This is a biological text intended for use by high-school students in the ninth and tenth grades. It is a carefully considered, well-organized book written by experienced teachers. The student is stimulated to think about things biological, especially those related to man, and his capacity is continually increased. Topics are considered under twelve "units," presented as questions, in the following order: obtaining and using food, growth, reproduction, ecology, behavior, classification, economic biology, evolution and conservation.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

IMPROVED KYMOGRAPH RECORDING

SINCE the introduction of smoked, glazed paper for kymographic recording, numerous attempts have been made to obviate many of the disadvantages of this method. Of these attempts the most recent have been the successful efforts of Wichart, Thienes and Visscher,[1] and Patterson.[2] The former group of investigators employ cellophane coated with carbon sprayed from a pressure air gun, whereas Patterson delivers ink from quill pens against white, glazed paper. The former method allows for direct reproduction in the lantern by simple insertion between two glass plates but still retains the disadvantage of requiring carbonizing before and fixing after recording. Patterson's method simplifies preparation of a record which requires no shellacking but requires photographing for reproduction in the lantern.

More recently Warren[3] reported the use of cellophane as a transparent preparation, capable of receiving impressions from carbon paper in the typewriter or by pencil pressure. He cautions, however, against handling, which removes the carbon particles from the cellophane.

We have found cellophane an excellent recipient for India ink, which dries almost immediately and resists violent finger friction. Cellophane also takes red, blue and green ink (concentrated by evaporation to one half or one third volume), and thus allows for differential tracings to be made of any type of drawing, photograph or record.

We have further utilized the ink-taking properties of cellophane in keeping permanent records of physiological activity to be kymographically registered. Curved glass capillary tubes of very fine bore deliver ink to the cellophane, which is held in position on the kymograph drum by library paste or rubber bands. To afford less chance of breakage capillary tubes can also be bent to lead ink to the inner surface of ordinary steel writing pens, which are supported on light reed or aluminum recording levers. To render the record easily discernible, the drum is first covered with permanent white facing—either enamel or paper.

This type of cellophane record requires no smoking nor fixing. The ink will not rub off unless it is moistened with water or alcohol, in which case the cellophane will retake ink at site of removal. Any part of the permanent record, as suggested by others,[1, 3] can be placed between glass plates and used directly in the projection lantern. The economy of the method, obviating smoking, shellacking and photographing parts of records, is apparent.

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[1] W. F. Wichardt, C. H. Thienes, M. B. Visscher, SCIENCE, 73: 99, Jan. 23, 1932.

[2] T. L. Patterson, Demonstration, The Federation of Amer. Societies for Exp. Biol. Philadelphia, April, 1932.

[3] K. L. Warren, SCIENCE, 76: 573, Dec. 16, 1932.

AN INEXPENSIVE PYROMETER FOR TEMPERATURES UP TO 1000° C

THE use of an electrical muffle furnace in operations such as ashing of biological materials makes the control of temperatures up to 1000° C. highly desirable. Finding most manufactured pyrometers expensive we originally fashioned a simple thermocouple of chromel-alumel and calculated the temperature from e.m.f. as measured by a student potentiometer. Subsequently we used an inexpensive microvoltmeter procured through the Weston Electrical Instrument Corporation, Newark, N. J., who were kind enough to modify one of their standard instruments (Model 301) and equip it with a scale calibrated in centigrade degrees, the entire assembly making a direct reading pyrometer with a range up to 1000° C. accurate to ± 10° C. and obtainable at nominal cost.

No. 14 gauge pieces of chromel and alumel wires each about 3 ft. long were twisted together tightly for a distance of one inch. The twisted ends were protected from corrosion by means of a small silica test-tube packed with asbestos fiber. The free ends were insulated from each other by short lengths of silica tubing sufficient to bring the wires out of the back of the oven and were held in position far enough from the oven to avoid being heated by radiation. They were then connected to copper leads, which ran to the reading instrument. Changes of ambient temperature about this junction were not compensated for, and, for the accuracy desired, could be neglected. The modified microvoltmeter was made for us by the