = 3·41 grains.

CASE 4.—C. F—, a male patient, on half-extra diet, and taking Vinum Colchici in half-drachm doses, night and morning ; patient not suffering from any very active symp-

toms, but has a considerable abscess, discharging urate of soda and some pus.

Under colchicum—

Jan. 4th.	—Urine	57 fl. oz.,	sp. gr.	1012;	uric acid in 24 hours	0·56 gr.
" 5th.	"	44 "	"	1013	"	0·06 "
" 6th.	"	44 "	"	1013	"	0·00 "
" 7th.	"	37 "	"	1012	"	0·14 "
" 8th.	"	48 "	"	1011	"	0·00 "
" 9th.	"	44 "	"	1011	"	0·00 "

The diet remaining the same, *no medicine taken—*

Jan. 10th.	—Urine	44 fl. oz.,	sp. gr.	1012;	uric acid in 24 hours	0·72 gr.
" 11th.	"	34 "	"	1014	"	0·85 "
" 12th.	"	61 "	"	1013	"	2·44 "
" 13th.	"	55 "	"	1012	"	0·00 "
" 14th.	"	87 "	"	1009	"	0·00 "

Under colchicum.—Average, 45·6 fluid ounces. Uric acid in twenty-four hours = 0·13 grain.

Without medicine.—Average, 56·2 fluid ounces. Uric acid in twenty-four hours = 0·80 grain.

CASE 5.—J. L—, a male, æt. 57; has had several attacks of gout, usually a year or more elapsing between each. For the first few years the balls of the great toes only were affected, the disease afterwards extending upwards. No visible deposits of urate of soda on any part of the body.

During the time the joints were severely affected the urine was scanty, high coloured, giving rise to a red sediment of urates. When the quantitative analyses were commenced, the patient was suffering only from slight affection of the joints, and there was an absence of febrile disturbance; no medicine had been taken, and the disease appeared to be still hovering about. Blood contained abundance of uric acid.

No medicine—

February 7th, 1856.—Urine, 26·5 fluid ounces; sp. gr. 1021 at 60° Fahr., clear. Urea in twenty-four hours = 213 grains.

8th.—Urine, 28 fluid ounces ; sp. gr. 1020·5 at 60° Fahr. Urea in twenty-four hours = 199 grains. Uric acid crystals, too small in quantity to collect.

9th.—Urine, 37 fluid ounces ; sp. gr. 1019 at 60° Fahr. Urea in twenty-four hours = 259 grains. Uric acid, only a few microscopic crystals.

Under colchicum (half a fluid drachm of Vinum Colchici three times a day)—

10th.—Urine, 38 fluid ounces ; sp. gr. 1019 at 60° Fahr. Urea in twenty-four hours = 209 grains. Uric acid, not able to be collected, from the minuteness of its quantity.

11th.—Urine, 32 fluid ounces ; sp. gr. 1021 at 60° Fahr. Urea in twenty-four hours = 244 grains. Uric acid in microscopic quantities only.

12th.—Urine, 41 fluid ounces ; sp. gr. 1019 at 60° Fahr. Urea in twenty-four hours = 270 grains. Uric acid, a trace only.

13th.—Urine, 39 fluid ounces ; sp. gr. 1017·5 at 60° Fahr. Urea in twenty-four hours = 241 grains. Uric acid, a very few crystals—too few to collect.

14th.—Urine, 33 fluid ounces ; sp. gr. 1021·5 at 60° Fahr. Urea in twenty-four hours = 259 grains.

Omitted colchicum, as faintness was produced.

No medicine taken—

16th.—Urine, 30 fluid ounces ; sp. gr. 1020 at 60° Fahr. Urea in twenty-four hours = 201 grains.

19th.—Urine, 30 fluid ounces ; sp. gr. 1020 at 60° Fahr. Urea in twenty-four hours = 201 grains.

20th.—Urine, 42 fluid ounces ; sp. gr. 1017·5 at 60° Fahr. Urea in twenty-four hours = 251 grains.

21st.—Urine, 51 fluid ounces ; sp. gr. 1014·5 at 60° Fahr. Urea in twenty-four hours = 279 grains. No crystals of uric acid precipitated by the addition of hydrochloric acid.

22d.—Urine, 54 fluid ounces ; sp. gr. 1013·5 at 60° Fahr. Urea in twenty-four hours = 250 grains.

Average before medicine.—Quantity of urine in twenty-

four hours, 30·5 fluid ounces. Amount of urea, 223·6 grains.

Average during administration of colchicum.—Quantity of urine, 36·6 fluid ounces in the twenty-four hours. Amount of urea, 244·6 grains.

Average after omitting colchicum.—Quantity of urine in twenty-four hours, 41·4 fluid ounces. Amount of urea, 236·4 grains.

The quantity of uric acid, both before, during, and after the administration of the drug, was too small to collect and weigh.

CASE 6.—H. C—, a male, æt. 51; has suffered from many attacks of gout, but at the time of the examination of the urine was not labouring under any acute affection. Four days before colchicum was administered the urine gave the following results :

Nov. 25th.	—Quantity 98 fl. oz.,	sp. gr. 1008 ;	uric acid in 24 hours	1·96	grs.
" 26th.	" 72 "	" 1012	"	3·12	"
" 27th.	" 68 "	" 1014	"	2·72	"
" 28th.	" 60 "	" 1014	"	3·00	"

Under colchicum (ἡxx ter in die)—

Nov. 29th.	—Quantity 68 fl. oz.,	sp. gr. 1011 ;	uric acid in 24 hours	1·81	grs.
" 30th.	" 66 "	" 1012	"	2·20	"
Dec. 1st.	" 64 "	" 1012	"	2·13	"
" 2d.	" 72 "	" 1008	"	1·36	"

Average before medicine.—Quantity, 74·5 fluid ounces. Uric acid, 2·70 grains.

Average when taking colchicum.—Quantity, 67·5 fluid ounces. Uric acid, 1·88 grain.

The results of these observations on the action of colchicum may be thus summed up :

In Case 1, where no gouty affection existed, and no febrile disturbance was present, colchicum appeared to have the effect of slightly diminishing the quantity of urine, and also of decreasing somewhat the excretion of uric acid.

In Case 2, where the circumstances were very

similar to those in Case 1, the influence of the medicine was notably to diminish the quantity of urine, the uric acid being very slightly augmented, the increase, however, was less than a quarter of a grain per diem.

In Case 3, a gouty patient recovering from an acute attack of the disease, the uric acid was somewhat increased, but certainly not more than often occurs in individuals under the same circumstances, when no medicine has been taken.

In Case 4 both the uric acid and the quantity of urine were much less when colchicum was administered.

In Case 5, where the examinations were made both before and after the drug was given, and also during the time of its administration, the uric acid remained about the same, but in such extremely small quantities as not to be capable of being weighed; the urea was also somewhat augmented. The increase, however, formed but a small fraction of the total elimination of that principle.

The amount of urine became greater when the patient was placed under the influence of the drug, but it continued to increase still further after its omission.

In Case 6, a gouty patient, the uric acid excretion became much less in amount, and the quantity of urine decidedly smaller. In this patient, however, considerable variations were observed in these respects, irrespective of any remedies, and therefore but little stress can be laid upon the figures obtained.

Besides the results detailed under this head, I have alluded, in other parts of the present communication, to analyses of urine which must have shown somewhat the influence of colchicum upon this secretion. Thus, among the cases of acute gout, we find that the patient in Case 5, on February 19th and February 20th, was under the marked influence of the remedy, and the peculiarity of the urine consisted in its then containing a very small quantity of uric acid, compared with the amount present during the time the inflammation was severe. In Case 6 the col-

chicum was continued during the whole course of the attack, but the dose was rather small, and the patient had been long accustomed to its administration; probably, therefore, the daily alterations in the uric acid seen in his urine depended rather on the different phases of the disease than the action of the medicine. Among the cases of chronic gout, it will be seen that patient No. 11 was put under the influence of colchicum, with the *apparent* effect of diminishing the excretion both of the uric acid and urea.

From a review of the results of these observations, we must, I think, draw the following conclusions:

First. That there is no evidence that colchicum produces any of its effects upon the system by causing the kidneys to eliminate more uric acid; in fact, I believe that when continued for any length of time, the contrary rather holds good.

Secondly. That from the observations in the present communication, we cannot assert that colchicum has any influence upon the excretion of the urea or other solids of the urine.

Thirdly. That colchicum is by no means a diuretic in all cases, but, on the contrary, it often diminishes the quantity of urine, especially when it produces a marked effect upon the secretions from the alimentary canal.

As yet I have made no experiments sufficiently decisive to enable me to say whether or not colchicum produces a diminished formation of uric acid in the system.

Dr. Christison's observations would have agreed with many of my own, had I taken only a small portion of urine for examination. Thus, Case 2 might have been made to show that the uric acid was more than doubled by the remedy, although there was no increase in the daily amount excreted. I am inclined, therefore, to believe that where the uric acid has been stated to have been increased by the administration of colchicum, the circumstance has arisen from the disease having become altered in phase during the examination, as occurred probably in Chelius's case, or else that erroneous deductions have been made, from analyses of portions only of the daily urine having been performed.

APPENDIX.

The subjoined analyses, seventy-one in number, were made on the urine of a male patient, fifty-one years of age, who was admitted into the hospital, suffering from chronic bronchitis, accompanied with much difficulty of breathing. These symptoms were suddenly relieved, on the occurrence of a fit of gout in the ball of the great toe, which afterwards extended to the side of the foot and the knee. The patient became relieved by treatment, and left the hospital, but in the course of a short time was readmitted, having bronchitis and flying pains in different joints, with some tenderness of the affected parts. The examinations of the urine were commenced on his readmission. The points attended to were the quantity of urine passed each day, its specific gravity, and also the amount of uric acid eliminated in the twenty-four hours. The results will be seen to illustrate, in a forcible manner, the very irregular and somewhat intermittent way in which the kidneys, in gout, secrete the uric acid from the blood; they will also show any influence which colchicum possesses of altering the amount of the acid, and are in entire accordance with those previously arrived at in the present communication.

Date.	Quantity.	Sp. gr.	Uric Acid passed in 24 hours.	Circumstances and state of Patient.
1852.				
Nov. 25th.	—98 fl. oz.	1008	1·96 grs.	No medicine.
" 26th.	72 "	1012	3·12 "	
" 27th.	68 "	1014	2·72 "	
" 28th.	60 "	1013·5	3·00 "	Average of uric acid 2·70 gr.
" 29th.	68 "	1010	1·81 "	
" 30th.	66 "	1011·5	2·20 "	Vin. Colchici ℥xx ter in die.
Dec. 1st.	64 "	1011·5	2·13 "	
" 2d.	72 "	1007	0·36 "	Average of uric acid 1·39 gr.
" 3d.	66 "	1011	0·44 "	
" 4th.	68 "	1010	1·13 "	Vin. Colchici ℥xxx ter in die.
" 5th.	64 "	1010	0·64 "	
" 6th.	68 "	1010·5	1·70 "	
" 7th.	76 "	1010	1·77 "	
" 8th.	72 "	1010	0·48 "	
" 9th.	70 "	1011	0·47 "	Average of uric acid 1·27 gr.
" 10th.	46 "	1012	1·38 "	
" 11th.	50 "	1010·5	1·00 "	
" 12th.	47 "	1012·5	2·82 "	

Date.	Quantity.	Sp. gr.	Uric Acid passed in 24 hours.	Circumstances and state of Patient.
1852.				
Dec. 13th.	45 fl. oz.	1012	1.65 grs.	Vin Colchici 3j ter in die. Much depression and faintness was produced at last. Average of uric acid 0.92 gr.
" 14th.	37 "	1014	1.85 "	
" 15th.	57 "	1009.5	1.02 "	
" 16th.	45 "	1010	0.90 "	
" 17th.	37 "	1011.5	1.35 "	
" 18th.	54 "	1007	0.27 "	
" 19th.	46 "	1010	0.15 "	
" 20th.	57 "	1009	0.19 "	
" 21st.	51 "	1015	2.21 "	
" 22d.	66 "	1012	1.81 "	
" 23d.	49 "	1010	0.65 "	Without colchicum.
" 24th.	35 "	1013	1.75 "	
" 25th.	49 "	1011.5	2.61 "	
" 26th.	64 "	1008	0.21 "	
" 27th.	48 "	1010	0.64 "	
" 28th.	61 "	1012	1.22 "	
" 29th.	52 "	1013	0.69 "	
" 30th.	49 "	1015.5	0.41 "	
" 31st.	49 "	1012	0.49 "	
1853.				
Jan. 1st.	53 "	1015	0.18 "	Average of uric acid 2.17 gr.
" 2d.	66 "	1013.5	4.07 "	
" 3d.	70 "	1011.5	4.08 "	
" 4th.	51 "	1012	3.65 "	
" 5th.	50 "	1011	2.92 "	
" 6th.	64 "	1010	1.28 "	
" 7th.	48 "	1011.5	2.10 "	
" 8th.	56 "	1011	3.17 "	
" 9th.	55 "	1011.5	2.84 "	
" 10th.	55 "	1009	0.18 "	
" 11th.	11 "	1030	3.10 "	Vin. Colch. ʒss ter in die.
" 12th.	36 "	1015.5	3.60 "	
" 13th.	28 "	1018	2.60 "	
" 14th.	47 "	1013.5	2.04 "	
" 15th.	53 "	1011.5	3.53 "	
" 16th.	43 "	1011.5	3.30 "	
" 17th.	35 "	1014.5	5.60 "	
" 18th.	23 "	1019.5	6.20 "	
" 19th.	24 "	1022	8.60 "	
" 20th.	21 "	1022	5.70 "	
" 21st.	50 "	1012	5.00 "	Average of uric acid 3.02 gr.
" 22d.	37 "	1008	1.23 "	
" 23d.	56 "	1007.5	1.49 "	
" 24th.	45 "	1011	3.45 "	
" 25th.	52 "	1006.5	0.52 "	
" 26th.	30 "	1016	2.00 "	
" 27th.	59 "	1010.5	1.96 "	
" 28th.	57 "	1014.5	4.37 "	
" 29th.	50 "	1011	1.17 "	
" 30th.	58 "	1012	0.97 "	
" 31st.	85 "	1007	not determined	No medicine.
Feb. 1st.	45 "	1012	0.75 "	Average of uric acid 1.90 gr.
" 2d.	67 "	1012	2.46 "	
" 3d.	46 "	1012	1.69 "	

Uric Acid passed in the twenty-four hours.

Maximum of uric acid	. 8.60	grs.
Minimum of uric acid	. 0.18	„
Average	. 1.96	„
Average without colchicum	. 2.26	„
Average under colchicum	. 1.65	„

Quantity and weight of the Urine.

Average quantity of urine passed without colchicum, 51fl. oz.

Average specific gravity, 1012.5.

Average quantity of urine passed when colchicum was administered, 51fl. oz.

Average specific gravity, 1011.4.