IDENTIFICATION OF WISCONSIN CATFISHES (ICTALURIDAE): A KEY BASED ON PECTORAL FIN SPINES

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Abstract

A key to the pectoral fin spines of the freshwater catfish of Wisconsin is provided and these are compared with the spine characters as described from regions adjacent to or near Wisconsin. The key is based upon the size, shape, and orientation of the spines and the bony structures found on them.

INTRODUCTION

Identification of catfish species is not always easy. Conventional means of identification are such features as the number of anal fin rays and the color of chin barbels, which are not always conclusive since there is considerable overlap between species. For example:

Overlap of anal ray counts in the genus *Ictalurus* (Slastenenko 1958, Pflieger 1975, Becker 1983).

species	anal ray count		
	Slastenenko	Pflieger	Becker
Ictalurus melas	16-22	17-21	15-21
Ictalurus nebulosus	19-24	22-23	21-24
Ictalurus natalis	23-28	24-27	24-27

The present study confirms that, by analyzing pectoral fin spines alone, most Wisconsin catfishes can be identified to species.

Since pectoral fin spines are persistent bony structures they are useful in providing the biologist with an important tool for the identification of badly decomposed specimens, skeletal materials, and food habits of fish-eating birds, mammals, and reptiles.

MATERIALS AND METHODS

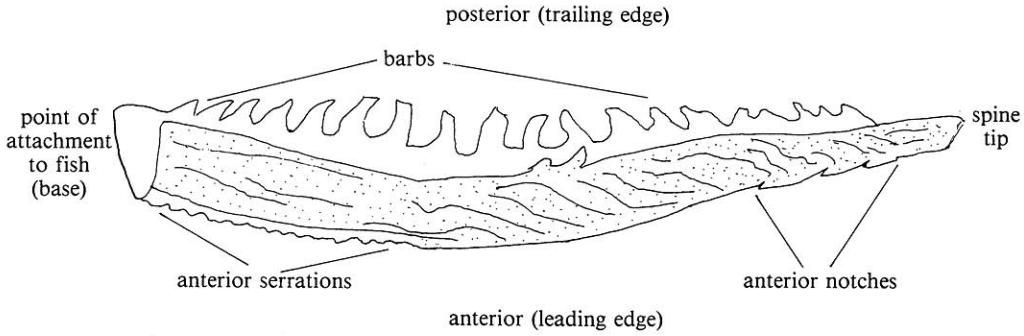
The following key to the spines of the ictalurids of Wisconsin is based upon the observation of spines from 571 *Ictalurus melas,* 102 *Ictalurus natalis,* 83 *Ictalurus nebulosus,* 60 *Ictalurus punctatus,* 4 *Pylodictis olivaris,* 145 *Noturus gyrinus,* 74 *Noturus flavus,* and 44 *Noturus exilis.* Personal collections were made from the Oconomowoc River and from the Wisconsin River, but the principal source of specimens was the Museum of Natural History at the University of Wisconsin in Stevens Point.

In this study the right pectoral spine, while held at right angles to the body was removed flush with the body using a jeweler's saw. The portion of the spine removed included the main shaft and its toothlike projections (barbs). Fin tissue was thoroughly teased from the spine with pins, razor, and forceps using a 20X dissecting scope. Characteristics of the ventral side of the spine were noted. Occasionally bony material on the dorsal side obscures size and shape of some barbs.

The bottom (ventral) side of the spine often shows important distinguishable features more readily than the top (dorsal) side. This is particularly true near the base of bullhead spines where bone on the dorsal side often obscures detail. Hence all drawings of the right pectoral spine which follow are made from the bottom (or ventral) side.

If one were to lay a fish upon its back with the tail pointing away, the spine on the right would be in the same position as the drawings in the key. Drawings of spines indicate typical shape and average adult size.

Terms used appear as follows:



Results

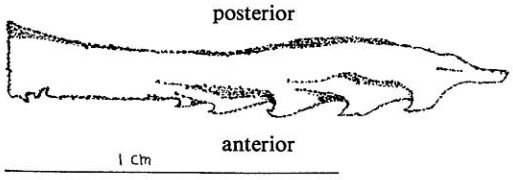
Key to Spines of the Ictaluridae of Wisconsin

1a. Barbs not present on posterior edge . 2

1b. Barbs present on posterior edge 3

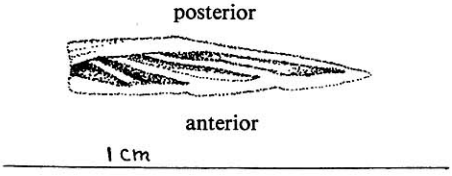
2a. Anterior notches prominent, wide, and deep, extending from tip at least halfway along shaft of spine. Surfaces of the base half of spine smooth and unfurrowed.

STONE CAT
Noturus flavus Rafinesque



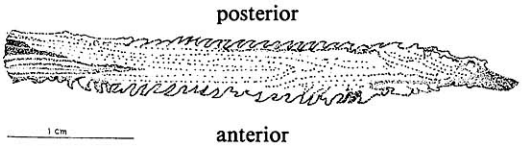
2b. Anterior notches, if present, are delicate and short, and limited to near tip. Both dorsal and ventral surfaces of spine deeply furrowed.

TADPOLE MADTOM
Noturus gyrinus (Mitchell)



3a. Barbs present on both posterior and anterior edges.

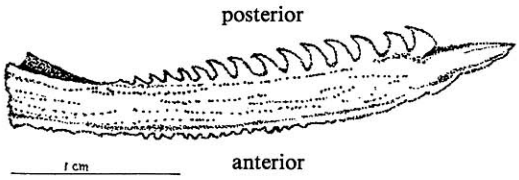
FLATHEAD CATFISH
Pylodictis olivaris (Rafinesque)



3b. Barbs present on posterior edge only 4

4a. Barb heights steadily decreasing from tip of spine to base, showing consistent strong inclination toward base.

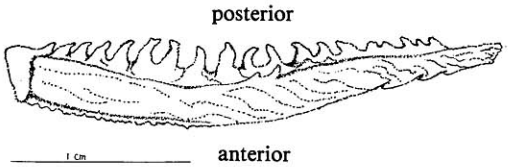
CHANNEL CATFISH
Ictalurus punctatus (Rafinesque)



4b. Barb heights not steadily decreasing from tip of spine to base some upright or showing inclination away from the base 5

5a. Barb heights on posterior edge of spine equal to or greater than one-half the diameter of spine shaft at point of barb attachment.

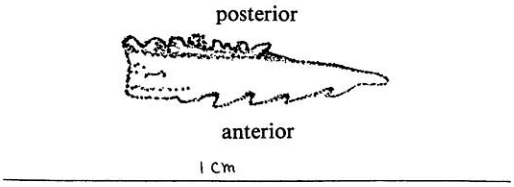
BROWN BULLHEAD
Ictalurus nebulosus (Lesueur)



5b. Barb heights on posterior edge of spine noticeably shorter than one-half the diameter of spine shaft at point of barb attachment 6

6a. Anterior notches extending from tip at least halfway along shaft of spine.

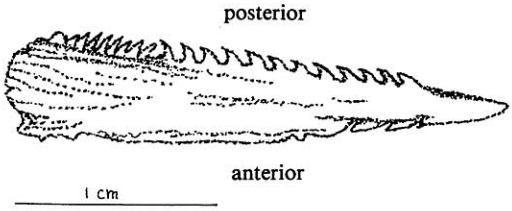
SLENDER MADTOM
Noturus exilis Nelson



6b. Anterior notches, when present, limited to tip of spine 7

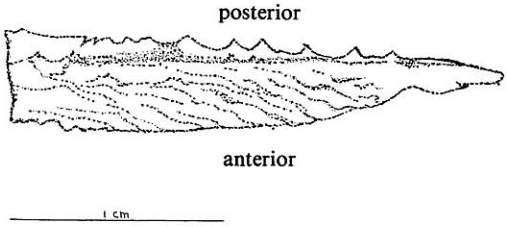
7a. Barbs from tip to mid-spine similar in size, shape, and spacing. Barbs not pyramidal in shape (as an isosceles triangle).

YELLOW BULLHEAD
Ictalurus natalis (Lesueur)



7b. Barbs from tip to mid-spine not similar in size, shape, and spacing. Barbs often pyramidal in shape (as an isosceles triangle).

BLACK BULLHEAD
Ictalurus melas (Rafinesque)



Discussion

Black Bullhead

The pectoral spines of the black bullhead are the most variable of Wisconsin catfish species, showing few consistent characteristics (see ill. under 7b of key). For this species spines with weak barbs have been reported from Illinois (Paloumpis 1963), Missouri (Pflieger 1975), Canada (Scott and Crossman 1973), Ohio (Trautman 1957), and Wisconsin (Becker 1983). Illustrations of black bullhead spines from Missouri, Canada and Ohio are smooth edged, lacking barbs.

According to Trautman, the spines of many young and some small adults may be "somewhat serrated." In Illinois, Forbes and Richardson (1920) reported that weak teeth occur only in adults, and Paloumpis (1963) has observed barbed spines at all ages.

All the Wisconsin black bullheads I examined had barbs on the spines; however Becker (pers. comm.) reported that some in-

dividuals "may have only the faintest resemblance to barbs." Although the barbs in the drawing by Becker (1983, p. 145) are less well defined than those I observed, their small size and irregularity allow correct identification to species using the above key.

Other characteristics of bullhead spines that may be useful are the anterior serrations and the anterior notch(es). The anterior edge of the black bullhead spine is generally smooth; however anterior serrations, when present, are small and limited to the part of the spine closest to the base (see ill. under 7b in the key). The anterior notch(es) near the tip of the spine appear(s) in Wisconsin black bullheads although not well defined. This characteristic has also been reported by Paloumpis (1963) from Illinois.

Brown Bullhead

The barbs near the tip of the pectoral spine of the brown bullhead point toward the base, those in the middle are erect, and the barbs near the base point toward the tip (see ill. under 5a of key). Spines from Illinois brown bullheads (Paloumpis 1963) are similarly described.

Brown bullhead spines as illustrated from Missouri (Pflieger 1975), Ohio (Trautman 1957), and Wisconsin (Becker 1983) show shorter barbs than those I observed in my Wisconsin specimens. In Ohio (Trautman 1957) and Canada (Scott and Crossman 1973) brown bullhead spines exhibit several short barbs near the base of the spine.

Yellow Bullhead

The barbs on the spines of the yellow bullhead in Wisconsin tend to be smaller, sharper, and more numerous than those of the two preceding species (see ill. under 7a in key). In Wisconsin specimens a few near the base point toward the tip.

Pectoral spines of yellow bullheads from Illinois (Paloumpis 1963), Canada (Scott and Crossman 1973), and Ohio (Trautman 1957) are similar to those on Wisconsin fish. It is noted however, that in individuals from Canada and Ohio, the barbs at the base of the pectoral spine were shown inclining toward the base instead of toward the tip. Apparently there is plasticity in the morphology of yellow bullhead pectoral spines as observed from different parts of its range. Despite this, such fish would key out correctly with the instrument provided above.

Anterior notches and serrations in the spine of the yellow bullhead are common as they are in Illinois (Paloumpis 1963) but their taxonomic use still needs determination.

Channel Catfish

Barbs on the pectoral spine of Wisconsin channel catfish incline toward the base with barb heights decreasing from tip to base (see ill. under 4a in key). This characteristic was diagrammed in the key by Paloumpis (1963).

In Canada (Scott and Crossman 1973) barbs were found to point in different directions on different parts of the spine.

Flathead Catfish

Barbs on the pectoral spine of Wisconsin flathead catfish are found along the anterior edge of the spine (anterior barbs pointing toward the base of the spine) and along its posterior edge (posterior barbs pointing toward the tip (see ill. under 3a of the key).

The barbs on the spine of a 24-year-old specimen I examined were much reduced, appearing as rounded nubs. Barbs on both anterior and posterior edges may be imbedded in the soft tissue of the fin beyond the bony spine.

Stonecat

The characteristic pectoral spine of the Wisconsin stonecat is illustrated under 2a in the key. The anterior notches are sharp-pointed and inclined toward the base. They are—as Taylor (1969) describes—"recurved hooks." In Wisconsin the posterior edge of the pectoral spine is smooth but Taylor finds

it "roughened or sometimes with a few serrae behind."

Illustrations of pectoral spines of stonecats from Canada (Scott and Crossman 1973) and Michigan (Taylor 1969) are similar to Wisconsin specimens and can readily be identified to species with the above key.

Tadpole Madtom

The pectoral spine of the tadpole madtom is short, deeply furrowed on both dorsal and ventral surfaces, lacks barbs, and the anterior notches, if present, are delicate and short (see ill. under 2b in key). Descriptions of tadpole madtom spines from Ohio (Trautman 1957) and Canada (Scott and Crossman 1973) agree with my observations. Illustrations by Pflieger (1975) and Taylor (1969) of pectoral spines from Missouri specimens agree with my observtions and can easily be identified to species with the above key.

Slender Madtom

The barbs on the pectoral spine of the slender madtom in Wisconsin are generally columnar, blunt-tipped, and occasionally with flat tops having small projections (see ill. under 6a in key). The barbs are generally perpendicular to the shaft of the spine, although some inclination of barbs is not unusual. Often barbs close to the tip lean toward the tip. Taylor (1969) also found barbs "usually straight, but sometimes bent outward or inward."

The distinct anterior notches or "retrorse hooks" (Taylor 1969) extend from the tip at least halfway toward the base of the spine.

Acknowledgments

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