to cool at room temperature. When it is cool enough to handle comfortably, the decoction is filtered through nonabsorbent cotton into Erlenmeyer flasks to a depth of about one centimeter. The flasks are plugged with cotton and set aside for 24 hours to permit the solution to cool and become sufficiently aerated.

Plankton is taken at the desired habitat, and inoculations are made as soon as possible by merely shaking the plankton mixture and pouring a small portion of it into the nutrient solution. These gross cultures are exposed to north light at room temperature and allowed to develop for 2 weeks. A microscopic examination will now reveal the organisms which may be most easily isolated and grown. The gross culture is shaken vigorously, portions being poured into watch glasses and, while viewed under a dissecting microscope, diluted to a point providing a satisfactory dispersal of the material. A fine pipette is used to withdraw several of the desired individuals, which are placed in fresh nutrient solution. The inoculated cultures are shaken and exposed to strong illumination from Mazda fluorescent 25-watt lights (each sufficient for 20 to 25 cultures) for about 12 to 14 hours daily. After a week, the cultures are inspected each day for signs of development. When such is detected, a few organisms are removed with a capillary pipette and transferred to fresh media. After three or four subcultures are made in this way, development is allowed to become more extensive until a suitable amount of material can be withdrawn for a thorough microscopic examination. Some cultures will be found to be unialgal at this stage, while others must be subcultured further until they are satisfactory. Vigorous shaking of the culture after inoculation, as well as use of small portions for inoculation, will yield the best results.

The use of artificial illumination materially speeds growth and shortens the time between each subculturing by 5 or 6 days. Unialgal cultures established in this nutrient were subcultured every 60 days. This was done by merely shaking the culture and pouring a small portion into a flask of fresh medium. Uninoculated media may be stored in an icebox for several days without appreciable change.

The combination of this medium and method of culture is suggested as being potentially useful in many ways, such as maintaining organisms for feeding or life-history study, providing large populations of otherwise scattered forms, growing soil algae, or furnishing a constant source of material for teaching purposes.

Pennate diatoms, especially *Nitzschia* and *Navicula* spp., were found to be particularly adaptable to this culture medium. The centric diatoms, *Coscinodiscus, Chaetoceras, Melosira* spp., did not develop so well, and the dinoflagellates, *Ceratium* and *Glenodinium* spp., did not grow at all. It may be noted also that various forms of marine or brackish Myxophyceae, such as *Spirulina subsalsa* and *Lyngbya semiplena,* grow luxuriantly.

A Slide Rule for the Addition of Squares

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Some years ago the writer had occasion to solve several thousand problems of the type: $d = (x^2 + y^2 + z^2)^{\frac{1}{2}}$. For the purpose a slide rule with appropriate square and square-root scales was constructed. Its convenience, demonstrated in continued use, leads him to believe that it might be found helpful to others in the solution of problems involving square roots and squares and the addition and subtraction of the latter. Such problems are often encountered in, for example, geometry and trigonometry (*cf.*: $2bc \cos A = b^2 + c^2 - a^2$).

The fixed part of the rule consists of two meter sticks, grooved as shown in diagram (a), and screwed to a baseboard. A hardwood slider about 103 cm. long is grooved to fit between the meter sticks. The cursor (diagram (b)) consists of a piece of glass mounted with Duco cement between two pieces of metal, fitted so as to slide in slits in the edges of the meter sticks. A hair line is scratched on the under side of the glass. About 1.5 cm. to the left of the zero end of the meter sticks a "stop" (see diagram (c)) is screwed to the baseboard.

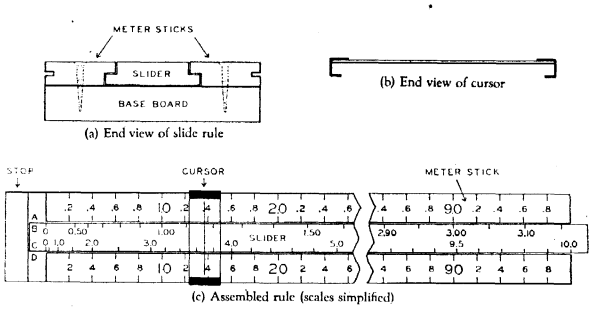

FIG. 1

Decimals added to the numbers on one of the meter sticks give A (diagram (c)) a scale which is linear from 0.0 to 10.0. The D scale, on the other meter stick, is linear from 0 to 100.

The corresponding square-root scales B and C on the slider are from 0.00 to 3.16 and from 0.0 to 10.0, respectively, as indicated in diagram (c). These

scales were marked off with the slider firmly clamped in the null position, its left end being against the stop. Sharp graduation lines in the desired positions were cut with a razor blade. Carbon black was worked into the cuts to make the lines stand out clearly. The surface was then sanded clean, the numbers were written on with India ink, and the surface was varnished.

A little practice enables the more accurate scale for the problem at hand to be chosen quickly. With the slider in the null position, squares and square roots can be read from the rule directly. Square roots of numbers from 1 to 10, from 100 to 1,000, from 0.01 to 0.10, etc., would ordinarily be sought on the upper half of the rule, while square roots of numbers from 10 to 100, from 1,000 to 10,000, from 0.10 to 1.00, from 0.0010 to 0.0100, etc., would be sought on the lower half, keeping in mind any necessary shifts of decimal points.

Similarly, in problems involving sums of squares the upper half would be used for sums approaching 0.10, 10, 1,000, etc., and the lower half for sums approaching 0.01, 1, 100, 10,000, etc.

To solve for x in the problem: $x = (1.53^2 + 0.95^2 + 2.17^2)^{\frac{1}{2}}$, one can proceed as follows: With the slider in the null position (pushed against the stop), the cursor is set on 1.53 on the B scale. (The reading on the A scale is now 2.34.) The slider is then moved so that its 0.00 is under the hair line on the cursor. The cursor is then moved to 0.95 on the B scale. (The A scale reading, the sum of the two squares, is now 3.24.) Again the slider is moved so that its 0.00 is under the hair line. The cursor is next moved to 2.17 on the B scale. (The A scale reading, the sum of the three squares, is now 7.95.) Finally the slider is pushed back to the null position, and the reading on the B scale, the square root of the sum of the squares, is seen to be 2.82.

Except for the final push to the automatically set null position, the sequence of movements in the solution of this problem therefore is exactly analogous to the series of motions involved in solving the corresponding problem: $X = 1.53 \times 0.95 \times 2.17$ on an ordinary slide rule.

With this rule the final answer in problems of the type just discussed can be recorded to three significant figures, with the error seldom larger than one unit in the third figure. In the majority of cases there is no error in the third figure. In fact, on some portions of the rule (particularly the right-hand end of the B scale) the answer can be read to four significant figures with less error in the result than would occur, on the average, in rounding off four-figure calculating machine answers to three figures.

An ordinary slide rule adds logs. This one adds squares. Obviously, similar rules could be designed and constructed for the addition (and subtraction) of other functions, such as cubes, roots, trigonometric functions, etc., or even for combinations of these, merely by providing the desired scales on the slider. The width of the slider could be increased to allow for as many scales as one might want to place on it. If it were desired to have slide rules available for several types of problems, in some cases appropriate interchangeable sliders could be constructed for use in a single base. In many cases meter sticks could be used for the linear scales on home-made rules.

A simple experimental model of any rule can easily be made by marking off appropriate scales on pieces of paper or cardboard, which can be folded and fitted together to serve as slider and fixed part.

Thanks should be expressed to Dr. O. L. I. Brown, now of the United States Naval Academy, for suggestions which he made concerning the construction of the rule discussed above.

An Impurity in Some Commercial Penicillin Preparations Which Interferes With the Diazo Reaction in Determining Blood Phenols

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While determining the free phenol content of the blood of a uremic patient, using the method of Schmidt (*1*), the following was observed: After extracting 35 ml. of the Folin-Wu protein-free filtrate plus 1 ml. of 10 N sulfuric acid for 2 hours with absolute ether, the free phenol was determined in 3 ml. of the ether extract, to which had been added 5 ml. of 95-per cent ethyl alcohol, 2 ml. of water, 1 ml. of diazotized *p*-nitroaniline reagent, and 3 ml. of 5-per cent sodium carbonate. The normal reaction yields a clear, straw-yellow to orange color. However, on this particular determination the final color which developed was an olive green, which, of course, made a colorimetric comparison impossible. This result was obtained with each of two blood samples taken on consecutive days.

Upon investigation it was found that 48 hours previous to securing the first blood sample the patient had received intravenously 220 000 Oxford Units of the sodium salt of penicillin (Brand I). The patient was anuric (except for one catheterized specimen) up to the time the blood sample was taken. It was hypothesized that the penicillin in the blood might be the cause of the adverse reaction, bearing in mind that penicillin is normally excreted in from 2 to 4 hours.