experiments with it might strengthen or weaken the theory that uric acid is a product of deficient oxydation.

Date.	Urine.	Sp. gr.	Urea.	Uric Acid.
October 25th	38 oz. clear acid amber	1023	482	11.5
" 26th	41 " " " "	1018	447	11.0
" 27th	42 " " " "	1018	443	10.8
" 28th	30 " " " "	1029	424	12.6
" 29th	49 " " " "	1013	426	10.6
" 30th	24 " " " dark	1030	340	15.0
" 31st	30 " " " "	1021	330	lost.
Novemb. 1st	34 " " " amber	1028	345	16.6
" 2nd	30 " " " "	1030	392	13.3
" 3rd	30 " " " "	1030	447	9.6

On October 27th, after three days during which the urine was fairly normal, and no drug had been administered, at 2 P.M., just before a meal, a drachm of strong nitrous ether was taken in four ounces of water. This solution of nitrous ether was equal to three drachms of spirit of nitrous ether, B.P. At 4 P.M. a headache commenced, which was not relieved till 8 P.M. The usual amount of liquid was taken, and no extra exercise or perspiration was present to account for any diminution of urine; yet the urine, passed up to 8 A.M. on the 28th amounted to 30 ounces only, the urea being 424 grains and the uric acid 12.6 grains. On the following day, 80 minims of the same sample of nitrous ether, equal to half an ounce of spiritus etheris nitrosi B. P., was taken in divided doses, the diet and exercise as usual. The bowels were confined. The urine equalled 49 ounces, and the urea was 426 grains, the uric acid 10.6 grains. The following day, the like dose was repeated in the same way, and the urine passed equalled 24 ounces, specific gravity 1030, urea being 340 grains, uric acid 15 grains. The next day no drug was taken, and the urine was 30 ounces, of 1021 gravity, the urea being 327 grains; the uric acid was not estimated, in consequence of an accident. Again, on the 31st, with no drug or abnormality of diet or habit, the urine collection of November 1st was 34 ounces, gravity 1028, the urea 338 grains, uric acid 16.6. Bowels regular. On November 1st, again no variation; and the urine collection of the 2nd gave 30 ounces, 1030 gravity, urea 387 grains, uric acid 13.3; and that of the 3rd, 30 ounces, 1030 gravity, 447 grains urea, and 9.6 uric acid. The average of the urine of the three days on which the drug was administered shows a deficiency of urine, a decrease of urea, and an excess of uric acid to some extent, which seemed to have no cause except the medicine ingested. The amount of urine voided for the next three days, and its content of urea and uric acid, seemed to indicate some influence of the medicine continuing beyond the period of ingestion, and lasting three days. The weather was bright and frosty throughout.

Experiments with this drug were discontinued until December 10th, when the urine equalled 41 ounces, and on the 11th 31 ounces.

Date	Urine	Sp. gr.	Urea	Uric acid
December 12 ...	32 oz. clear amber	1024	409 grains	14.8 grains
" 13 ...	41 " " " pale	1019	416	19 "
" 14 ...	38 " " " "	1020	447	17 "
" 15 ...	38 " " " "	1025	406	17.6 "
" 16 ...	45 " " " "	1020	377	15.7 "
" 17 ...	45 " " " "	1023	480	15.7 "
" 18 ...	30 " " " dark	1025	431	11.6 "

On December 11th, after a period of non-medication, and during which the diet was maintained, 90 minims of the same sample of nitrous ether were taken in 3 doses. In the evening a slight headache occurred, and in the morning following an increased headache. The urine collected on December 12th amounted to 32 ounces, amber, 1024 gravity, and the urea amounted to 409 grains, the uric acid being 14.8; the liquid taken equalled 49 ounces. The weather cold and wet. On the 12th, the 90 minims of nitrous ether were repeated in the same manner; weather continuing cold and wet. There was a feeling of heat, and restlessness, and headache; but no increase of temperature; no change of water or diet was made, except onions as a vegetable at the midday meal. The collection of the boiled 13th gave 41 ounces, 1019 gravity, which yielded 416 grains urea, and uric acid 19 grains. On the 13th the doses of nitrous ether were again administered, as also on the 14th, and the amount and content of the urine collection are given in the table.

All along the nitrous ether produced a feeling of depression, and the weather had been continuously dull and depressing; the pulse was practically not affected, but in no case was there an immediate flow of urine after taking the dose; the calls to micturate were more frequent, probably owing to irritation. The 14th was the last day of the administration of nitrous ether. It had all been taken in the concentrated form, diluted with water, to avoid the administration of the spirit contained in ordinary spirit of nitrous ether, which might have confused the results, already complicated enough. It was thought advisable to cease the administration, because the

period seemed long enough, and some slight irritability of the bladder began to be felt. The results on this occasion differ greatly from those of the former, and there seemed nothing reasonably to account for any difference except the markedly different weather. When the administration ceased, the urine excreted rose to 45 ounces on the 16th and 17th, and the uric acid diminished; and on the 18th was near normal.

These two sets of experiments are evidently wanting in correspondence, and a further set is desirable. There are various points of difference not explicable, and the only points left out of doubt are (1) that nitrous ether is in no sense a diuretic by itself, nor a diaphoretic, and in this the results agree with those of Dr. Nunneley; (2) that it has a tendency to increase the amount of uric acid eliminated. If a solution of nitrous acid in water be mixed with a solution of urea at a medium temperature, a decomposition will occur, and urea and nitrous acid will be converted into water and nitrogen. Such a decomposition may go on in the body to some extent, and thus less urea may appear in the excretions; and certainly this would account for the fact that nitrous acid or nitrites have never been found in urine, although nitrates have been frequently detected after their administration.

THE PICRIC ACID TEST FOR ALBUMEN.

By GEORGE JOHNSON, M.D., F.R.S.,

Professor of Clinical Medicine, Senior Physician to King's College Hospital.

In the present communication, I propose to refer to some practical points regarding the use of picric acid as a test for albumen, to which my attention has recently been directed. Within the last week, I have been applied to by two practitioners, graduates of the University of London, for an explanation of the following difficulty, which each had met with. A specimen of urine was shown to contain albumen by heat and nitric acid; in one, the albumen was very abundant. But when picric acid solution was gently poured on the surface of the urine, in one case there was no indication of albumen, while, in the other, which contained much albumen, there was a coagulum, which was redissolved. Now, both these gentlemen have misunderstood, and therefore misapplied, my directions for detecting a very minute quantity of albumen (see BRITISH MEDICAL JOURNAL, March 9th).

It should always be borne in mind that, in testing for albumen, the picric acid must be in excess. A few drops of a saturated solution of picric acid in a highly albuminous specimen will form a coagulum, which is quickly redissolved; and this explains the fact that one of my correspondents, who poured the picric acid solution on the surface of highly albuminous urine, got an indication of albumen, which soon disappeared. When urine contains much albumen, it should be mixed with its own volume of the picric acid solution; and in testing a fresh specimen, it is better to begin by adding an equal volume of the test liquid.

One difference between picric acid and nitric acid as tests for albumen is, that whereas an excess of nitric acid, especially when the urine is heated, will entirely redissolve the previously precipitated albumen, no excess of picric acid will redissolve the precipitate which it has once formed in an albuminous solution. Picric acid solution on the surface of the urine is applicable only for the detection of a minute trace of albumen. For this purpose, in my paper read at the Clinical Society, I advise that a column of urine four inches in height should be poured into a six-inch test-tube, and upon this one inch of the picric acid solution. The result is that the upper layer of the urine is mixed with about its own volume of the test liquid; and if albumen is present, the stained portion of the urine is instantly rendered more or less opalescent, and thus contrasts with the unstained and transparent urine below. If the picric acid solution were allowed to flow so gently on to the surface of the urine as merely to come in contact and not to become mixed with its upper portion, the albumen, if present, would not be detected, or it would be indicated only after an interval of some minutes, when the two liquids had become mixed by slow diffusion. There must be an actual mixture in about equal proportions, and not merely contact of the two liquids, to ensure the action of the test.

The slight opalescence caused by the picric acid solution in a sample of urine which contains a mere trace of albumen is always increased by the application of heat. So that, if the flame of a spirit-lamp be applied to the upper part of the opalescent column, this will become more opaque than the lower part, which had not been exposed to heat. I now invariably apply heat to a specimen of

urine which has been rendered opaque, or more or less coagulated, by picric acid; my chief reason for this practice is to ascertain if peptones ever appear in the urine. In a paper published in the JOURNAL, March 31st, p. 614, I have shown that, whereas the albuminous precipitate with picric acid is rendered more opaque and coherent by heat, the precipitate which picric acid gives with peptones is entirely redissolved by heat, considerably below the boiling point. During the last few weeks, I have met with two specimens of urine in which a precipitate caused by picric acid was redissolved by heat. The first specimen was brought to me by a friend who, having read my paper before referred to, thought that he had discovered an example of peptonuria. Picric acid gave a copious precipitate, which was entirely redissolved by heat. Clearly, therefore, the urine was not albuminous. Fehling's solution did not give the violet tint which it invariably brings out when added to a solution of peptones; and, under the microscope, the precipitate was found to consist of amorphous urates, globular masses of urate of soda, and small crystals of uric acid.

The other specimen was from a private patient of my own. The urine contained a trace of albumen, as shown by heat and nitric acid. With picric acid, there was a copious precipitate, which was in great part redissolved by heat. The greater part of the precipitate again was shown by the microscope to consist of urates and uric acid.

The microscope alone would serve to distinguish the precipitate caused by picric acid with peptones, with urates, and with albumen respectively.

The precipitate recently thrown down with artificially prepared peptone appears under the microscope quite homogeneous, and free from solid particles; but when the precipitate, having been dissolved by heat, reforms on cooling, it seems to consist of numerous very minute, apparently globular particles, in which the so-called "Brunonian movement" is very active. The microscopic appearances of uric acid and urates are so well known as to need no description.

The precipitate produced by picric acid with albumen presents irregular clusters of granular material, which appear much larger and more opaque after the application of heat. According to my experience, a deposit of uric acid and urates is about as rare a result of adding picric acid to urine as a similar deposit caused by nitric acid; and hitherto I have met with no specimen of urine in which the presence of peptones has been indicated. A deposit thrown down by picric acid and redissolved by heat, may pretty safely be assumed to consist of urates, but in any case of doubt, the addition of Fehling's solution and the microscopic appearances will at once serve to distinguish between precipitated peptones and urates.

One of my correspondents above mentioned found that "on adding a few crystals of picric acid to a highly albuminous urine, they did not dissolve, but simply caked together, and shortly fell to the bottom of the tube." The explanation is, that each crystal became encased in a film of coagulated albumen. This would not have occurred if the acid had been pulverised, as it always should be when used in the dry state.

ON A NEW AND SIMPLE METHOD OF APPLYING AIR-PRESSURE TO WOLFF'S BOTTLES.

By WILLIAM FEARLEY, L.R.C.S.Ed.

THE injection of blood-vessels plays so important a part in microscopic anatomy, healthy and morbid, and the present way of effecting it by the syringe is so difficult to acquire, and, when acquired, so uncertain in its results, that an exceedingly simple and efficacious way of doing it will be hailed with satisfaction by the profession.

The method of Ludwig has always been acknowledged as superior to injecting by the syringe, except for the one great obstacle—applying the necessary pressure—which had to be effected by elevating and depressing huge water-bottles, or by connecting the air-pressure bottle with a water-tap, and regulating the pressure as best one could, thus rendering the pressure almost as uncertain and irregular as the thumb-pressure of the syringe.

My method is to apply the pressure with an ordinary Higginson's enema-syringe, as shown in the annexed engraving.

So even and delicate is the pressure by this method, that one arm of the mercurial manometer must be closely watched if movement of the mercury is to be seen at all, whilst one entire compression of

the barrel of the syringe raises the manometer a measured inch; so that, in injecting a small animal, such as a rabbit, for instance, a pint of water is amply sufficient.

As there are hundreds of workers who have not dared to face the difficulties and expense of injecting with the syringe, and have also never tried Ludwig's method, the following description may be acceptable.

Suppose we decide upon injecting a rabbit, or a guinea-pig with Carter's carmine and gelatine mass, our steps are these. The bath is filled with warm water (which saves time), and a Bunsen's burner is applied beneath it to heat the water not below 100° Fahr., and not much above 110°. Then, supposing we have our mass ready, we fill a sixteen-ounce Wolff's bottle with it, and secure the corks thoroughly, and place it in the deeper of the two departments of the bath. Not only must the mass bottle be always well immersed, but on no account is the efflux tube for a moment to be allowed to get above the warm water, or the mass congeals, and there is a block. Our next step is to chloroform the animal, and, immediately it is dead, to open the thorax with scissors, making an oval opening with its long axis across the thorax, taking care to keep as far as possible from the root of the neck, to avoid severing arteries that would give rise to leakage and waste of the mass. We now snip open the pericardium; seize the apex of the heart, and cut it off, when we see the right and left ventricles, as in A, Fig. 2. I use a nozzle, as in B, Fig. 2, which has an elastic collar (*e.c.*), which is plugged by a nozzle, as here shown.

We now insert a nozzle as large or larger than the aorta, and, of course, for the arterial system, insert it in the left (round-holed) ventricle, until it appears well in the aorta. We now tie the heart-substance tightly round the nozzle with floss silk, or darning-worsted, the former being the better. On no account is hard string or thread to be used, as it either cuts the soft parts at the time of applying it, or when pressure becomes great. We now, to keep the water in the bath clear, wash out the thorax, and lift the animal into the bath, and, after allowing it to be in the hot water five minutes or so, we apply an inch of mercury pressure (*i.e.*, a measured half-inch of either arm of the manometer), when, on removing the clamp on the efflux tube, c, Fig. 2, air-bubbles are expelled; then comes the carmine mass, when we at once make the connec-