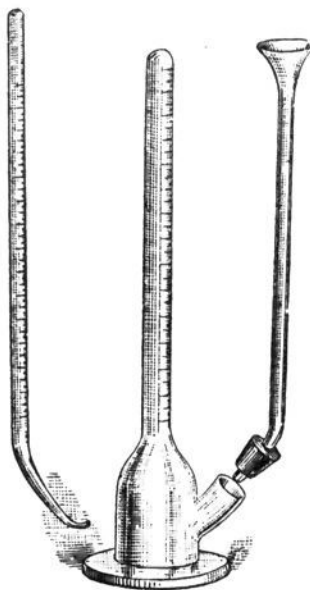


SOME REMARKS ON DR. DOREMUS' SIMPLE APPARATUS FOR THE RAPID ESTIMATION OF UREA.

BY WM. H. GREENE, M. D.

In this Journal (Vol. VII, page 72), Dr. Charles A. Doremus, describes an apparatus for the estimation of urea which appears to be a modification of an apparatus described by me in the *Comptes Rendus* (Vol. XCVII, page 1141), and represented in the accompanying cut.



“The general form” of Dr. Doremus' apparatus is not new ; it is a Cooper's mercurial receiver, known since 1825, with a bulb blown near the mouth. Neither is the graduation of the tube for the direct reading of the proportion of urea new. This graduation, to which I will revert, was first suggested by Russell and West (*Journal of the Chemical Society*, XXVII, page 749), and more recently by A. W. Gerrard in the *Pharmaceutical Journal* (III, 464).

The manipulations with Dr. Doremus' ureometer are not accomplished with greater facility than with that which I suggested, and his instrument requires a special support while mine is provided with a base.

One cubic centimetre of urine frequently evolves so small a volume of gas as greatly to augment the probable error; for this reason I recommended a gravity pipette which permits the introduction of such a quantity of urine as will furnish a fairly readable volume

of gas. This decided advantage seems to have been overlooked by Dr. Doremus.

He also suggests that the bromine and sodium hydroxide solution be mixed in the ureometer, and it has been claimed that this procedure will avoid irritating fumes. I would especially desire that the method of transferring bromine without the production of vapors should be made public.

The proportion of urea in the urine, and even the daily excretion of that compound, are functions of such variable and uncertain factors that a mere knowledge of their quantities can be of but trivial importance to the practitioner of medicine. The centesimal proportion is naturally dependent on the volume of the liquid ingesta and on the relative activity of the skin and the kidneys, while the experiments of Lehmann and of Franque have shown the influence of the character of the alimentation on the absolute quantity. In perfect health, the daily excretion may be as low as twenty-five grammes during a vegetable regimen—as high as ninety grammes during an exclusively animal diet. Besides this, the quantity of urea eliminated is intimately related to the muscular activity, and it is not improbable that the diminution in the diurnal exertion of urea which is usually observable during sickness may often be a direct consequence of the coincident muscular repose.

Since, therefore, variations of such magnitude may be expected in health, it is evident that observations made during disease can have but little value unless they be made in series and with great care. A knowledge of the percentage of urea is absolutely worthless; the daily elimination is the only factor that can have significance. Then under similar conditions as to diet, exercise, and time given to sleep, the comparison of a series of observations may become the source of useful knowledge.

The error which may be introduced into the result of an urea estimation by neglecting corrections for the influence of temperature and pressure on the volume of gas, is uncertain; it may be inappreciable—it may amount to eight per cent. of the whole quantity. An approximation to the proportion of urea may, therefore, be obtained by omitting the calculations which Dr. Doremus states are repugnant to "the average medical man," and assuming that the same quantity of urea always yields the same volume of gas; but how can such an estimation be useful? Assuredly, any

graduation pretending to indicate variations from a supposed *normal percentage* of urea in the urine is based on the unwarranted assumption that the daily emission of urine and urea is constant.

The ability required to make an analysis and to deduce from it correct conclusions is not greater than that necessary for a very simple calculation. There is, however, a method for the estimation of urea which avoids the necessity of any calculation except a single proportion, and which at the same time gives exact results. It is by a second and simultaneous determination of the volume of gas evolved by the decomposition of a known quantity of urea—say one centigramme—in aqueous solution. Supposing that all the nitrogen eliminated from the urine be derived from urea, the quantity in grammes of the latter in the volume of urine employed will be found by dividing one hundredth of the volume of gas obtained from it by the volume obtained from one centigramme of urea. If “the average medical man” possess a thermometer, a barometer, and a table of the tensions of aqueous vapor, he can make the calculation in less time than would be required for the decomposition of the urea solution.

IN REBUTTAL.

BY DR. CHARLES A. DOREMUS.

The author of the preceding article has in two letters, one to the editor of a Philadelphia medical journal and another to Professor Austin Flint, Jr., which appeared in the *Medical News* of May 30th, criticised the instrument presented by me before this Society in March. The tone of the first letter was of so uncourteous a character, as it seemed to me, that no response was made to it. On the appearance of an abstract of it in the *Medical Record* of this city, an answer was written at the suggestion of friends, and would have been published had not Prof. Flint informed me of his intention of presenting to the New York County Medical Society, at Dr. Greene's request, the instrument described on the preceding pages.

Dr. Greene's letter to Prof. Flint appears along with a description of the apparatus which accompanied the instrument and some remarks made on the reclamation of priority and the comparative usefulness of the two ureometers. The publication of that article