

nearly two years a relatively inexpensive multiple constant temperature apparatus meeting these requirements. It contains a single refrigeration chamber from which a non-freezing fluid circulates through the other chambers, each of which is provided with a simple heating unit (an incandescent light bulb in our case) controlled by an accurate thermoregulator. The flow of cold fluid need be regulated only roughly. For temperatures above the possible high level of room temperature, the flow of cold fluid is of course stopped.

We have not as yet tried to maintain temperature above 50° C. or more than slightly below freezing, but these extremes in our own practice do not necessarily mark the limits to which the apparatus is adaptable. Similarly, although we have now only six culture chambers, there is no apparent reason why the number of chambers may not be increased.

The setting of the temperature in any chamber to a tenth of a degree requires but a few minutes or perhaps a half hour, depending upon one's skill in manipulating the thermoregulator. Thereafter the temperature of the chamber remains constant for weeks or months, unless a change is desired or an accident intervenes, and, with ordinary care, the latter contingency need rarely, if ever, arise. Because of the heavy insulation, even the cessation of electric currents for a short time effects little change; the circulation of cooling fluid, as well as the operation of the heating unit, is arrested with interruption of electric current.

This multiple-chambered constant temperature apparatus is described and illustrated in a forthcoming issue of the *Journal* of the Elisha Mitchell Scientific Society.

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THE VISUALIZATION OF DIFFERENT ORGANS IN NORMAL UNANESTHETIZED ANIMALS

EXPERIMENTS have recently been performed in which the colons of cats were made permanently opaque to x-rays by injecting a solution of thorium dioxide (Thorotrast) just underneath the serous membrane at various points along the entire length of the colon wall. Three to four weeks after the operation this material became quite uniformly distributed, so that it gave a clear outline of the organ which could be studied in an empty as well as a distended state.

The animals showed no harmful effects from the presence of the Thorotrast. One cat, whose colon was injected over sixteen months ago, and three others more than seven months ago are still in apparently perfect health.

Experiments to visualize the stomach and urinary bladder of cats as well as the crop, gizzard and uterus of the fowl in the same manner are now under way which promise to give results just as satisfactory as those obtained on the colon.¹

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A METHOD OF DEMONSTRATING CO₂ PRODUCTION DURING RESPIRATION

BARIUM hydroxide and the formation of barium carbonate have been much used in elementary botany classes to demonstrate the production of CO₂ by germinating seeds during respiration. The writer has made use of a method which is even more striking and which requires no special apparatus. Two 250 cc Erlenmeyer flasks are connected in series by the usual method, *i.e.*, right angle glass tubing, rubber tubing and single hole cork stoppers. In flask A are placed 100 pea seeds which have been germinated from 12 to 24 hours. In flask B are placed 50 cc of an alcoholic solution of phenolphthalein, to which has been added a drop of 10 per cent. NaOH, just sufficient to give the solution a brilliant red color. Before the apparatus is connected the students are shown the characteristic color reaction of phenolphthalein in acid and basic solutions. The connection is then made between flasks A and B and in a few days it will be noted that the phenolphthalein solution has lost its color. This demonstration has been found to be of interest to students in the class in elementary plant physiology at Vanderbilt University and might easily be used to supplement the usual demonstration in the general course.

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¹ A more complete description of this method will appear in the *Anatomical Record* of 1937.

BOOKS RECEIVED

- ALLISTON, NORMAN. *Mathematical Snack Bar; A Collection of Notes and Results*. Pp. 155. Heffer, Cambridge, England. 7s. 6d.
- Collection de Monographies sur la Théorie des Fonctions. *Théorie Générale des Fonctionnelles*. Tome I: *Généralités sur les Fonctionnelles, Théorie des Equations Intégrales*. Vito Volterra et Joseph Pérès. Pp. xii + 359. Gauthier-Villars, Paris. 100 fr.
- DE DONDER, TH. and PIERRE VAN RYSELBERGHE. *Thermodynamic Theory of Affinity; A Book of Principles*. Pp. 142. 4 figures. Stanford University Press. \$3.00.
- Transactions of the Royal Entomological Society of London. Vol. 84, *The Tsetse Flies of East Africa; A First Study of their Ecology, with a View to their Control*. C. F. M. SWYNNERTON. Pp. xxxvi + 579. 33 figures. 22 plates. The Society, London.