IN THE LABORATORY

An Instrument for Plotting ED_{50} Curves

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Several methods for plotting ED_{50} curves have been described. De Beer (*2*) employed a permanent board with several instruments which enabled him to plot the curve and compute the results accurately and rapidly. Litchfield and Fertig (*3*) have described a rapid and accurate method for the calculation of the ED_{50} value, as have Miller and Tainter (*4*), who employed a special probit paper. Many investigators have used all of these methods, but thus far no instrument has been described which would allow a choice of the method to be used. The instrument described below has been used in our laboratories for over a year and has given accurate results with any of the above methods as well as with the longer Bliss (*1*) method.

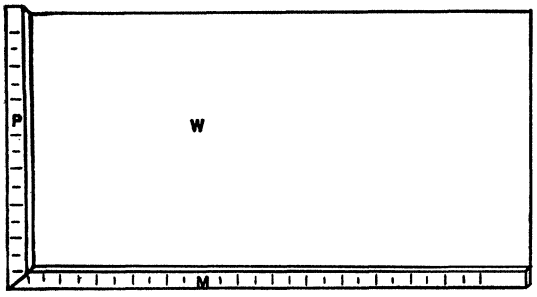

FIG. 1. Completed instruments. P = probit or per cent response scale; M = millimeter graph paper scale; W = Winthrop Probit Paper on plywood base.

The instrument (Fig. 1) was constructed from a piece of plywood 15 x 12 x $\frac{1}{4}$ inches, bordered by two pieces of molding 1 x $\frac{3}{8}$ x 15 inches and 12 inches respectively. To the plywood was glued a piece of Winthrop Probit Paper.[1] To the left-hand molding was attached the two scales cut from another piece of the same paper. While being glued, these scales were aligned so that part of the scale extended over the inner edge of the molding and fitted flush with the plywood. Attached to the lower molding was a piece of millimeter graph paper, which was divided into an arbitary scale allowing the plotting of log doses to 3 or more places, depending upon the accuracy desired. The entire board, including scales, was painted with a solution of cellulose nitrate in acetone to protect it against wear.

For plotting the ED_{50} of estrogenic response, where there is a definite logarithmic ratio between each dose, the scales on the plywood are used. The board is covered with a piece of tracing paper, and each dose response is marked off. The provisional and corrected curves relating log dose to probit or per cent response are obtained in the conventional manner, depending upon the method used. In plotting LD_{50} data, the scales on the plywood base of the board are covered with a piece of blank paper, the scales on the molding being used to obtain the dose-response curve. The log-dose values on the horizontal scale are chosen so that the greatest spread between doses will be obtained. This has a tendency to flatten the curve and make the results more accurate. The calculations for the provisional and corrected curves are done in the manner described by the method used.

[1] Obtained from the Winthrop Chemical Company, Rensselaer, New York.

References

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Conversion of Heart Potentials Into Auditory Equivalents

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For purposes of our research, it became desirable to have an instrument that would convert to auditory equivalents the changes in electrical potential occurring during the cardiac cycle. In consulting the literature, we found many instruments that involve the simple electronic amplification of the heart sounds (which may then be recorded graphically or phonographically) or the graphic or oscillographic recording of the changes in heart potential: amplifying stethoscopes, recording stethoscopes, stethographs, and electrocardiographs; but we were unable to find what we have termed an electrocardiophone or EKP: an instrument that, instead of expressing the heart potentials in graphic form, expresses them in auditory equivalents.

In developing a frequency modulation amplifier suitable for our purposes, preliminary difficulties were met in handling the extremely low frequencies without distortion. These difficulties have been largely overcome, although alternating-current fields and similar electrical conditions must be avoided.

The basic circuit of the electrocardiophone utilizes the fact that two radio frequencies will produce a beat frequency when fed into a suitable detector circuit. Since the beat frequency is equal to the difference between the frequency of oscillator I and oscillator II, it will be an audible frequency if the oscillators are within a few kilocycles of each other.