

IN THE LABORATORY

A Slide Rule for Determining Chicken Red Cell Agglutination Titer

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Because of the extensive use of the turbidimetric chicken red cell agglutination (CCA) test at this laboratory in checking production and research on influenza virus, it became desirable to provide a rapid method for evaluating the results. This is customarily done by means of a nomograph¹ with a scale of colorimeter readings along each vertical edge (the nomograph and the slide rule are based on readings obtained from the Klett-Summerson colorimeter). After determining the two virus dilutions which give colorimeter readings bracketing the 50 per cent end-point control, a straight edge is applied to these two readings on the nomograph, and an interpolating factor is read from the horizontal scale above the intersection of the straight edge and the line representing the colorimeter reading of the

ing of standard dilution of unknown which is the higher of the two dilutions bracketing the control value.

The slide rule, which provides a means for determining the fraction $\frac{Y - X}{Z - X}$ and calibrates this value directly against the CCA titer, is constructed as shown in Fig. 1. A and B are matching linear scales; C and D are matching logarithmic scales; and the lower four lines are actual CCA values.

Use of the rule requires the following steps:

(1) The lower colorimeter reading (X, above) is taken on the A scale and placed opposite the higher colorimeter reading (Z) on the B scale. This gives a reading on the B scale opposite the A scale index.

(2) The hair line is then set on the D scale at the value obtained from step 1.

(3) The lower colorimeter reading (X) is taken on the A scale and placed opposite the control colorimeter reading (Y) on the B scale. This again gives a reading on the B scale opposite the A scale index.

(4) The sliding portion of the rule is then moved so that the

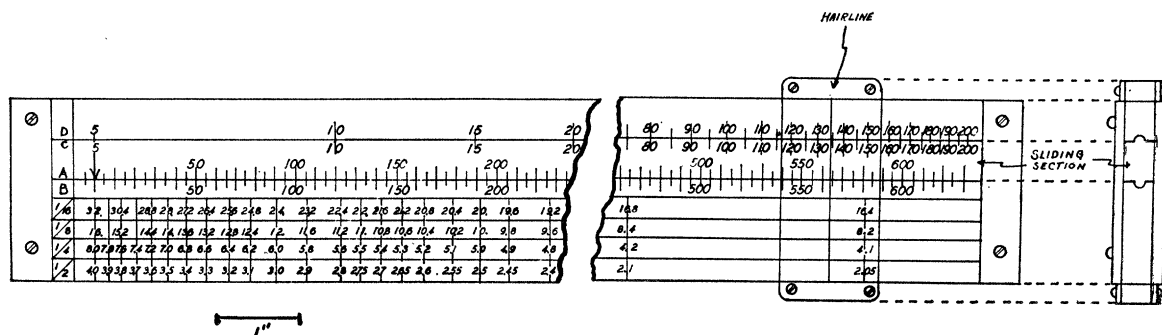


FIG. 1

control. This interpolating factor is then referred to a table, and the desired CCA titer is read therefrom.

A slide rule has been devised in order to carry out these operations more rapidly. The equation involved (1) is

$$\log D = \log S + \frac{Y - X}{Z - X} \log 2,$$

where D is the dilution giving 50 per cent agglutination; S, standard dilution of the unknown which is the lower of the two dilutions bracketing the control value; Y, colorimeter reading of control; X, colorimeter reading of S; and Z, colorimeter read-

value obtained in step 3, taken on the C scale, is under the hair line.

(5) The index on the left end of the sliding portion then is directly opposite the required CCA value on the four bottom scales, which give a range from 1:2 to 1:32, as shown. If desired, this can be extended by adding more lines. The CCA value is read from the appropriate scale; i.e. if the needed figure falls between the 1:2 and 1:4 dilutions, the reading is made on the 1:2 line, etc.

Steps 1 and 2 are subtractions which are usually very simple, so that by performing them mentally further time can be saved.

Reference

1. HIRST, GEORGE K., and PICKLES, EDWARD G. *J. Immunol.*, 1942, 45, 273.

¹ NIH directions for the titration of the chicken red cell agglutination (CCA) activity of influenza virus and vaccines according to Hirst's method as modified for use in the Laboratories of the Rockefeller Institute at Princeton, New Jersey.