As a practical example, in the graphic calculation of the results of routine biological assays of the all-or-none type it was found convenient to plot all such results on a graph in which each $x$ or log dose unit was 50 cm long and each $y$ or probit unit was 5 cm long. Therefore, $R = 50/5 = 10$. For making the scale a simple table like that below was constructed. In the

TABLE I

| Slope or $b$ | Slope/$R$ or tan $\theta$ | $\theta$ in degrees |
|---|---|---|
| 1 | 0.1 | 5.72 |
| 2 | 0.2 | 11.32 |
| 3 | 0.3 | 16.70 |
| . | . | . |
| . | . | . |
| 60 | 6.0 | 80.53 |

first column a series of consecutive slope figures, such as one may expect to encounter, was written down. The second column, giving the values of the tan $\theta$ was calculated by substituting the corresponding slope figures in the equation tan $\theta = b/10$. The values of $\theta$ were then obtained from a table of tangents, and for convenience the minutes were converted into decimal fractions of degrees by dividing by 60. To mark off the actual divisions on the scale, select a point as the angle zero on a piece of polar coordinate paper which is divided into 360 degrees, and mark off each slope value at the proper number of degrees from zero, using the relationship between the slope values and the corresponding angles as given in the first and last columns of the table. For example, at a distance of 16.7° from zero make a mark corresponding to the slope 3.

This particular scale may be used with any assay providing that on the graph, each $x$ unit (log dose) is 10 times as long as each $y$ unit (cc, gm, probit, etc.). For any graph in which $R$ is not 10 the size of the scale divisions will be different.

To use this protractor-like scale, place the center of the circle of which the slope scale is an arc at the intersection of the dose-response curve with the $x$ axis and let the zero of the scale also fall on the $x$ axis. The slope may be read directly from the slope scale at the point at which it is intersected by the straight-line dose-response curve. In the figure, the scale shows that the slope is 10.

A complete graphic treatment of the Bliss[1] method for handling the all-or-none type of data will be published in the near future.

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## MODIFIED HYDRAULIC METHOD FOR REMOVING PLUNGERS FROM "FROZEN" SYRINGES

A METHOD similar to the one described recently by McCoord in SCIENCE, volume 94, page 170, has been used by us for several years to remove the plungers of "frozen" syringes. An additional simple device which we use makes the method more convenient and foolproof. We realize that this modification may already be familiar to some, but feel that since the problem is such a common one in clinical laboratories, any additional improvement is worthy of publicity.

The drawing (Fig. 1) illustrates the method. The

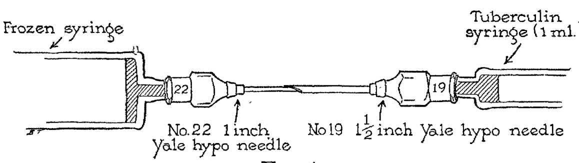


FIG. 1.

device referred to consists of a number 22 (one inch) Yale hypodermic needle telescoped into a number 19 (one and one-half inch) Yale hypodermic needle so as to make a tight connection. Other tight-fitting combinations of needles may be used and, if desired, the connection may be soldered, although we have not found this necessary. By attaching one end of the device to the "frozen" syringe and the other to a tuberculin syringe filled with water, enough hydraulic pressure can be developed by exerting force on the plunger of the tuberculin syringe to free the barrel. The desired result is almost always attained. The device can be made in a few minutes and can be kept on hand for future use which, in our experience, is frequent.

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