Philippines. The damage resulting from the disease to both seedling and field plants caused great concern in several tobacco-growing areas. Spraying and needle puncture inoculations recently conducted in this laboratory have shown the culture to be pathogenic for tobacco. On the basis of its disease-producing ability in plants, this organism has been placed by systematists among the phytopathogenic bacteria.

In the course of a serological study of the green fluorescent group of phytopathogenic bacteria, to which *Phytomonas polycolor* has been ascribed, it was found that this organism was extremely virulent when introduced into small laboratory animals. Rabbits, guinea pigs and mice were found to be susceptible. Intraperitoneal injections of 0.05 cc of a 24-hour broth culture proved fatal to mice in 12 hours, while 0.25 cc killed 300 g guinea pigs in the same period of time. The intravenous injection of 0.2 cc of a bacillary suspension brought about the death of 2,000 g rabbits in 24 hours. Bacterial cells which had been washed free of metabolites were found to be as lethal as were the broth cultures. In each case the organism was recovered in pure culture from the heart's blood, spleen, liver and lung. Intravenous injections into mice of 0.2 cc of the sterile filtrate of a broth culture failed to kill, whereas the same culture unfiltered was fatal. Varying amounts of washed bacterial cells which had been killed by heating at 55° C for 1 hour failed in each instance to kill mice. Sterile filtrates of lysed suspensions of the organism (lysed by alternate freezing and thawing) were apparently toxic for mice on intraperitoneal and intravenous injection but failed to cause the death of the animals. It was possible to isolate the organism from the blood stream in moderate quantities 5 or 6 hours before death, and in great numbers just previous to death. There seems no doubt, therefore, that this organism multiplies within the animal and manifests itself in a true bacteraemic fashion. That the organism is not particularly invasive is evident from the fact that very small doses were not fatal. Forced feeding of the organism produced no ill effects. Fifteen other organisms of the green fluorescent group of plant pathogens failed to produce any of the results noted above.

Although a comparative study has not yet been completed, all available evidence points to the probability of this organism being *Pseudomonas aeruginosa* (Schroeter) Migula. Whatever its true identity, the ability to multiply in both animal and plant tissues is remarkable. The fact that both animals and plants are susceptible to experimental infection makes this organism interesting from an evolutionary point of view.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SCALE FOR GRAPHICALLY DETERMINING THE SLOPES OF DOSE-RESPONSE CURVES

THE following device, which may have been overlooked by other workers in the field of biological assay, has been found useful in our laboratories for the routine estimation of the slopes of such dose-response curves as may be transformed into straight lines. It is based on the well-known fact that the slope is a tangent. As Fig. 1 shows

$$b = \frac{y_2 - y_1}{x_2 - x_1} = R \tan \theta \text{ or } \tan \theta = b/R.$$

In these equations b is the slope, x_2, y_2 and x_1, y_1 are the coordinates of any two points on the line, θ is the indicated angle and R is the ratio of the length of one plotted unit of dose to the length of one plotted unit of response. The dose-response curve must be plotted in such a way as to give a straight line. This usually can be done for the graded response type of data by plotting response against the log dose. And the curve for the all-or-none type of data may be made straight by converting the response into probits by means of tables developed by Bliss[1] and then plotting the probits against the log dose.

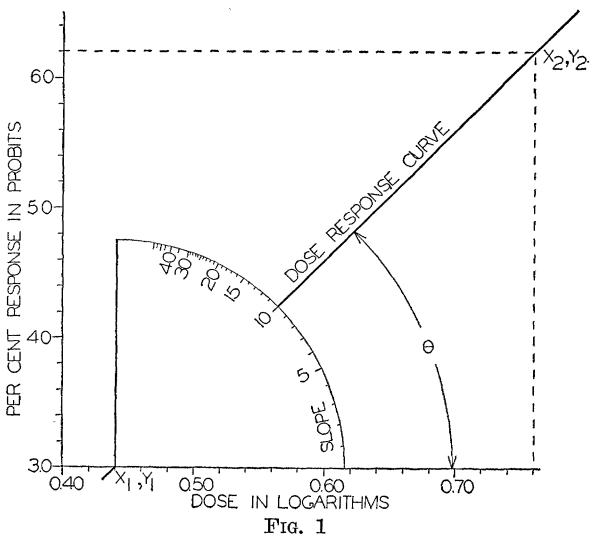

FIG. 1

[1] C. I. Bliss, *Quart. Jour. Pharm. and Pharmacol.*, 11: 192, 1938.

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 θ	θ 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 θ was calculated by substituting the corresponding slope figures in the equation $\tan \theta = b/10$. The values of θ 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

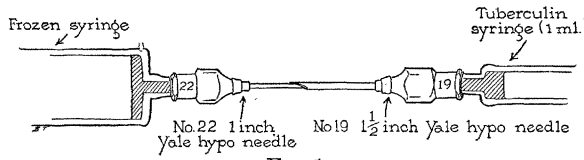

FIG. 1.

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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