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Reprinted from TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY
Vol. 90, No. 4, October, 1961
pp. 500–501

A Technique for Direct Photography of Translucent Objects[1]

The method described below was developed to demonstrate annuli in otoliths of various serranid fishes in which the age or number of rings is large. It is believed that the method might have wider application.

Otoliths were brushed vigorously with a detergent solution and placed in glycerin for clearing. The otolith was placed on a transparent specimen platform (Figure 1) consisting of a black plastic jar top with a circular hole cut in it and cemented to a 9-inch square transparent plastic sheet (less than 1 millimeter thick). The jar top was filled with sufficient glycerin to immerse the specimen and then placed on a photographic enlarger stage. The stage was then raised or lowered to attain the desired magnification and adjustment made to focus the specimen on an enlarging easel. Any type photographic en-

[1] Contribution No. 57.

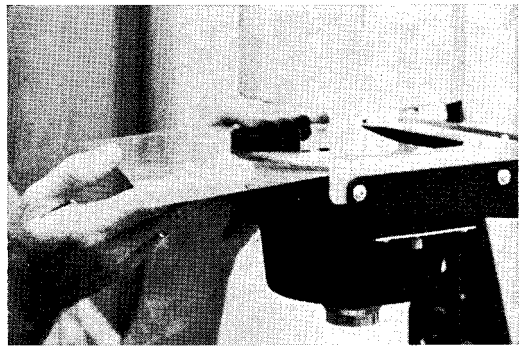

FIGURE 1.—Transparent specimen platform displaying affixed jar top.

FIGURE 2. — Otolith of *Epinephelus morio* — 5+ years old. Cleared in glycerin for 28 days.

larger can be used for this projection, but in the present case a Simmon Omega with proper condenser and lens for 35-millimeter film was used. This arrangement permitted a larger projected image at a given enlarging position than the condenser and lens for larger film sizes.

The image was projected directly onto F-5 Kodabromide printing paper which was developed in Dektol, washed in a weak acetic acid solution, fixed, and washed for 1 hour. In order to obtain a moderate depth of field with specimens 1 to 2 millimeters thick, a lens aperture of f 10 was adopted as standard. An exposure time of 35 seconds for younger, thinner otoliths and as long as 70 seconds for older, thicker structures was required. More contrast was obtained in developing by decreasing the 2:1 suggested ratio of water to Dektol. Essentially, the picture represents a negative image (Figure 2). Contrast is increased by printing directly so that no intermediate transfers to film are involved. The use of direct light through the structure rather than reflected light increased contrast. Apparent sharpness is gained through increased contrast and by the absence of grain, which is a problem when 35-millimeter film is used. One disadvantage of the method is that no permanent negative is produced; however, by saving the specimen, pictures can be made quickly at any time.

The chief advantages of this technique are that it obviates the use of camera and film and permits rapid photography of a series of specimens of known quality. The chief disadvantage is that the method is limited to relatively thin and/or transparent specimens.

Dr. Shoemaker of the Rochester Institute of Technology (personal communication) suggested exposing the image on the enlarging easel to a negative emulsion so that one might have a permanent negative. Such a procedure would increase the time required and contrast might be lost using a film base unless a high contrast developer such as D-19, made especially for scientific and technical work, is used.

ACKNOWLEDGMENTS

We gratefully acknowledge the aid of G. K. Reid, Florida Presbyterian College, who read and criticized this note. W. S. Shoemaker contributed suggestions and encouraged the authors.

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