

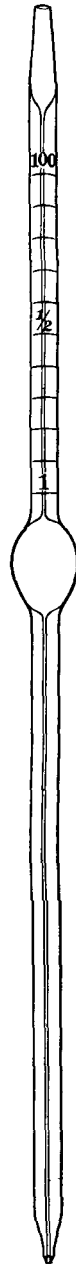
A PIPETTE FOR DILUTING SERUM, ETC.

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AN instrument which I had made several years ago presents some advantages and may therefore be of use to others who have to deal with serum-diagnosis, etc. The chief advantage of the instrument is that after each dilution has been made it is ready for making further dilutions without cleansing it. The instrument is moreover easy to manipulate. It may be described as essentially a "reversed Thoma-Zeiss pipette," the graduations being marked upon the upper section of the tube, instead of on the lower section. The accompanying figure makes the construction of the instrument clear.

The method of using the pipette is as follows: A rubber tube and mouth-piece having been affixed to the upper end, the pipette is filled with saline solution or other diluent up to the mark desired for the intended dilution. The pipette is now laid horizontally, and the fluid to be diluted (serum, etc.) is allowed to flow into the pointed end from a fine capillary, until the top graduation mark is reached. The contents are then blown out into a watch-glass. It will be noted that the lower section of the pipette is longer than the upper, or graduated section; the object of this is to prevent the entrance of the serum into the bulb. The expulsion of the fluid from the pipette, the small amount of serum being expelled first and being followed by a relatively large volume of diluent, secures a practical cleansing of the instrument. In order to prove that no appreciable amount



of serum remains in the instrument, after diluting samples of very potent serum, the lower section of the instrument was filled with fresh saline solution, and these were found to possess no agglutinating properties. Another point is that the serum might diffuse up into the bulb during the manipulations; this does not take place however within a reasonable time, as may be proved by staining the serum, thus enabling one to determine the limits of its diffusion. From the fact that a certain amount of the diluent remains within the pipette, when used in the above-described manner, there is naturally a slight error. In order to determine the extent of this error, the pipettes were weighed dry, full of distilled water, and again after expulsion of the water. Tested in this way, the mean of three weighings gave an error of 1 in 162, a negligible quantity in practical work. If it is desired to avoid this small error, the diluted serum may be sucked up into the instrument and again expelled, but this would entail cleansing the pipette for further use. In practice the error above noted needs scarcely to be taken into account.

Three sizes of pipette were made for me, as follows :—

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| <i>a</i> | gives dilutions from 1:100 to 1:1000, its capacity being about 570 mg. of water. |
| <i>b</i> | " " " 1:50 to 1:500, " " " " 370 mg. " " |
| <i>c</i> | " " " 1:10 to 1:100, " " " " 430 mg. " " |

The fact that the pipettes are made by Zeiss (Jena), may be taken as a sufficient guarantee for the accuracy of the graduations, and of the neatness of finish.

Where it is desired to make an extensive series of serial dilutions, I have employed the above-described instrument in conjunction with the method which I published in the *Edinburgh Medical Journal* for 1897; see also R. C. Cabot (1901), *A Guide to the Clinical Examination of the Blood for Diagnostic Purposes* (New York: William Wood and Company). In this latter method the possession of a number of calibrated capillaries, ranging from 5 to 100 c.mm. capacity, greatly increases the value of the instrument.