

ON URÆMIA.

Some interesting additions have been recently made to the already copious literature of uræmia. It is a remarkable fact that, although innumerable observations and experiments have been made to determine the cause of the well-known uræmic poisoning, and although with regard to many incidental points regarding it, our knowledge has been greatly advanced, still the central problem in the causation of uræmia remains as yet unsolved. We seem not much nearer the determination of the question, whether uræmia is caused by the presence of an abnormal amount of urea in the blood, than we were at the time of the earliest experiments on the subject. The subject is one of great practical importance, because on the elucidation of it depends our hope of being able to deal with the phenomena of uræmic poisoning with any reasonable prospect of success. Every physician of experience has met with cases in which the most formidable uræmic symptoms proved to be only transitory, although undoubted organic disease of the kidney existed. And it must be admitted that our therapeutic resources do not always enable us to claim much share in the favourable issue in such cases. Nevertheless their frequent occurrence gives ground for the expectation that we may ultimately be enabled to aid in promoting the temporary amendment which we so often witness in Bright's disease. It becomes accordingly a matter of great moment to ascertain to what change in the blood, or in the tissues, the phenomena of uræmia are to be ascribed. The first great problem is, to determine what is the part played by urea in the production of the symptoms in question. There can be no doubt that urea is the principal element in the urinary secretion, and for a considerable period it was naturally regarded as the most important factor in the production of uræmia. It was clearly impossible to arrive at a conclusion on the subject merely from clinical observation, and resort was had to physiological observations and experiments on the lower animals, for the purpose of ascertaining whether urea accumulated in the blood when the kidneys are removed. The first experimental attempt at a determination of this problem was made by Prevost and Dumas, who communicated the results at which they had arrived in a paper which was read at a meeting of the Société de Physique et d'Histoire Naturelle of Geneva, in November, 1821.* The method adopted by these observers was to examine the blood of animals in whom the kidneys had been removed. They found that dogs, cats, and rabbits, survived the removal of their kidneys for from five to nine days, and that during the first three days after the operation they showed scarcely any sign of disturbance. On examination of blood taken from these animals they found evidence of the presence of a considerable amount of urea, no trace of which they had been able to discover in the blood of animals who had not been

subjected to this operation. From these experiments they came to the conclusion, as had before been suggested by Rollo, that the kidneys merely eliminated urea from the blood, and had nothing to do with its formation. Nephrotomy had been previously performed by Vesalius and by Richerand, but neither had employed chemical analysis for the purpose of determining the condition of the blood. Prevost and Dumas suggested that probably the liver was intimately concerned in the production of urea, an idea which they founded on the supposed diminution of urea in the urine in cases of chronic hepatitis. Richerand, also, having found in his nephrotomized animals the gall-bladder considerably distended, thought it probable that the biliary secretion could to some extent take the place of the urinary, when the latter was suppressed.

The paper of Prevost and Dumas has always been considered, and with justice, one of the most important contributions to this subject which has been made, and from it, it seemed probable that urea, as the principal solid constituent of the urine, was also the principal cause, by its retention in the blood, of the peculiar aggregation of symptoms which have been grouped together under the name of uræmia; for there is every reason to believe that in advanced cases of Bright's disease, the kidney, as far as its function is concerned, is almost altogether useless. Prout^a taught that it was universally admitted by physiologists that the kidneys are little more than the outlets by which, as an excreted principal, urea is removed from the economy. He gave it, however, as his own opinion, that in the healthy condition of the system imperfectly developed urea may be found in the economy, which, in subsequently passing through the kidneys, is reduced to the crystallized form; so that the kidneys are not to be regarded as entirely passive in the matter.

Very soon after the observations of Prevost and Dumas, Segalas and Vauquelin showed that urea could be injected into the veins of animals without giving rise to any symptoms of disturbance beyond diuresis; and, as a consequence of these experiments great expectations were formed of the value of the administration of urea as a diuretic. It was suggested by those observers and has been supported by Stokvis, Hammond, and others, that some of the injurious effects of the suppression of the renal secretion are to be attributed to other constituents of the urine, and that the extractives especially have much to do with them, so that the apparently anomalous conclusion has been arrived at that suppression of the urinary secretion brings about fatal effects, not in virtue of its effects, not in virtue of its principal constituent being retained in the system, but because of the non-excretion of substances certainly in a physiological sense much less important.

From a clinical point of view Bright, Owen Rees, and Christison pointed out that a large amount of urea might be present in the blood without any

* The paper was published in the "Annales de Chimie et de Physique," par Gay.—Lussac et Arago. Tome 23, p. 90.

^a On the Nature and Treatment of Stomach and Urinary Diseases. Third edition. 1840, p. 87.