Order of Appearance of Scales in the Black Crappie, *Pomoxis nigromaculatus*[1]

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Considerable research has been done concerning the relationship between scale appearance and body length, but salmonids were the fishes usually investigated. The study of Potter (3) on scales of bluegill, *Lepomis macrochirus*, and that of Everhart (1) on the smallmouth bass, *Micropterus dolomieu*, are the only data on the order of appearance of scales of centrarchids. Everhart gives a review of the literature in his paper on the smallmouth bass.

Potter (3), found that the scales of the bluegill first appeared over the anterior part of the body when a standard length of 17 millimeters was attained. Everhart (1) found that the scales of the smallmouth bass first arise along the lateral line on the caudal peduncle just anterior to the caudal fin.

Materials and Methods

The black crappie used in this study were obtained from the 1952 young-of-year stock hatched at the Holdenville Hatchery of the Oklahoma Game and Fish Department.[2] The fish were taken from a brood that hatched April 20, 1952. Collections began two weeks later on May 3, and were continued weekly until July 5, 1952. All specimens were preserved in 10 per cent formalin.

In determining scale appearance the fish were measured to the nearest millimeter (total-length), stained in alizarin red according to the method of Hollister (2), and examined at a magnification of 30 diameters. Scale formation patterns were transferred to diagramatic fish outlines with the aid of graph paper. A total of 179 fish was examined.

Results

The data on the body length-scale appearance relation were derived from 117 specimens. The mean body length at the time of scale appearance was 17.7 millimeters. Table 1 gives the frequency distribution of the fish whose scales had just formed and those on which scales had not developed. Scales first appeared in the 16-mm. class; two of the twelve specimens examined in this length-class possessed scales. Specimens of the 17- and 18-mm. classes with and without scales were about equally divided, those without scales being slightly in the majority. In the 19-mm. class two fish were without scales while scale formation of 14 fish were advanced beyond the "scales just formed" category. All fish in the 20-mm. class possessed well-defined scale patterns.

Apparently the age of black crappie is a determining factor in scale appearance. Fish three weeks of age with an average total-length of 17.5 mm. did not show evidence of scales, but 30 of the 33 fish four weeks of age (average total-length 18.8 mm.) possessed scales, and 19 of the 20 fish five weeks of age had scales.

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[2] The writers are indebted to Mr. Victor Graham, Superintendent, State Fish Hatchery, Holdenville, who collected the fish.

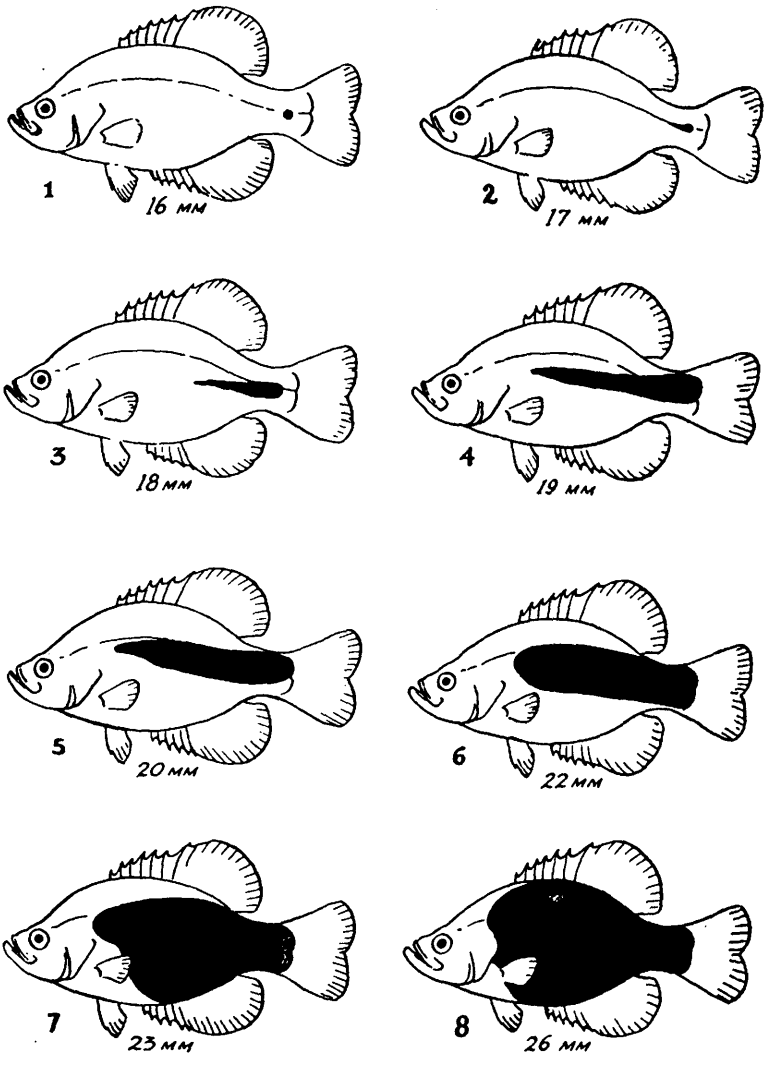

FIGURE 1. Diagrammatic Representation of Young Black Crappie Showing Origin of Scales and Development of Scale Pattern.

TABLE I

Frequency Distribution in One-millimeter Classes of Young Black Crappie Without Scales and With Scales Just Formed.

Class in millimeters	Without scales	With scales just formed
12	1	0
13	1	0
14	11	0
15	1	0
16	10	2
17	7	6
18	5	4
19	2	Scale formation well-advanced
20	0	" " " "

Figure 1 shows the origin of scale formation and subsequent development of the scale pattern. The specimens shown are averages of the length-classes represented in the diagram. Scales first appeared on the caudal peduncle near the lateral line and slightly anterior to the origin of the caudal fin. The scale pattern increased in size by accelerated growth anteriorly, less rapidly ventrally and dorsally, and least rapidly caudally. On some specimens two or more patterns developed in addition to the original pattern on the caudal peduncle. By the time the fish had reached a length of 23-25 mm., the scales had extended anteriorly to the gill opening. Ventral to the lateral line the posterior portion of the body was completely covered, leaving an unscaled area in the region of the pectoral fins. Dorsal to the lateral line scale formation proceeded at a considerably less rapid rate, having covered approximately one quarter of the area above the lateral line. Posteriorly, scale formation was nearly complete.

When the fish had reached an average total-length of 26 mm., the area of most rapid increase of scale development was dorsal to the lateral line, leaving only the nape area naked. There was not such a marked change ventral to the lateral line. The fish were completely scaled at an average total-length of 30 millimeters.

Summary

1. The mean body length at the time of scale appearance was 17.7 millimeters.

2. The data indicate that the age of the black crappie is a determining factor in scale appearance.

3. Scale formation begins on the caudle peduncle and develops more rapidly anteriorly and ventrally than posteriorly and dorsally.

LITERATURE CITED

1. Everhart, W. Harry. 1949. Body length of the smallmouth bass at scale formation. Copeia 1949: 110-115.

2. Hollister, Gloria. 1934. Clearing and dyeing fish for bone study. Zoologica 10: 89-101.

3. Potter, George E. 1924. Scales of the bluegill, *Lepomis pallidus* Mitchill. Trans. Am. Microscop. Soc. 44: 1-37.