SCIENTIFIC APPARATUS AND LABORATORY METHODS

IMPROVEMENT OF DEW-POINT DETERMINATION

IN the visual determination of a dew-point temperature, a polished metal surface is viewed under conditions favoring sensitive detection of a slight condensation of water upon the metal. The change in apparent reflectance of the cooled surface caused by the condensation is most readily observed in a hygrometer of the Alluard type, in which the cooled metal is closely bordered by polished metal which is not cooled. However, the zone between the two surfaces can be seen, and it is well known that the minimum detectable brightness differential in a photometrical field depends critically upon the width of the zone between the portions of the field. Moreover, temperature differences in the cooled metal plate are such that condensation usually starts in a central spot, and the advantage of a closely neighboring comparison surface is therefore not of much significance.

An excellent photometrical field can be produced easily on a polished surface through the use of a wetting agent. A thin film of the wetting agent may be applied on an outer zone, leaving, for example, a rectangular central region untouched by the agent. All the film excepting an invisible layer is removed by rubbing with a clean cloth; the removal of the excess is done carefully, with strokes parallel to the edges of the plate, so that the two zones are sharply defined. Condensation of water upon the zone treated with the wetting agent immediately forms a continuous film and can not be seen, while the condensation upon the central zone occurs in the usual manner. Because of the exceedingly narrow line of demarcation between the two zones, it is believed that a reflectance differential of the order of 1.5 per cent. can be observed by an experienced operator. We have found that determinations of dew-point temperatures carried out with the technique described above are very appreciably more accurate (and more satisfying) than those previously made by the ordinary method.

From time to time it will be found desirable to clean and polish the whole metal surface, and apply a new film of wetting agent. Undoubtedly there are many agents which would function satisfactorily. The first one we tried (Victor Wetting Agent No. 35-B) left nothing to be desired.

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QUIETING PARAMECIUM FOR CLASS STUDY

THE method described below for quieting *Paramecium* obviates most of the difficulties experienced with the usual techniques of anesthesia or mechanical constraint. It has been used with uniform success for two years in our elementary zoology course, and also at Coe College.

Three grams of compressed yeast, 30 mg congo red and 10 cc distilled water are mixed thoroughly and boiled gently for ten minutes. (This amount is ample for 200 students.) A thin ring of vaseline, 15 mm in diameter, is made on a slide with a syringe, and into this is put a drop from a very rich infusion of paramecia. This drop is then stirred with a teasing needle which has been dipped one-half inch into the stained yeast, and a cover is added and pressed down sufficiently to permit observation with the 4 mm objective. The color of the drop should be pink, not red, as too thick a suspension hinders observation. The medium keeps satisfactorily for at least a week if stoppered and refrigerated, and should be shaken before use.

Feeding begins at once, and in five minutes nearly all animals have several vacuoles of diverse sizes packed with bright red yeast cells. At first the animals swim rapidly, but in less than ten minutes many individuals settle down. They tend to aggregate at the surfaces of air bubbles, clumps of yeast or masses of zooglea (which last may profitably be added), often lining up like pigs at a trough. The student can then see in different animals all stages of feeding, including the ciliary beat and currents in the gullet, the filling of the vacuole, its elongation and pinching off, its course through the cytoplasm and the eventual defecation of the apparently indigestible yeast. Moreover, since congo red is a hydrogen ion indicator, it gives evidence of chemical changes occurring in the food vacuoles: In most animals the majority of vacuoles are bright orange-red (pH 5.0 or above), but usually these are interspersed with brilliant blue vacuoles (pH 3.0 or below) and with some of intermediate purple. The indigestibility of the yeast is a possible cause of another instructive phenomenon, for it can often be seen, after a time, that some of the paramecia are rejecting all but an occasional yeast cell, and forming vacuoles packed with bacteria.

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BOOKS RECEIVED

BELL, CLIFFORD and TRACY Y. THOMAS. *Essentials of Plant and Spherical Trigonometry.* Illustrated. Pp. vi + 142. Henry Holt and Company. $1.80.

BENNETT, H. *Practical Emulsions.* Pp. x + 462. Chemical Publishing Company. $5.00.

FISHER, RONALD A. and FRANK YATES. *Statistical Tables for Biological Agricultural Medical Research.* Illustrated. Pp. viii + 98. Oliver and Boyd, Ltd. 13/6 net.

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