

mortems, as also in the kidney of a foetus, and in the urine of a child two years old. When these little masses have reached a certain size they adhere to one another, producing the well known mulberry calculus. The uric acid calculus may be composed entirely of uric acid, but it will generally be found that the nucleus consists of a mass of dumb-bell crystals of oxalate of lime.

Now, experimentally we know that uric acid, when in a specimen of urine sent to us for examination, is easily dissolved by an alkaline solution, some alkalis having more power in this respect than others, and their resultant salts being more soluble. The urate of soda is to a certain extent soluble, the urate of lime more so, the urate of potash the most soluble. Therefore potash has for a very long time been considered the most powerful agent that could be used in cases of uric acid gravel, and is one that can be taken for a long time without producing any objectionable effects. The citrate of potash seems generally to be the best form to give it in, except when, as Sir Henry Thompson points out, it exerts too much diuretic action; then the bicarbonate should be used. Care, however, should be taken in using the carbonate; for if the solution in which it is given be too strong, as Dr. Roberts found, the calculus becomes coated with an alkaline bi-urate, and is not dissolved. But the citrate and acetate, as we know, when given by the mouth, become carbonates in the urine; and although about six drams a day may be given of either of these, they should be very largely diluted with water. If, therefore, a calculus has formed, or is forming, in the kidney, and we know from our chemical and microscopical examination of the water, that it is composed wholly or in part of uric acid, the treatment we are told should be to give potash to dissolve as much of the stone as possible, and plenty of water to suspend and carry away the resultant. Although this has been recommended on the highest authority, it is a treatment that is very difficult to enforce, chiefly because many patients object to drinking the necessary amount of cold water—whereas we know that water alone is a very good solvent. Hence a course of Vichy water is frequently ordered in these cases.

But Vichy owes its utility to the carbonate of soda it contains, of which about forty-seven grains exist in every English pint. Of the natural mineral waters many are of undoubted value, not only on account of the potash, lime or soda that they contain, but because they are all more or less purgative, and so assist digestion and prevent further deposit.

The most efficacious seems to be that obtained from the Waukesha Spring, known formerly as "Bethesda," but latterly as "Glenn." Though I am not prepared to state that this water will destroy a uric acid calculus in the kidney, it certainly will do so when we put such a stone into a bottle of it. The way in which I have been in the habit of treating these cases for many years has been to order the carbonate, or citrate of lithia, to be taken in a tumbler of Bethesda three or four times a day. In a very few days of this treatment the pain and other distressing symptoms abate, and in a short time there will probably be evidence of the passage of a small calculus down the ureter, or through the urethra. The aerated lithia water, which I understand can now be obtained here, is a pleasant water to drink, and a definite amount of lithia can be put in each bottle.

This treatment should be combined with a careful diet. Alcohols, sugars and fatty substances should be avoided, and care should be taken not to catch cold. But no treatment can be satisfactory unless the exact location and composition of the stone is ascertained. For to treat a phosphatic stone even in the bladder, as if it was composed of uric acid, would rather tend to increase instead of diminish its size. It is a matter of doubt whether any solvent taken by the mouth has much effect on a stone that has formed in the bladder, an operation being generally the best treatment under these circumstances. But even here much may be done by solvents, not administered by the mouth, but injected into the bladder. The stone in these cases is generally phosphatic, and the mucous membrane of the bladder more or less irritated. It is advisable to have the water drawn off twice a day, and the patient should be taught how to pass the catheter for himself. If this is done he can carry out the further treatment also. This consists in washing out the