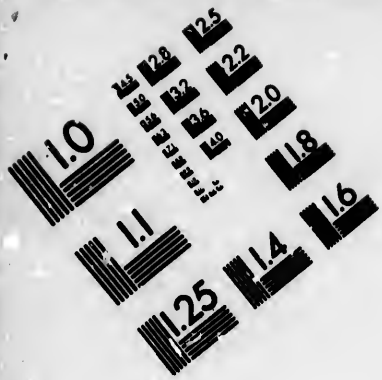

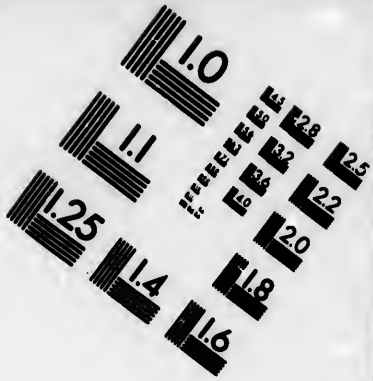

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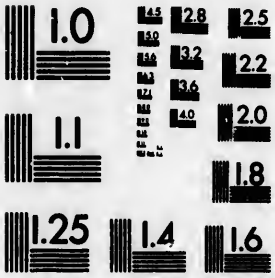

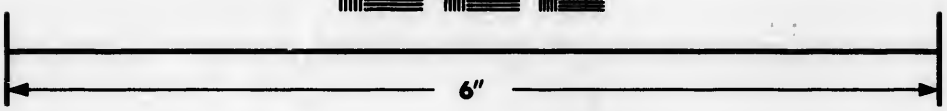

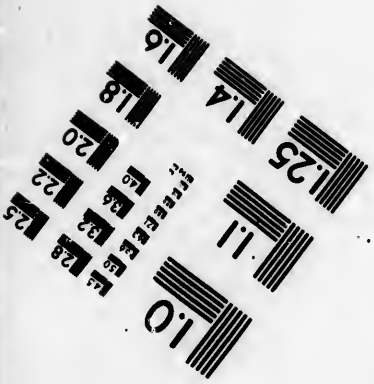

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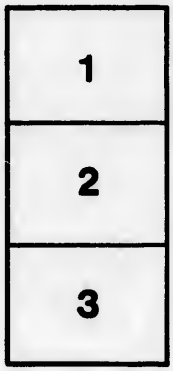

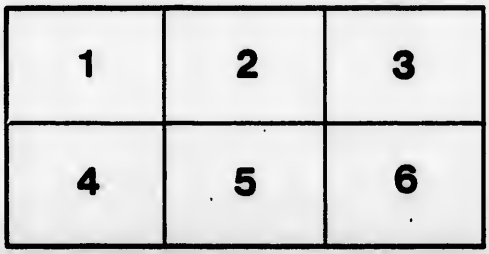

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Reprinted for the Authors from the BRITISH MEDICAL JOURNAL,
February 5th, 1898.

A QUANTITATIVE METHOD OF SERUM DIAGNOSIS BY MEANS OF DRIED BLOOD.

BY
WYATT JOHNSTON, M.D., and HAROLD WOLFERSTAN THOMAS, M.D.,
Montreal.
[From the Laboratory of the Montreal General Hospital.]

WIDAL suggested[1] the plan of simply dissolving the dried blood drop in a fixed number of drops of water. Dacosta advocates the same plan. The objection to this is that the previous volume of the blood drop cannot be determined after it has been dried, and they have not attempted to estimate the limit of possible dilution.

The plan adopted by us is that of taking the sample by means of a loop of standard size, made of No. 20 gauge copper wire, 2 mm. inside diameter. This gives a considerable quantity of blood which, when dried and spread on a glass slide, can afterwards be dissolved by means of a definite number of loopfuls of water. The solution thus obtained is abundant enough to yield much more blood solution than is necessary for quantitative measurement of the reaction. To ensure greater accuracy a small outfit was used in which the original loop used in taking the blood is returned, and employed in making the dilutions.

The dried blood drop is dissolved in five loopfuls of water used *seriatim*, the solution from each drop being sucked up by a capillary tube, and the whole mixed. From this stock solution standard sub-solutions are made in a straight capillary tube bound by a rubber band to a thermometer scale. The advantage of this plan is that the exact quantity of blood taken is immaterial. The tube is easily washed. The method of placing the loopfuls separately on the glass, as recommended by Delépine, was found very reliable.

In testing, a small platinum loop of the blood solutions is mixed with as many loops of water and bouillon culture as may be needed to give the required dilution, and make the volume of the diluted blood as nearly as possible equal to that of the culture. For convenience a table of the formulæ for dilutions was made, and is useful when one is ascertaining the extreme limit of dilution possible, as this often reaches into the hundreds.

For an ordinary test—to learn, for instance, if the blood reacts at 1 to 10—all that is necessary is to mix a loop of the stock 1 to 5 solution with one of the culture. By mixing it with four loops of water and five of culture, a dilution of 1 to 50 is readily obtained. The time required when this simple test only is needed does not exceed five minutes.

We have made duplicate observations to ascertain the average limit of error, and find this to be about 10 per cent. after some familiarity has been obtained with the method. It is much more accurate than a plan previously suggested by one of us of taking the standard of colour as a guide.

Comparative tests, when the duplicate samples consisted either of serum or of watery solutions of fresh blood taken by a Zeiss-Thoma barometer pipette, gave us results practically identical with those by the dry blood method, the latter being slightly lower, however, as a rule. So that if the dry blood showed a given intensity, the serum would show at least that, and perhaps 10 per cent. more.

Drying for a few days did not make any great difference in the intensity, though it slightly lessened the reaction. We defer the publication in detail of our results until our observations are more numerous.

The result of the quantitative dry method so far has convinced us that it is delicate and accurate enough to give results sufficiently close for practical purposes or for comparison with other methods of testing. It has not yet been found necessary to use the quantitative test for the ordinary routine diagnostic work; but where the results are to be used for recording doubtful or exceptional cases for scientific publication, we think quantitative data preferable.

It does not appear necessary, however, to use quantitative tests in ordinary routine diagnostic work. Our experience has been that in no case hitherto examined by us have we been able to obtain a decisive reaction by the use of quantitative methods of fluid blood or serum, when it could not also be obtained by the dried blood test without quantitative complications.

At the same time, we fully agree with the views expressed by Professor Welch on a recent occasion, that for scientific observations it was very desirable that the dried blood method should be also made a quantitative one, and our work in that direction was prompted by a friendly suggestion coming from him, for which we wish here to express our thanks.

REFERENCE.

[1] Soc. de Biol., January, 1897.