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# PECTORAL-SPINE EMBEDDING TO FACILITATE SECTIONING FOR AGE ANALYSIS OF YOUNG CHANNEL CATFISH (*ICTALURUS PUNCTATUS*)*

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We describe a method of preparing pectoral spines from juvenile channel catfish *Ictalurus punctatus* and other ictalurid species that allows easy sectioning and aging. The method uses marine epoxy poured into molds that enables the encased spine to be held firmly for sectioning with a saw. The technique costs less than US$10 to prepare up to 500 spines and takes only a few hours

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Validation of length-frequency age analysis using hard bony structures such as otoliths, fin rays and spines is especially important when dealing with early age class fish (Sneed, 1951; Ambrose, 1983). Sectioning pectoral spines for aging juvenile channel catfish *Ictalurus punctatus* and other species with small spines using a jewelers saw is difficult. Smaller spines may be too short for most spine saws and are difficult to hold securely in the appropriate orientation. Various wooden blocks and/or modified clamp chucks have been use to secure spines in position on saws for sectioning (Margenau, 1982; Chilton and Beamish, 1982). In addition, small spine sections often fly off the saw and can be easily lost. To avoid such problems associated with sectioning spines with a saw, researchers have developed as number of decalcification techniques that allows sectioning with razor blades or scalpels (Perry, 1967; Scholl, 1968; Ashley and Garling, 1980). However, these techniques are time-consuming, requiring from 1–7 days for spine decalcification prior to sectioning.

Embedding of spines in epoxy resin has been used as an alternative approach to facilitate sectioning (Andrews, 1963; Margenau, 1982; Chilton and Beamish, 1982). A variety of wooden, fiberglass or aluminum molds has been used to hold the spine and resin during the hardening phase. Based on these earlier techniques, we describe an easy and inexpensive method for embedding spines for sectioning using marine epoxy and straws. This technique does not require modifications to the jewelers saw for holding the spines during sectioning.

Clear drinking-straws (0.25 inch diameter), cut into 2–3 inch lengths, are used as molds for epoxy resin. A piece of board is drilled with 5/16 inch holes to hold the straw sections upright. Holes are drilled 0.5 inches deep, one inch apart, making rows across the length of the board. Each hole is numbered sequentially to correspond with the spine to be embedded. Before inserting straws the holes in the board are filled with petroleum jelly and the excess wiped off. The petroleum jelly seals the lower end of the straw and a light film of lubrication over the board serves to keep the epoxy from adhering to the board after it hardens.

These steps are completed before mixing the resin. After spines are cleaned they are ready for embedding. The resin is mixed with hardener as per directions on the can and poured immediately into the straws. At 77°F, the resin we used (Evercoat Marine Resin: Fibre Glass-Evercoat Co., Inc. 6600 Cornell Road, Cincinnati, Ohio 45242) begins to gel

in 30 minutes, but depending upon air temperature and the amount of hardener in the mixture, setting time will vary. The resin can be thinned and cleaned up using acetone. It is most effective to mix just enough resin to fill 25–30 straws (40ml) at a time. As the resin begins to set up, spines are embedding by inserting the distal end into the straw keeping the spine as vertical as possible. The spine should be centered in the straw with the knuckle of the spine just below the surface of the hardening resin. Forceps may be used to insert very small spines.

After the last spine is embedded, straws should be left in a well-ventilated area for two to three hours to harden. Leaving straws overnight at room temperature allows ample time for the compound to cure. Hardening time can be decreased to less than an hour if embedded spines are placed in a drying oven at 90–120°F. After removing straws from the board, the plastic straw is removed from around the hardened resin by cutting length-wise with a razor blade or scalpel. The spine is then ready for sectioning, or it can be placed in its envelope. Spine cross-sections with hardened resin are then mounted on slides using a permanent mounting medium.

This technique allows quick and easy analysis of spines from juvenile channel catfish or any other ictalurid less than 5 inches total length. Spines can be manipulated readily for sectioning with a spine saw because of the elongated and regular cylindrical shape of the resin plug surrounding the spine. The epoxy enveloping the spine helps prevent spine sections from shattering or flying off during sectioning. Other time-consuming methods such as decalcification (Perry, 1967; Scholl, 1968; Ashley and Garling, 1980) are not necessary with this procedure, thus a number of spines can be prepared for sectioning in a few hours. Use of a drying oven can reduce time for hardening, allowing sectioning within an hour after pouring the epoxy. This technique is relatively inexpensive, with embedding materials to prepare up to 500 pectoral spines for sectioning costing under US$10.

This method of spine preparation can also be used for embedding small spines of other species. We have analyzed pectoral spines from black bullheads, *Ictalurus melas*, and flathead catfish, *Pylodictis olivaris*, using the procedure.

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