

clear. When viewed through the substrate, with suitable illumination, the progress of marginal growth can be accurately measured to 1 mm or better. When closed by means of the usual cotton plug this modified culture tube may be more satisfactory for many purposes than is the ordinary test-tube, Petri dish or standard Kolle flask.

In the writer's experiments ten culture tubes of this type, 2.5 cm in diameter and 20 cm long, are joined together and are operated as a single unit. Each tube is provided with a tightly fitted, 2-hole rubber stopper, bearing an inlet and an outlet tube, as shown in the diagram, so that any specified gas mixture may be passed continuously over the culture. The tubes are joined in series by short connections of rubber tubing. To prevent significant exchange of gas between inside and outside of the culture system and to reduce temperature fluctuations, the whole group is inverted and stands vertically in a water bath. The continuous gas stream not only maintains oxygen pressure practically the same for all cultures of a group, but it also insures the continuous removal of the CO₂ produced, which may be collected in absorption apparatus and measured from time to time in conjunction with the growth measurements.

THEO. C. SCHEFFER,

*National Research Council Fellow in
the Biological Sciences*

LABORATORY OF PLANT PHYSIOLOGY

THE JOHNS HOPKINS UNIVERSITY

RAPID WEIGHINGS WITH A TROEMNER SOLUTION BALANCE

THOUSANDS of weighings have been made during the past five years with a 20-kilo capacity Troemner solution balance. To avoid the inconvenient, tiresome and time-consuming method of getting the eye on a level with the pointer-end of the beam in order to make a correct reading, two very simple, but very satisfactory, additions were made to the balance.

The two additions consist of a damper, as shown in Fig. 1, *a*, and two white strips attached to the adjacent projections on the swinging and stationary beams (Fig. 1, *b*). In the center of each of these strips a black line about 1 mm wide was drawn, the two separate black lines appearing as one continuous line when the weighing beam is exactly balanced. Black and white enamel paints could have been used. The parts of the damper are of glass and aluminum to prevent corrosion. The liquid is glycerine and may be diluted or not, as convenience demands. The vessel containing the glycerine is covered to exclude foreign matter, except for a small opening in the center of the cover through which the disk support passes. It does not show in the figure, but the upper

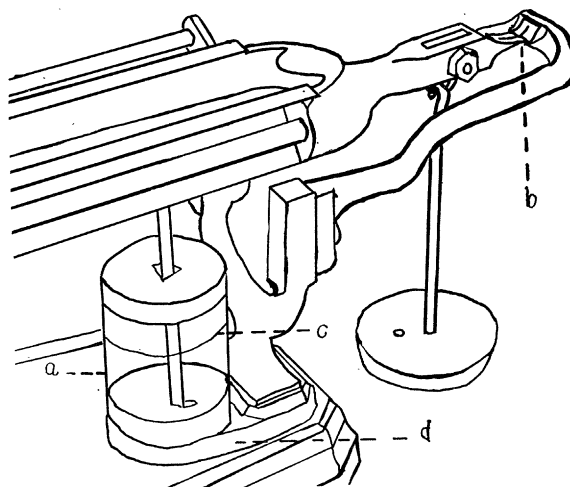


FIG. 1. Aids for reading Troemner solution balance: *a*, damper; *b*, black lines on white background; *c*, level of glycerine; *d*, tape to hold damper vessel in place.

end of the disk support is attached near the distal end of the rod which carries the adjusting rider.

Balance adjustments with objects weighing 15 or more kilos can be rapidly and accurately made to within 1 gram. It has proved helpful in making readings to provide a black background for the outer ends of the beams. This may be done by standing a black card on the table, allowing it to lean at right angles to and against the distal end of the stationary beam.

E. T. BARTHOLOMEW

E. C. RABY

UNIVERSITY OF CALIFORNIA
RIVERSIDE

BOOKS RECEIVED

- ALLEN, EDWARD M. *America's Story as Told in Postage Stamps*. Pp. 199. McGraw-Hill. \$2.50.
- BORRADALE, L. A. and F. A. POTTS and others. *The Invertebrata*. Pp. xv + 725. 483 figures. Cambridge University Press, Macmillan. \$4.00.
- BOYD, EDITH. *The Growth of the Surface Area of the Human Body*. Pp. xi + 145. 50 figures. University of Minnesota Press. \$5.00.
- CLEAVES, H. E. and J. G. THOMPSON. *The Metal—Iron*. Pp. xii + 574. \$6.00.
- COMPTON, ARTHUR H. *The Freedom of Man*. Pp. x + 152. Yale University Press. \$2.00.
- DAMPIER-WHETHAM, W. C. D. and MARGARET DAMPIER-WHETHAM. *Cambridge Readings in the Literature of Science*. Second edition. Pp. 275. Cambridge University Press, Macmillan. \$1.00.
- FINDLAY, ALEXANDER. *The Teaching of Chemistry in the Universities of Aberdeen*. Pp. viii + 92. Aberdeen University Press.
- GRIMSEHL, E. *A Textbook of Physics*. Vol. 5: *Physics of the Atom*. Pp. xiii + 474. Illustrated. Blackie and Son, London. 17s, 6d.
- HAWKINS, ALFRED C. *The Book of Minerals*. Pp. xii + 161. Illustrated. Wiley. \$1.50.
- VALENTINE, WILLARD L. *Student's Guide for Beginning the Study of Psychology*. Pp. 267. 56 figures. Prentice-Hall. \$2.35.