quality, intensity of the light and the life of the lamp are dependently related. For a closer approach to average daylight the lamps may be operated at from 100 to 105 per cent. of their rated voltage. When the average line-voltage during normal operation is 115 volts (*i.e.,* at full-load conditions of the circuit being used) lamps having a rated voltage of 110 volts may be used. This results in 60 per cent. of lamp life, 107 per cent. watts consumed, 116 per cent. light intensity and a color quality richer in the blue. The cost of operation (lamps plus energy) under these conditions is not an increase per unit of light, and permits the use of smaller bulbs for the same intensity and of a whiter light.

(4) The fixture-unit (see Fig. 1) has been sturdily

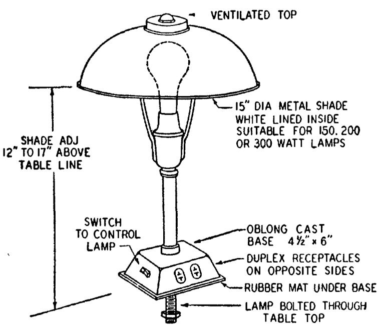

Fig. 1

built. It is flexible in construction, with parts readily accessible. The height of the unit may be adapted so that the lower edge of the reflector hood is fixed at some arbitrary distance above the table top; *e.g.,* 12 inches for tables using one or two microscopes and up to 17 inches for tables using 6 microscopes. The reflector hood is ventilated to provide better lamp life. Its stem is intended to be rigidly connected to the table top to facilitate concealed table wiring; but this may be modified at a slight additional cost to permit surface wiring or use as a portable unit. A rubber guard is placed between the base of the unit and the table top to protect the wiring from liquids accidentally spilled around the base.

(5) The duplex receptacle outlets have been located in the lamp base convenient for simultaneous use of four electrical appliances, such as stage warmers, micro incineration outfits, etc. A separate toggle switch controlling the lamp only is also located in the base of the unit.

(6) Finish of the unit is made durable by a dull black bakelite coated surface; but may be altered to match other requirements. The interior (*i.e.,* reflecting) surface of the hood is a matte white having a coefficient of reflection of 94 per cent. in comparison with a standard magnesia test surface.

The reflector hood is proportioned and located to minimize direct glare from the unit itself and also from units on neighboring tables. The lamp proper is placed in the "base-down" position and only a portion of the neck of the lamp is visible. When the inside frosted blue daylight lamp is used, this visible neck portion of the lamp is free from objectionable glare.

(7) Low cost is obtained because of the simplified design, use of standard fittings and standard lamps. This low initial cost is accompanied by decreased wiring costs when making the installation because both the lighting and receptacle outlet loads are furnished from the same branch circuit, thus making it unnecessary to provide one complete branch circuit for the lighting and another complete branch circuit for the receptacle outlets. This unit may be installed in an existing laboratory without prohibitive rewiring costs.

Laboratory replacements are in progress using this new fixture at the Marine Biological Laboratory, Woods Hole, Massachusetts, with the cooperation of the Biddle-Gaumer Company, Philadelphia, and the laboratory facilities of the Moore School of Electrical Engineering, University of Pennsylvania.

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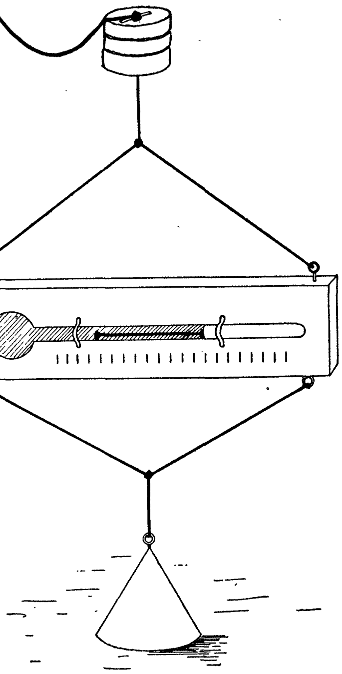
A SIMPLE SUBSURFACE THERMOMETER

In order that fishermen may take advantage of the findings of recent research into the relationship of fish to water temperature it is necessary that a subsurface thermometer be used in the course of fishing operations. The difficulty so far has been to devise an instrument of low cost. The apparatus described here entails only the purchase of an ordinary minimum thermometer. Since reversals of temperature gradient are comparatively rare, especially in water of less than 50 fathoms, the minimum thermometer can be used for practical purposes to give the temperature at the greatest depth to which it may be lowered.

The precaution necessary in its use is that it must be maintained in the horizontal position throughout the operation of lowering and hauling; otherwise the double-headed pin may slide. As a rule the pin is not very sensitive and will usually stand a tilt of as much as 30° without sliding. The accompanying illustration shows the means of maintaining the thermometer in the horizontal position.

It is suspended between the opposing pulls of a submerged float and a weight. The lifting power of the float is considerably less than the sinking power of the weight. The figure shows the apparatus resting on the sea-bottom, the usual position at which a temperature will need to be taken. The hauling



line is slack. Before lowering, the thermometer must be tilted so that the pin touches the meniscus. As the column contracts it is drawn back and left behind on subsequent expansion of the column as the thermometer reenters a zone of higher temperature. In the figure the size of the thermometer is exaggerated. In practice the distance from the thermometer to the sinker should be about a yard. On lowering, the bottom will be felt as in an ordinary sounding; and the observer has merely to wait a few minutes and haul up, the pull of the float maintaining the horizontal position throughout.

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A SPECIMEN MOUNT FOR INSECTS AND OTHER OBJECTS OF NATURAL HISTORY, ETC.

THE following description of a method of making permanent mounts of natural history specimens is based on work done at the Bermuda Biological Station in January to March in 1933, the plan being adopted during January with trials of different manipulations and with tests of the availability of each.

A dry cell is made by punching the center of a cardboard, bristol-board or similar material of different thicknesses or, where necessary, by building up to desired thickness by assembling several together, and then gluing a proper sized sheet of Cellophane to one side with duco or Cellophane adhesive, making a cell of sufficient depth to accommodate the object to be preserved. The cell and the object are dried by warmth and then the cell closed by applying adhesive to the upper side of the card and drawing the Cellophane down over the cell and pressing it to make a smooth adhesion and, if desired, turning a lap over on the under side and closing the ends by laps of the Cellophane. This makes a mount that is completely enclosed by moisture-proof Cellophane protected from mold, moisture, insect pests or other sources of deterioration and is especially applicable for insect or other collections in tropical or humid climates. Specimens so mounted are available for immediate and convenient examination or study with lens or microscope, either compound or binocular, and can be studied from either side or even at a considerable angle, since the thin layer of Cellophane does not interfere with extremely close study. Records or labels placed on the cards before sealing are also permanently protected by the transparent covering. Specimens mounted in this manner during January and exposed for a number of weeks to the attacks of ants, cockroaches and other pests and also to molds have shown no traces of injury, and it is believed that they will maintain their condition for an indefinite period. Delicate insects like mosquitoes and parasitic hymenoptera as well as insects of larger size are kept in perfect condition.

These mounts have been observed by a number of workers at the Bermuda Biological Station and have also been shown to a number of other specialists and all have agreed that the method seems to have a wide application and to be worthy of special notice.

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SPECIAL ARTICLES

THE ABSOLUTE MOTION OF THE SOLAR SYSTEM AND THE ORBITAL MOTION OF THE EARTH DETERMINED BY THE ETHER-DRIFT EXPERIMENT[1]

THE ether-drift experiment, first suggested by Maxwell in 1876 and made possible by Michelson's invention of the interferometer in 1881, though capable of being applied to the detection of the general absolute motion in space of the earth, was actually arranged for detetcing only the known orbital component of the earth's motion. For the first time, in 1925 and 1926, at Mount Wilson, the writer made observations of such extent and completeness that they were sufficient

[1] Read before the National Academy of Sciences, Washington, D. C., April, 1933.