

OCCASIONAL PAPERS OF THE MUSEUM OF  
ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN

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*ETHEOSTOMA ACUTICEPS*, A NEW DARTER  
FROM THE TENNESSEE RIVER SYSTEM,  
WITH REMARKS ON THE SUBGENUS *NOTHONOTUS*

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PRIOR to the impoundment of the South Fork of the Holston River, Tennessee, a qualitative fish survey of the area to be inundated was conducted by a party representing the Tennessee Valley Authority, the Tennessee Department of Conservation, and The University of Michigan. On the last day of field operations, September, 1947, two specimens of an undescribed darter were secured. In an attempt to obtain additional material the locality was revisited in June, 1949, by Gerald P. Cooper, John D. Kilby, and myself. Low water made success possible, because we found that the species was apparently confined to the deeper, faster riffles near the center of the stream. The darter was so rare that only four individuals were seined in three hours.

The South Holston Reservoir is now full and the only known locality for *Etheostoma acuticeps* lies beneath 190 feet of water. Since it is unlikely that this swift-water species can tolerate quiet water, it is hoped that other stations of occurrence may be discovered. To my companions in the field work, the late R. W. Eschmeyer, then with the Tennessee Valley Authority, Jack Chance, formerly with the Tennessee Department of Conservation, Gerald P. Cooper, Michigan Department of Conservation, and John D. Kilby, University of Florida, I am sincerely grateful.

For several years I have been assembling data leading toward a revision of the bluebreast darters (subgenus *Nothonotus*). Since that work will be further delayed, I am now making the new species known in the hope that knowledge of its existence and habitat preference may stimulate search and facilitate its capture elsewhere.

THE SUBGENUS *Nothonotus*

As visualized by me (see Bailey, Winn, and Smith, 1954: 139-141), *Etheostoma*, with nearly 80 known species, is exceeded in size among

North American freshwater fish genera only by *Notropis*. In this assemblage of darters several obviously natural groups of related species are recognizable. *Nothonotus*, as properly constituted, is one such group.

INCLUDED SPECIES.—*Nothonotus*, with 7 species, was ranked as a subgenus by Jordan and Evermann (1896: 1076–80), and was later elevated to generic rank with the same included species by Jordan, Evermann, and Clark (1930: 290). Four of these (*Etheostoma maculata* Kirtland, *Poecilichthys camurus* Cope, *Poecilichthys rufilineatus* Cope, and *Etheostoma jordani* Gilbert) are here interpreted as valid species belonging to a natural group, for which the name *Nothonotus* Putnam, 1863, is available. The status of another form is uncertain: *Poecilichthys vulneratus* Cope is probably not a valid species but may be a hybrid, *Etheostoma camurum* × *E. rufilineatum*, or perhaps a synonym of one of these or of *E. maculatum*. As indicated elsewhere (Bailey and Gosline, 1955: 6–7), *Etheostoma cinerea* Storer is not closely allied to the other species formerly grouped in *Nothonotus*, but has been made the type species of another subgenus, *Allohistium*.

Still another nominal species formerly assigned to *Nothonotus* is *Etheostoma tessellata* Storer, 1845. That name is a homonym of *Boleosoma tessellatum* DeKay, 1842, itself a synonym of *Etheostoma (Boleosoma) olmstedii* Storer, 1842. Although not nomenclatorially available, it is desirable that *E. tessellata* Storer be allocated correctly. The Tennessee River system has been extensively collected during the past century so it is unlikely that the species noticed by Storer has been actually overlooked by subsequent workers. Although Storer failed to describe the midventral scales, which would have permitted reliable generic identification, his clear description (reprinted almost verbatim by Jordan and Evermann, 1896: 1078) of color, fin-ray counts, and habitat (running water) applies well to *Percina evides* (Jordan and Copeland), a not uncommon species in the Tennessee basin. *Etheostoma tessellata* Storer, 1845, is, therefore, regarded as a senior synonym of *Alwordius evides* Jordan and Copeland (in Jordan, 1877), but the former is nomenclatorially unavailable because of homonymy.

Since the extent of development of the lateral line provided the first dichotomy in their key to the species of *Etheostoma*, Jordan and Evermann (1896: 1067–69) evidently placed considerable importance on this character. All species in their group *Nothonotus* usually have the lateral line complete. Many individuals, however, actually have one or more unpored posterior scales. *Etheostoma tippecanoe*, in part because of an incomplete lateral line, was assigned to *Oligocephalus*.

It is apparent, however, as was first pointed out to me by Dr. Milton B. Trautman, that *E. tippecanoe* is a close relative of the other species of *Nothonotus*. It not only shares several structural characters, but also has close similarities in coloration, behavior, habitat, and geography. It is, therefore, here assigned to *Nothonotus*. An incomplete lateral line has probably been evolved repeatedly among the more specialized forms of *Etheostoma*.

DIAGNOSIS.—The subgenus *Nothonotus*, including the species *Etheostoma maculatum* Kirtland, *E. aculiceps*, new species, *E. tippecanoe* Jordan and Evermann, *E. camurum* (Cope), *E. rufilineatum* (Cope), and *E. jordani* Gilbert, may be characterized as follows: Lateral line straight, usually complete or almost so (incomplete in *tippecanoe* which has 14 to 28 unpored scales); infraorbital and supratemporal canals complete; preoperculo-mandibular pores usually 10; vomer and palatine with teeth; branchiostegal membranes separate or narrowly conjoined, each with 6 rays; preopercle entire; top of head, cheek, prepectoral area, and breast naked; opercle naked or scaled; nape usually naked, occasionally with a few posterior scales; belly usually fully scaled (naked anteriorly in *tippecanoe*); body scales moderate or small, in 44 to 67 transverse rows on body; flesh opaque; body of moderate depth, compressed, the caudal peduncle deep; head of moderate length; vertebrae 36 to 40; snout of moderate length, very sharp to blunt; premaxillary frenum broad; interorbital area narrow. Fin rays: dorsal (IX) X–XIII (reportedly rarely XIV)—11 to 14, anal II, 7 to 9 (10), pectoral 12 to 15; first dorsal fin of moderate height, the spines without fleshy tips; second dorsal subequal in height or somewhat higher than first dorsal, gently rounded; anal spines rather long and stiff, the first especially well developed; pelvic fins closely approximated, the separation about one-half to two-thirds of pelvic fin base; anus not encircled with fleshy villi. Sexual dimorphism in color is well marked. All species are colorful, varying from subdued to gaudy. The breast is blue or green in adult males (also true of *E. caeruleum*). The body is lined with dark in several species; the soft dorsal, caudal, and anal fins are dark-edged in some, and the fins may be somber or brightly colored with red, orange, or green. In *jordani* there is a bright crimson border on the first dorsal fin, but no species has a submarginal red or orange band in this fin.

RELATIONSHIP.—*Nothonotus* is most intimately related to the subgenus *Oligocephalus*. A community of characters clearly associates the species of *Nothonotus*, and marks them as a natural group, but on the basis of present information this subgenus and *Oligocephalus* are not

sharply distinguished. Most if not all species of *Oligocephalus* (Bailey and Gosline, 1955: 40-42) have a submarginal orange band in the first dorsal fin; in all but *mariae*, *fricksium*, and *swaini* the lateral line is notably incomplete; in many species either the infraorbital or the supratemporal canal is interrupted; and in most species scales are present on some anterior areas (top of head, nape, cheek, prepectoral area, and breast) which are naked in *Nothonotus*. Since no single character suffices to distinguish them, it might be equally satisfactory to unite these subgenera. In view of the close kinship of the species placed in *Nothonotus*, however, the application of a subgeneric name seems appropriate and useful. *Nothonotus* is not a simple species group or Rassenkreise consisting of allopatric forms. Four of the six included species were taken from the same riffle area at the type locality of *E. acuticeps*. Only *E. jordani* is not sympatric with at least three other species. It is the only representative of the group in the Mobile River system, and is one of the two most distinctive species.

ECOLOGY AND ZOOGEOGRAPHY.—The compact character of *Nothonotus* carries over into habitat selection and distribution. All species inhabit riffles and clear water; usually they are found in the deeper and swifter riffles, but this depends on relative conditions. *Etheostoma maculatum* is customarily thought of as a swift-water species in the upper Ohio basin, but in the steep gradient of the South Fork of the Holston this species occupied the slower and shallower marginal riffles whereas *E. acuticeps* was restricted to the deeper, faster chutes near the center of the stream. Our specimens were taken from beneath boulders at depths of 10 to 14 inches, where the speed of the current was estimated at five feet per second. *E. rufilineatum* lived in the same part of this extensive riffle, but, unlike *acuticeps*, it was also found elsewhere in shallower and slower water. The riffle area extended across the stream, and was several hundred yards long. All species of *Nothonotus* are confined to the basins of the Ohio and Mobile river systems where they are restricted to waters of steep gradient.

KEY TO THE SPECIES OF THE SUBGENUS *Nothonotus* (GENUS *Etheostoma*)

- 1a. Belly fully scaled. Lateral line complete, or undeveloped on not more than 3 or 4 posterior scales; 44 to 67 scales pored. Size large, all species attaining at least 47 mm. in standard length ..... 2
- 2a. Body with regular, dark, longitudinal streaks along edges of scale rows (especially evident on lower half of caudal peduncle). Nape naked. Scales small, in 48 to 67 (usually more than 50) rows along body. Dorsal spines, 11 to 13. First dorsal fin not margined with crimson ..... 3
- 3a. Soft dorsal and anal fins usually not margined with black (often narrowly dark edged in *maculatum* in the Cumberland and Tennessee drain-

ages), without light submarginal band, and without red or orange. Head length 3.2 to 3.6 in body; head depth 1.55 to 1.8 in its length. Blue or green of breast (in adult males) extends backward onto belly. Snout moderately to very sharp . . . . . 4

4a. Opercle scaly. Branchiostegal membranes separate. Snout moderately sharp, but contour of head definitely angulate above eye, anterior and posterior profiles meet at an angle of 158° to 167°. Body (of adult males) with many blood-red spots; spinous dorsal sometimes with a few red or orange spots, caudal with red or orange in basal part of upper and lower rays. Subocular dark bar well marked. Orbital length greater than snout. *Ohio River system from western New York and southern Ohio to western Virginia and Tennessee* . . . . . Spotted darter, *E. maculatum*

4b. Opercle scaleless. Branchiostegal membranes narrowly conjoined. Snout exceedingly sharp; contour of head almost straight above, anterior and posterior profiles meet at an angle of 171° to 176°. Body and fins devoid of red or orange. Subocular dark bar faint or obsolete. Orbital length less than snout. *South Fork Holston River, Tennessee* . . . . . Sharphead darter, *E. acuticeps*

3b. Soft dorsal and anal fins (at least in adult males) broadly margined with black, each fin with a light (red or orange) submarginal band. Head length (in large juveniles and adults) 3.5 to 3.8 in body; head depth 1.3 to 1.6 in its length. Blue or green of breast sharply delimited, does not extend backward onto belly. Snout moderately sharp to blunt . . . . . 5

5a. Check with single dark spot behind eye and a well-developed, uniform subocular dark bar. Males with many small red or orange spots on body. Females with or without reddish brown; spots on fins small and more or less interconnected with dark; paired fins immaculate. Snout blunt (at least in adult males, often rather sharp in juveniles and females), the predorsal contour much decurved in front of eye. *Ohio River drainage from Illinois, Indiana, and western Pennsylvania south to western North Carolina and eastern Tennessee* . . . . . Bluebreast darter, *E. camurum*

5b. Check with 5 to 7 dark spots or dashes; subocular dark bar, if clearly defined, usually involving two areas of pigment concentration. Adult males with the body lined with red. Females without reddish brown, all fins boldly marked with discrete dark spots. Snout moderately sharp, the predorsal contour not much decurved in front of eye. *Cumberland and Tennessee river systems from southern Kentucky to northern Georgia and Alabama* . . . Redlined darter, *E. rufileatum*

2b. Body without regular longitudinal dark stripes along edges of scale rows. Nape with a few scales posteriorly. Scales large, in 44 to 53 (rarely more than 50) rows along body. Dorsal spines 9 to 11. First dorsal fin (in adult male) narrowly margined with crimson. *Alabama River system in Alabama and Georgia* . . . . . Greenbreast darter, *E. jordani*

1b. Anterior part and midline of belly largely naked. Lateral line incomplete, the 19 to 34 pored scales do not extend beyond middle of second dorsal fin. Size

small, largest specimen examined, 34 mm. in standard length. *Ohio River system, exclusive of the Tennessee basin*<sup>1</sup> . . . . . Tippecanoe darter, *E. tippecanoe*

*Etheostoma (Nothonotus) acuticeps*, new species

Sharphead Darter  
(Plate I)

MATERIAL.—The holotype, UMMZ 159014, an adult male 58.0 mm. in standard length, was collected in the South Fork of the Holston River, altitude about 1490 feet, approximately one-half mile above the South Holston Dam (during the period of construction, hence prior to impoundment), seven miles southeast of Bristol, Sullivan County, Tennessee, on June 23, 1949, by G. P. Cooper, J. D. Kilby, and R. M. Bailey. Three paratopotypes, UMMZ 159013, 49 to 51 mm. long, were taken with the holotype on June 23 and 24, 1949. Two additional paratopotypes, UMMZ 157585, 45 and 52 mm. in length, were collected at the same locality on September 23, 1947, by R. W. Eschmeyer, J. Chance, and R. M. Bailey.

DIAGNOSIS.—A species of the bluebreast darter group (subgenus *Nothonotus*), distinguished by an extremely sharp snout, and the scaleless head and nape. The branchiostegal membranes are narrowly conjoined. The subdued coloration is devoid of red or orange even in adult males, but includes considerable blue green or pale green on fins and lower surface; the body is crossed by 13 or 14 narrow vertical bands and has dark horizontal lines between the scale rows. The subocular dark bar is faint or obsolete. The fins are not dark edged. The lateral line is complete, or has no more than 4 unpored posterior scales.

DESCRIPTION.—*Etheostoma acuticeps* is considerably compressed, and has a deep caudal peduncle. The head is slender. The angle formed by its upper and lower profiles, 44° to 49°, and the entering angle of the muzzle, 48° to 55°, are the sharpest among the species of *Nothonotus* if not in the genus *Etheostoma*. The body, including the belly, is well scaled, but the entire head, nape, prepectoral area, and breast are scaleless. Most body proportions are given in Table I, together

<sup>1</sup> An adult male of *Etheostoma tippecanoe*, UMMZ 168388, 25 mm. in standard length, was collected in Harpeth River at U. S. Highway 70, eight miles east of White Bluff, Cheatham County, Tennessee, on August 28, 1954, by the R. M. Bailey family. This constitutes the first record of the species from Tennessee, the only known locality for the Cumberland River system, and represents a considerable southwestern extension of the known range. The closest previous localities known to me are in Redbird Creek in the Kentucky River system: UMMZ 168882 just below the mouth of Sextons Creek, nine miles north of Oneida, and UMMZ 159071, ten miles south of Booneville, both in Owsley County, Kentucky.

with angle measurements and counts of fin rays, scales, and vertebrae (counted on radiographs). Each specimen has 17 principal caudal rays. The smallest individual, however, has the upper marginal caudal ray branched, so the count of branched caudal rays is 16; in the other specimens the count is 15.

TABLE I

COUNTS AND MEASUREMENTS OF *Etheostoma acuticeps*.

Proportional measurements are expressed as thousandths of the standard length

Character	UMMZ	UMMZ	UMMZ 159013			UMMZ
	159014 (Holotype)	157585				157585
Sex	M	M	F	F	M	M
Standard length (mm.)	58.0	51.8	50.7	49.8	48.6	44.0
Body depth at dorsal origin	236	220	249	241	224	216
Caudal peduncle depth	134	129	126	129	134	127
Body width	138	127	170	151	134	127
Caudal peduncle length	224	228	227	215	237	216
Highest dorsal spine	131	129	118	108	128	116
Highest dorsal soft ray	155	168	146	153	146	...
Caudal fin length	183	195	187	185	183	189
First anal spine	86	87	83	70	86	91
Highest anal ray	157	162	152	151	154	159
Longest pectoral ray	219	239	229	231	216	211
Pelvic fin length	207	212	225	203	189	198
Pelvic fin base	38	39	39	36	41	39
Interpelvic space	21	23	20	20	21	23
Head length	291	297	290	293	300	295
Head depth (at occiput)	184	180	185	181	195	159
Head width	148	135	138	147	134	125
Snout length	79	75	81	72	82	75
Orbit length	52	60	57	60	62	59
Fleshy interorbital width	38	37	36	38	35	34
Upper jaw length	83	79	85	82	84	86
Lower jaw to juncture of gill membranes	178	185	191	189	185	180
Pelvic insertion to juncture of gill membranes	157	149	162	155	175	161
Angle of muzzle	54°	52°	49°	52°	55°	48°
Angle of head	49°	44°	47°	48°	48°	45°
Angle of gill membranes	85°	93°	79°	84°	75°	82°
Dorsal rays	XII-12	XII-12	XII-11	XII-12	XII-12	XII-12
Anal rays	II, 8	II, 8	II, 7	II, 7	II, 8	II, 8
Pectoral rays	13-13	13-14	13-14	13-13	13-14	14-14
Lateral line scales	61	61	57	54	59	60
Vertebrae	39	39	38	38	39	39

The lateral line is either complete or lacks pores on not more than 4 posterior scales. The number of unpored scales in the six specimens is 0 in two, 1 in two (including holotype), 3 in one, and 4 in one. The lateral canal has 5 pores, the supratemporal canal is complete and has 3 pores, there is a postorbital pore and a coronal pore, the infraorbital canal is complete and has 8 pores on each side in the paratypes, but there are 9 pores on each side in the holotype. The preoperculomandibular canal is complete, with 6 pores on the preopercle and 4 on the mandible on each side ( $5 + 4 = 9$  on one side of one paratype).

In the darters, a scale count of a transverse series extending from the origin of the second dorsal fin downward and backward to the anal fin (or the midventral line) is preferable to the customary counts taken above and below the lateral line. The latter vary with the position of the line, some species have the line so short that it does not reach the normal counting line, and the counts are too small and variable to have much value. In *Etheostoma acuticeps* each specimen has 17 scales in the diagonal series; counts above the lateral line are 8 in four (including the holotype) and 9 in two; counts below the lateral line are 8 in two and 9 in four (including the holotype).

There are 22 to 26 rows of scales around the caudal peduncle of which 9 to 11 are above the lateral lines and 11 to 13 are below. The counts for the six specimens are  $9/11 = 22$  in one;  $10/11 = 23$  in three;  $10/12 = 24$  in the holotype; and  $11/13 = 26$  in one.

All specimens of *Etheostoma acuticeps* have the upper lip bound to the snout with a well-defined frenum of moderate width. The branchiostegal rays number 6-6 in all specimens. The gill membranes are narrowly but distinctly conjoined, unlike the condition in other species of *Nothonotus*, in which they are separate. The values for the ratio, distance from tip of lower jaw to juncture of gill membranes/distance from that juncture to insertion of pelvic fin, are: 1.13 (holotype), 1.25, 1.18, 1.22, 1.06, and 1.11 (same sequence of specimens as in Table I). The ratio, pelvic interspace/pelvic base, yields the following values: .55 (holotype), .60, .50, .56, .50, and .59, respectively. The union of the gill membranes forms an angle of  $75^\circ$  to  $93^\circ$ , the variation probably depends more on preservation than on individual differences. It is probable that no nuptial tubercles are developed since adults taken in June, and nearly ready to spawn, have none.

COLORATION.—The holotype, a prespawning adult male at the time of capture, had the body dark olive, with about 14 obscure vertical, dark crossbands. The head was dull bronze-olive below and on the cheek, very dark above, and had only a faint trace of a subocular dark



bar. The iris was dark. The first dorsal was dull olive with a trace of blue-green at the margin and a dark blotch anteriorly. The soft dorsal was similar to the first dorsal, but paler and without the blotch; the blue-green margin was clearly evident, but not conspicuous. The anal fin was blue-green, but darker near the base of the middle rays and greenish white near the margin. The caudal fin was bright blue-green, especially marked on the procurrent rays above and below and on the distal one-third of the fin. The basal and middle parts were lighter, the rays green, but the membranes pale olive. On the pectoral fin there was a bronze blotch near the base of the middle rays. On the basal parts of all but the lowermost rays, and extending to the tips of the six dorsalmost rays, the fin was olive; a median blue-green band extended from the bases of the lowermost rays to the tip of the seventh ray (counting from upper border); the distal parts of the lower rays were white. The pelvic fin was blue-green; the spine was bordered with greenish white, the posterior rays with dusky. The breast was dull blue-green, not as bright as in males of *Etheostoma camurum* and *E. rufilineatum*. The lower side, belly, anal region, and the lower edge of the caudal peduncle were washed with greenish white. This contrasts with *E. camurum* and *E. rufilineatum*, in both of which the green is limited ventrally to the breast. The longitudinal streaks contrasted little with the dark ground color in life, but are clearly evident in preservation. A second adult male, taken the following day, agreed closely with this description. Neither specimen had any trace of red, orange, or yellow, colors that mark males of the three related species (*E. camurum*, *E. rufilineatum*, *E. maculatum*) that were taken on the same riffle.

Adult prespawning females taken with the above males had the ground color light olive, darker above, with 13 or 14 clearly evident dark bands. The fins were all uniform yellowish olive, without blue-green, the dorsal fins the darkest. There was a dark blotch near the front of the spinous dorsal and two dark marks, one each at the base of the upper and lower caudal rays. The head was dark above, olive laterally, and whitish below. The lips were rather dark, and the subocular dark bar was scarcely perceptible. The breast and anal areas were white, the former with a faint olive wash. The belly was dirty white and the lower edge of the caudal peduncle was similar to the side.

The overall appearance, especially of the male, is one of subdued and modest attractiveness, quite in contrast to the resplendent ornateness of *E. rufilineatum* and *E. camurum*.

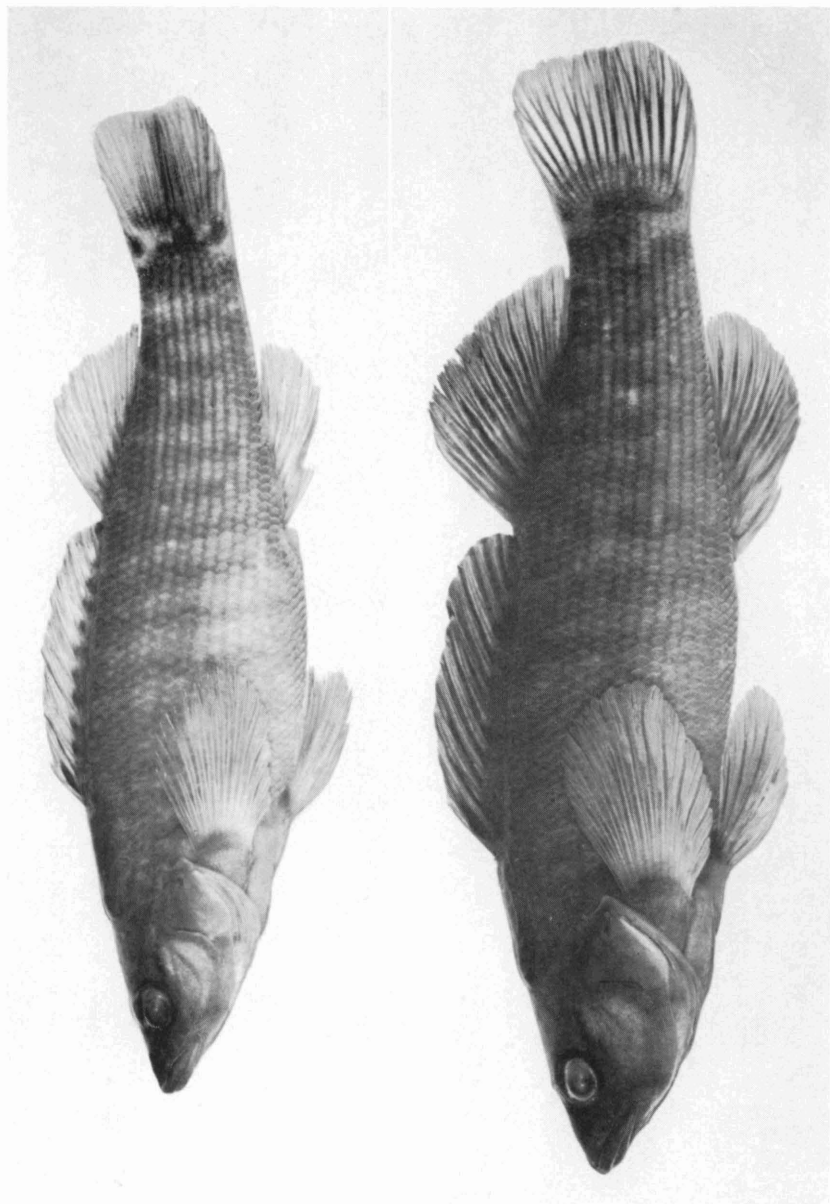
ETYMOLOGY.—The Latin name *acuticeps* is a substantive derived from *acutus*, sharp or pointed, and *ceps*, the New Latin form of *caput*, head.

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*Accepted for publication February 2, 1959*

PLATE I



*Etheostoma acuticeps*, new species

Upper: adult female, UMMZ 159013, 50.7 mm. in standard length.

Lower: adult male, holotype, UMMZ 159014, 58.0 mm. in standard length.

(Photographs by William L. Bruton)





