A METHOD OF COLLECTING AND PRESERVING URINARY CASTS AND OTHER ORGANIC URINARY SEDIMENTS.

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It is often desirable to preserve and retain for future reference and for teaching purposes renal casts or other organic urinary sediments. The reason why such permanent preparations are not more frequently made is probably partly due to the time such work requires, but chiefly, I think, to the failures which many have experienced in attempting to preserve organic urinary sediments in a condition in which they retain the appearances presented when seen in recently passed urine.

About ten years ago I was interested in this subject, but was so disappointed with the way the microscopical specimens kept, or rather did not keep, that I ceased to attempt to preserve organic urinary sediments. Between two and three years ago I again began to work at the subject, and after several unsuccessful efforts obtained a method which has given very satisfactory results. I have used the method regularly now for over two years, and as all my specimens have retained the characters which they presented when they were mounted, I think the method will not cause disappointment on the score of the deterioration of the specimens. The principle of the method is the same as that which has been usually adopted and recommended for the preservation of organic urinary sediments. The deposit is taken from the urine and mixed with a preservative fluid, and subsequently hermetically sealed on a glass slide.

The preservative fluid is a solution of potassium acetate saturated with chloroform, and is prepared as follows: Potassium acetate, 60 grammes; chloroform, 10 c.c.; distilled water 1,000 c.c.

The potassium acetate is dissolved in a small quantity of the water and the solution filtered; the chloroform is then added to the filtrate, which is then placed in a stoppered bottle of at least a litre capacity, with about half the remaining quantity of water, and thoroughly shaken for one or two minutes. The remaining portion of the water is then added and the solution again thoroughly shaken and allowed to stand twelve hours. At the end of that time the solution

will be perfectly clear, the undissolved portion of the chloroform will have settled to the bottom, and the clear supernatant potassium acetate and chloroform solution is ready for use. It is advisable to leave the portion of chloroform which is undissolved in the bottle so as to maintain the strength of the chloroform solution. The specific gravity of this solution will be found to be about 1030.¹

The urinary sediment is obtained in the usual way, by allowing the urine to stand in a urine glass having a conical bottom for twelve to twenty-four hours. When the sediment has collected at the bottom of the glass, about 1 to 2 cubic centimetres of it are withdrawn by means of a pipette and placed in some of the preservative fluid which has been placed in a glass tube similar to those represented in the accompanying illustration.

The deposit in the course of six to twelve hours gradually sinks through the fluid to the lower tapered extremity of the tube, and then by means of pressure on the india-rubber cork one or two drops are forced out and mounted in a cell on a microscopical glass slide.

The tube employed for this purpose is made of ordinary glass tubing about $\frac{3}{8}$ inch in diameter, which is drawn out to a point so that the lower opening is about $\frac{1}{4}$ inch in diameter, the length of the tube when so drawn out being about 13 inches and its capacity about 60 c.c. The tube is fitted with an india-rubber cork $1\frac{1}{4}$ inch long, it being an advantage to have a long cork, as the tube is then less liable to leak. These tubes and corks can be obtained from Mr. R. Kanthack, 21, Golden Square, London, or from Messrs. Woolley, Sons, and Co., Victoria Bridge, Manchester. Such a tube is a convenient means of passing the urinary sediment through a large volume of the preservative fluid and of subsequently easily obtaining the sediment for microscopical purposes, as pressure upon the india-rubber cork readily drives out a small portion of the washed sediment when it has collected in the lower part of the tube.

The above is the summary of the method employed, but as much of the success in obtaining good and clean preparations of organic urinary sediments depends upon attention

B, A, C, represents a tube which has been properly filled so that only a small air space has been left at C; the sediment is seen to have collected at B. B', A', C', represents a tube which has not been sufficiently filled, too much air space having been left at C'; the consequence has been that through the alternate expansion and contraction of the column of air at C' above the fluid, the sediment has been driven out and lost.

¹ Dr. E. S. Wood, in a reviser's note at page 335 of Neubauer and Vogel's work, *Analysis of Urine*, states that a solution of acetate of potassium, to which a little carbolic acid has been added, is an excellent preservative fluid for organised urinary sediments, and that the acetate of potassium solution should have a specific gravity of between 1050 and 1060. A solution of so high a density is unnecessary and inconvenient if the method here described is employed.

to small details, I may perhaps be allowed to describe the various steps which should be taken.

The vessel into which the urine is passed should not only be thoroughly cleansed by being scalded out, but it should not be dried or wiped out with any towel or other material before the urine is passed into it. If the vessel has been so treated it should be rinsed out with cold water immediately before the patient uses it. The object of this is to obtain a sediment free from all dirt, cotton fibres, etc., which cannot be done if the urine is passed into a vessel which has been dried with an ordinary towel, or left standing some time in the bedroom or a hospital ward. The urine having been passed into a vessel so prepared, is poured into an ordinary urine glass of about four ounce capacity with a conical bottom; the urine glass having been as carefully prepared as the first vessel into which the urine was passed. If the patient is a male it is advisable that he should pass the urine directly into the urine glass. The urine is covered to prevent the entrance of dust, and allowed to stand about twelve hours.² At the end of that time some of the sediment is withdrawn by means of a glass pipette, from 1 to 2 c.c. of the sediment being an ample quantity, and placed in one of the drawn-out tubes containing the preservative fluid.

To carry this out the tube is filled with the preservative fluid to within about one inch of the top, the tube being held in the left hand, and the tip of the first finger placed beneath the lower opening whilst the tube is being filled.

The sediment is then withdrawn from the bottom of the urine glass by means of a pipette, and at once placed in the glass tube at the upper part of the preservative fluid. The india-rubber cork is then firmly inserted, the finger being withdrawn from the lower opening as this is being done, and a little of the fluid will escape from the lower opening until equilibrium is established. The tube is then placed in a vertical position in a burette holder, and allowed to stand about twelve hours. At the end of this time the sediment will have gradually passed from the top of the tube through the preservative fluid, and collected in the tapered lower extremity, and is ready for mounting. (See illustration B.A.C.)

When the sediment has subsided a small portion of it is readily obtained by pressure upon the india-rubber cork, which is made to act as a piston. At the time pressure is being made upon the cork a glass microscopical slide, on which a shallow cell has been previously made with some cement, is held beneath the pointed lower extremity of the tube, and the drops, as they are pressed out, are received on to the glass slide. A cover slip is then placed over the cell, and the excess of fluid having been removed by filter paper, the cover glass is made firm and hermetically sealed by ringing it with cement.

The actual time spent in performing these manipulations is extremely short. A few further precautions are necessary, however, in some cases.

In collecting urine deposits it is usually sufficient to employ the ordinary sized urine glasses of 3 or 4 ounce capacity, but if the casts are not numerous a glass having double the usual capacity but still having the conically-shaped bottom may be advantageously employed. I do not think much advantage is gained by setting aside a larger quantity of urine than this to deposit. In some weather and in all cases where the urine has a tendency to become the seat of bacterial growth after being passed a piece of camphor may be placed in the urine. As the camphor will float on the top it will not interfere with the subsequent collection of the deposit and it will retard considerably the decomposition of the urine.³ It is also advantageous to place a piece of camphor in the chamber when the urine is passed only in small quantities and some delay ensues before sufficient urine is obtained to place in the urine glass to sediment.

Where the urine is very concentrated and deposits urates on cooling great difficulty is experienced in finding casts among the uratic deposit. In such cases the urine immediately on being passed should be diluted with equal parts of the potassium acetate and chloroform solution, and then

² I have not found it necessary to employ a centrifugal machine for the separation of urinary deposits; of course if such a machine is available, time can be saved.

³ The employment of a centrifugal machine, as is frequently recommended, would render this procedure and the delay unnecessary.

put aside in the usual way to sediment. The dilution with the potassium acetate solution usually prevents the deposition of urates, and this plan will be found more satisfactory than to attempt to keep the urine warm, and by that means to prevent the formation of the urates.

Leucorrhœal discharge is one of the frequent causes which prevent good preparations or urinary casts being obtained in cases of Bright's disease in the female. The only efficient method which I know of in such cases is to have the vagina syringed out before the specimen of urine is collected.

When a urinary sediment has been put into the preservative fluid the glass tube should be as nearly as possible full after the sediment has been introduced, only a very small air space remaining between the cork and the top of the fluid (see tube B A C in the illustration). A large air space, such as is represented as occurring in tube B' A' C' must not be left, because the alteration in the temperature of the room or laboratory acts upon the column of air above the fluid and gradually drives out the sediment when it has collected below.

It all depends upon the amount and the thickness of the sediment whether it is or is not necessary to add any preservative fluid from the stock bottle to the sediment after it is placed upon the slide. If the sediment is not a large nor a dense one, it is simply necessary to proceed in the manner above described, and to put the cover-glass immediately on the sediment when it has been pressed out on to the slide. If, on the other hand, the sediment is copious and very dense, it is advisable to press out only one drop of the sediment from the tube and to dilute it with about two drops of the preservative fluid, to mix the sediment with the added fluid gently by means of a needle, and then to place the cover-glass on it and seal it up as before.

It is, of course, necessary to use a reliable cement for making the cell on the slide and for sealing on the cover-glass. Some cements readily crack when they dry, and the preparation, not being hermetically sealed, spoils.

The method will be found simple of manipulation, and the specimens so prepared will keep. Urinary casts and other organic urinary sediments undergo extremely little alteration during the process. Of course passing some forms of casts through such a solution must occasion some slight change in the cast. Casts composed largely of blood corpuscles or of blood-colouring matter become slightly paler in consequence of a portion of the blood-colouring matter being unavoidably dissolved during the passage of the cast through the fluid, but such a change is slight. Some granules, fat droplets, or cells on casts may also be lost, but not to any material extent, if there has been no undue shaking of the tube or other roughness in the manipulations.

It is very rare to obtain urinary sediments which will not have sunk to the bottom of the tube at the end of twelve hours; I have, however, occasionally met with sediments which at the end of twelve hours had only sunk a short distance through the fluid. In such cases it is advisable to press the india-rubber cork forcibly and drive out one or two drops of fluid, and then to allow the tube to stand for another six to twelve hours, by which time it will usually be found that the sediment has sunk to the bottom of the tube and is ready for mounting. Usually it is not advisable to leave the sediment longer than twelve hours in the tube; when it has sunk to the bottom of the tube it is best to mount some of it at once.

It will be understood that the above method is not suitable for the preservation of crystals and inorganic deposits generally. Usually, however, oxalate of lime crystals can be well preserved by it, whilst phosphatic crystals, and crystals or uric acid are partially or completely dissolved by the potassium acetate solution.

UNIVERSITY COLLEGE HOSPITAL.—The annual dinner in aid of the funds of this hospital was held on June 13th at the Criterion. Mr. Justice Charles, who occupied the chair, said that the hospital had been in existence sixty years, and that it had recently passed through a trying financial period. It had received £15,000 as compensation for the removal of the bar at the top of Gower Street, but far more was required before the task of reconstructing the hospital on modern principles could be undertaken. The Treasurer announced donations of £4,440 and a subscription list increased by £21.