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*NOTROPIS SIGNIPINNIS*, A NEW CYPRINID FISH  
FROM SOUTHEASTERN UNITED STATES

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THE species here introduced, although one of the most colorful and abundant minnows in the coastwise streams from southeastern Louisiana to western Florida, has nevertheless remained unnamed. During recent years, however, several collectors have secured it independently and have known or suspected that the species was undescribed. We are sincerely grateful to these persons for the use of their collections and for permitting us to draw the description, and to others who have participated in the collection of specimens: the late Louis Agassiz, Paul K. Anderson, Marian K. Bailey, Richard E. Bellamy, Alton Black, Archie F. Carr, Jr., A. C. Chable, Charles F. Cole, Fannye A. Cook, Robert H. Gibbs, Charles D. Hancock, the late Samuel F. Hildebrand, Horton H. Hobbs, Ancil D. Holloway, Carl L. Hubbs, Laura C. Hubbs, Leonard J. Kezer, John D. Kilby, Edward C. Raney, Leonard P. Schultz, Clarence L. Smith, Merlin G. Suttkus, Boyd W. Walker, Roland L. Wigley, and Ralph W. Yerger.

Mr. William L. Brudon, staff artist of the Museum of Zoology, has our especial thanks for his patient care and precision in the preparation of Plates I and II.

*Notropis signipinnis*, new species

Flagfin Shiner

(Pls. I and IIb; Map 1)

MATERIAL.—Holotype, an adult male, UMMZ<sup>1</sup> 157117, 49.5 mm. in standard length, from Maletts Spring Branch, tributary to Rocky Creek, tributary to Escatawpa River (Pascagoula R. drainage), 6.6

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<sup>1</sup>The following abbreviations are employed in listing this material: CU, Cornell University; MCZ, Museum of Comparative Zoology, Harvard University; TU, Tulane University; UMMZ, University of Michigan Museum of Zoology; and USNM, United States National Museum.

mi. SE Lucedale, George Co., Mississippi; collected Apr. 4, 1948 by Marian K. and Reeve M. Bailey. Paratypes, UMMZ 155477 (173), 21 to 49 mm. long, taken with the holotype, and TU 1133 (164), 22 to 46 mm. long, obtained at the type locality by Royal D. Suttkus and Charles D. Hancock, on June 4, 1951.

Additional collections examined, totaling 3,323 specimens, are as follows:

*Pearl River drainage, Louisiana and Mississippi.*—TU 94 (73), 17 to 41 mm., 12.7 mi. NW Pearl River, St. Tammany Parish, La.; TU 736 (78), 15 to 48 mm., and TU 1663 (11), 25 to 43 mm., 0.3 mi. N Talisheek, St. Tammany Parish, La.; TU 1544, 37 mm., 5.7 mi. W Angie, Washington Parish, La.; UMMZ 155379, 29 mm., small trib. to Hobolochitto R., 3.4 mi. NW Poplarville, Pearl River Co., Miss.; UMMZ 159903 (3), 39 to 44 mm., Mill Cr., trib. to West Hobolochitto R., near Carriere, Pearl River Co., Miss.; CU 14310 (56), 24 to 51 mm., CU 16611 (19), 30 to 49 mm., TU 108 (26), 19 to 40 mm., TU 1726 (70), 21 to 47 mm., and TU 1794 (32), 30 to 46 mm., creek, 2.7 mi. N Sandy Hook, Hwy. 13W, Marion Co., Miss.; TU 75 (347), 18 to 42 mm., 1.7 mi. S Sandy Hook, Marion Co., Miss.; TU 91 (146), 22 to 50 mm., 1.1 mi. S Sandy Hook, Marion Co., Miss.; TU 1651 (27), 19 to 45 mm., 2.2 mi. N jct. Hwys. 43 and 26, Pearl River Co., Miss.; and TU 1629 (2), 22 and 23 mm., 4.6 mi. N jct. Hwys. 43 and 26, Pearl River Co., Miss.

*Wolf River drainage, Mississippi.*—TU 118 (8), 14 to 25 mm., small trib. to Catahoula Cr., 11.2 mi. E Picayune, Hancock Co.; CU 16637 (33), 27 to 41 mm., 8.6 mi. E Poplarville, Pearl River Co.; UMMZ 155386 (32), 22 to 53 mm., roadside brook, 7 mi. N Poplarville, U.S. Hwy. 11, Pearl River Co.; UMMZ 167101 (296), 17 to 48 mm., 3 mi. N Poplarville, Pearl River Co.; and UMMZ 145064 (4), 30 to 35 mm., Poplar Springs Branch, 3.5 mi. E Poplarville, Pearl River Co.

*Biloxi Bay drainage, Mississippi.*—CU 16637 (18), 28 to 46 mm., headwaters of Biloxi R., 12.2 mi. SW Wiggins, Stone Co.

*Pascagoula River drainage, Mississippi and Alabama.*—USNM 128930 (6), 22 to 40 mm., and TU 1557 (35), 26 to 45 mm., Priests Cr., trib. to Leaf R., 3.5 mi. S Hattiesburg, Forrest Co., Miss.; CU 16648 (33), 24 to 44 mm., trib. to Red Cr., 2.5 mi. E jct. Hwys. 26 and 57, George Co., Miss.; CU 12476 (5), 15 to 18 mm., Beaverdam Cr. (Big Cr.), 2.2 mi. W Lucedale, George Co., Miss.; CU 15618 (4), 24 to 37 mm., trib. to Black Cr., 7.9 mi. W Hattiesburg city limits, Lamar Co., Miss.; CU 16644 (25), 29 to 47 mm., trib. to Red Cr., 7.6 mi. SW Wiggins, Stone Co., Miss.; TU 566 (106), 20 to 43 mm., 3.6 mi. N Wade, Jackson Co., Miss.; TU 564 (47), 26 to 47 mm., trib. to Cedar Cr., 7.2 mi. N Wade, George Co., Miss.; TU 1612 (2), both 30 mm., Red Cr., Lumberton, Lamar Co., Miss.; UMMZ 155440 (42), 21 to 53 mm., CU 12523 (60), 16 to 48 mm., and TU 1123 (171), 24 to 47 mm., Rocky Cr., trib. to Escatawpa R., 3.3 mi. E Lucedale, George Co., Miss.; CU 12465 (31), 12 to 43 mm., Big Cr., trib. to Escatawpa R., 5.3 mi. NW Semmes, Hwy. 42, Mobile Co., Ala.; TU 58 (23), 28 to 44 mm., trib. to Escatawpa R., 6.8 mi. E Hurley, Miss., Mobile Co., Ala.; and TU 1128 (134), 20 to 45 mm., Beaver Pond Cr., trib. to Big Cr., 4.3 mi. SW Georgetown, Mobile Co., Ala.

*Mobile Bay drainage, Alabama.*—TU 1641 (53), 21 to 44 mm., Cedar Cr., trib. to Tombigbee R., 8.7 mi. W Mount Vernon, Mobile Co.; UMMZ 112980 (1), former-

ly part of MCZ 1844, 45 mm., 10 mi. W Mobile, Mobile Co., collected in 1853 by Louis Agassiz; UMMZ 112979 (1), from a lot of 9 cotypes of *Alburnus formosus* Putnam, Mobile, Mobile Co., collected between 1853 and 1855, for Agassiz; UMMZ 155462 (15), 24 to 43 mm., and CU 12638 (7), 15 to 38 mm., trib. to Chickasaw Cr., 5.5 mi. SE Semmes, Hwy. 42, Mobile Co.; CU 16652 (16), 25 to 37 mm., Clear Cr., trib. to Chickasaw Cr., 4.7 mi. SE Semmes, Mobile Co.; CU 16172 (2), 33 and 38 mm., trib. to Bassett Cr., 1.8 mi. W Wagarville, Washington Co.; CU 16163 (44), 12 to 41 mm., trib. to Bassett Cr., 2.8 mi. S Leroy, Washington Co.; CU 16659 (1), 34 mm., 10 mi. E Mobile, U.S. Hwy. 90, Baldwin Co.; CU 16671 (23), 24 to 41 mm., and TU 1770 (3), 32 to 39 mm., trib. to Fish R., 5.1 mi. NW Loxley, U.S. Hwy. 90, Baldwin Co.; and TU 1773 (5), 25 to 38 mm., trib. to Fish R., 6.4 mi. NW Loxley, Baldwin Co.

*Perdido Bay drainage, Alabama and Florida.*—TU 1763 (6), 30 to 37 mm., trib. to Blackwater R., 2.8 mi. NE Robertsedale, Baldwin Co., Ala.; UMMZ 155471, 38 mm., trib. to Blackwater R., 5.5 mi. SE Loxley, U.S. Hwy. 90, Baldwin Co., Ala.; CU 12623 (12), 20 to 42 mm., and CU 14314 (11), 32 to 51 mm., Brushy Cr., 2.8 mi. W Atmore, Hwy. 31, Escambia Co., Ala.; UMMZ 134596 (4), 18 to 36 mm., Perdido Cr., near Pineville, Escambia Co., Fla.; TU 1760 (47), 18 to 42 mm., trib. to Perdido R., 2.4 mi. N Muscogee, Escambia Co., Fla.; TU 1777 (2), 26 and 34 mm., trib. to Perdido R., 4.7 mi. N Muscogee, Escambia Co., Fla.; TU 1783 (4), 23 to 37 mm., Meatosia Cr., 7.4 mi. N Muscogee, Escambia Co., Fla.; TU 1755 (25), 16 to 48 mm., Alligator Cr., 2.6 mi. NE Barrineau Park, Escambia Co., Fla.; and UMMZ 112905 (2), 34 and 40 mm., Marcus Cr., Escambia Co., Fla.

*Pensacola Bay drainage, Alabama and Florida.*—UMMZ 155515, 21 mm., Bear Cr., 2 mi. S Castleberry, U.S. Hwy. 31, Conecuh Co., Ala.; CU 16151 (90), 22 to 47 mm., trib. to Escambia R., 5.8 mi. E Excel, Conecuh Co., Ala.; CU 14380 (24), 19 to 43 mm., trib. to Conecuh R., 9.4 mi. W Dixie, Hwy. 49, Escambia Co., Ala.; CU 14012 (3), 28 to 32 mm., Franklin Mill Cr., 3.9 mi. SW Brewton, Hwy. 29, Escambia Co., Ala.; UMMZ 155495 (8), 31 to 40 mm., creek, Milton, Santa Rosa Co., Fla.; UMMZ 167102 (36), 20 to 53 mm., Sweetwater Cr., near Munson, Santa Rosa Co., Fla.; CU 16699 (61), 14 to 44 mm., trib. to Blackwater R., 100 yards E Santa Rosa Co., Hwy. 4, Okaloosa Co., Fla.; CU 12599 (27), 19 to 39 mm., west fork Coldwater Cr., trib. to Blackwater R., 3.5 mi. E Jay, Hwy. 4, Santa Rosa Co., Fla.; CU 12669 (6), 16 to 23 mm., Blackwater R., 4.3 mi. NW Baker, Okaloosa Co., Fla.; CU 12143 (4), 30 to 40 mm., Sweetwater Cr., 12.4 mi. NW Baker, Hwy. 4, Santa Rosa Co., Fla.; CU 16676 (6), 26 to 38 mm., trib. to Coldwater Cr., 13.1 mi. N Milton, Hwy. 87, Santa Rosa Co., Fla.; UMMZ 112982 (12), 22 to 41 mm., Malone Cr., trib. to Yellow R., 15 mi. NW Niceville, Okaloosa Co., Fla.; UMMZ 112983 (33), 29 to 50 mm., Bull Cr., trib. to Yellow R., 11 mi. NE Niceville (Okaloosa or Walton Co.), Fla.; CU 12126 (52), 16 to 39 mm., Gum Cr., trib. to Shoal R., 5.9 mi. NW De Funiak Springs, Walton Co., Fla.; CU 18186 (2), 25 and 38 mm., Pinelog Cr., 6.6 mi. S Florala, Ala., Walton Co., Fla.; TU 1747 (6), 31 to 42 mm., Pinelog Cr., about 7.6 mi. S Florala, Ala., Fla. Hwy. 2, Walton Co., Fla.; and TU 1722 (26), 21 to 41 mm., Middle Cr., 0.8 mi. SE Liberty, Walton Co., Fla.

*Choctawhatchee Bay Drainage, Alabama and Florida.*—TU 1696 (11), 35 to 42 mm., trib. to Choctawhatchee R., 5.2 mi. N Black, Geneva Co., Ala.; CU 18187 (54), 17 to 44 mm., trib. to Choctawhatchee R., 6 mi. W Ponce de Leon, Hwy. 90, Holmes

TABLE I

Proportional Measurements and Counts of Adults  
of *Notropis signipinnis*

All proportions are expressed in thousandths of the standard length.

Measurement or Count	Holotype	Paratypes (TU 1133)			
	UMMZ	10 Males		10 Females	
	157117	Range	Av.	Range	Av.
Standard length, mm. . . . .	49.5	39-46	42	35-44	38
Dorsal origin to snout tip . . .	582	560-598	581	573-591	582
Dorsal origin to caudal base . .	459	462-489	477	452-478	466
Dorsal origin to occiput . . . .	390	370-399	381	362-402	380
Pelvic insertion to snout tip . .	485	476-505	489	483-505	496
Anal origin to caudal base . . .	345	351-380	365	340-367	351
Body, greatest depth . . . . .	293	246-276	261	247-273	264
Body, greatest width . . . . .	145	142-153	149	152-174	161
Dorsal origin to lateral line . .	198	172-190	181	158-170	165
Pelvic insertion to lateral line	99	80-99	90	98-122	110
Caudal peduncle, length . . . . .	202	186-211	198	193-213	203
Caudal peduncle, least depth . .	111	108-116	112	101-111	106
Head, length . . . . .	263	254-268	263	262-273	268
Head, depth . . . . .	174	155-184	174	172-183	178
Head, width . . . . .	137	138-154	147	150-157	153
Interorbital, least fleshy width	91	98-107	103	90-110	99
Snout, length . . . . .	81	72-84	79	70-82	77
Orbit, length . . . . .	79	76-85	81	79-89	85
Upper jaw, length . . . . .	95	83-92	88	83-94	88
Suborbital, least width . . . . .	28	26-32	29	26-32	29
Dorsal fin, depressed length . .	238	222-253	242	228-249	239
Anal fin, depressed length . . .	253	251-302	272	244-274	256
Caudal fin, length from base to tip of longest ray . . . . .	275	265-298	282	270-295	282
Pectoral fin, length . . . . .	184	178-202	191	191-207	198
Pelvic fin, length . . . . .	166	166-186	174	160-175	166

TABLE I (Cont.)

Measurement or Count	Holotype	Paratypes (TU 1133)			
	UMMZ	10 Males		10 Females	
	157117	Range	Av.	Range	Av.
<b>Scale row counts:</b>					
Predorsal rows . . . . .	16	15-18	16.2	16	16
Predorsal scales . . . . .	19	15-19	16.8	16-21	17.5
Dorsal origin to lateral line	6	5-6	5.3	5-6	5.5
Lateral line . . . . .	35	34-35	34.5	34-36	34.4
Anal origin to lateral line .	3	3-4	3.8	3-4	3.6
<b>Body circumference rows:</b>					
Above . . . . .	11	11-12	11.2	11	11
Below . . . . .	10	9-11	9.6	9-12	10.6
Total . . . . .	23	22-24	22.8	22-25	23.6
<b>Caudal peduncle rows:</b>					
Above . . . . .	7	5-7	6.5	6-7	6.9
Below . . . . .	5	5	5	5	5
Total . . . . .	14	12-14	13.5	13-14	13.9
<b>Fin rays:</b>					
Dorsal . . . . .	8	8	8	7-8	7.9
Anal . . . . .	10	10-12	11.3	10-11	10.9
Caudal . . . . .	19	19	19	19	19
Pectoral . . . . .	13	14-15	14.4	13-15	14.5
Pelvic . . . . .	8	8	8	8	8

Co., Fla.; TU 1657 (2), 30 and 35 mm., Seven Runs Cr., 6 mi. N Bruce, Walton Co., Fla.; TU 1574 (56), 23 to 40 mm., trib. to Seven Runs Cr., 7.2 mi. N Bruce, Walton Co., Fla.; TU 1687 (22), 29 to 47 mm., Turnpike Branch, trib. to Camp Cr., 3.6 mi. E Freeport, Walton Co., Fla.; TU 1600 (49), 17 to 46 mm., trib. to Choctawhatchee R., 4 mi. N Bruce, Walton Co., Fla.; and TU 1582 (2), 33 and 36 mm., Little Cr., at Ponce de Leon, Holmes Co., Fla.

*St. Andrews Bay drainage, Florida.*—UMMZ 145297 (5), 30 to 51 mm., creek, 0.5 mi. W Econfina Cr., W Bennett, Bay Co.; CU 18127 (60), 25 to 48 mm., trib. to Econfina R., 3.1 mi. N Bear Cr. bridge, Bay Co.; CU 18155 (15), 27 to 56 mm., creek, 1.8 mi. N Bear Cr. bridge, Bay Co.; CU 18160 (10), 23 to 44 mm., trib. to Econfina R., 0.4 mi. W Econfina R. bridge, E Bennett, Bay Co.; CU 18163 (5), 25

to 38 mm., trib. to Bear Cr., 0.5 mi. W Youngstown, Bay Co.; CU 18132 (18), 24 to 43 mm., Longbranch Cr., 1.6 mi. W Econfina R. on road west from Youngstown, Bay Co.; and CU 18137 (4), 30 to 42 mm., Wetappo Cr., W Wewahitchka, Gulf Co.

*Chipola River system, Apalachicola River drainage, Florida.*—CU 12677 (73), 14 to 47 mm., and CU 18130 (20), 19 to 30 mm., Sugar Cr., 6.5 mi. W Clarksville, Hwy. 20, Calhoun Co.; CU 12086 (24), 14 to 33 mm., creek, 3.3 mi. W Blountstown, Hwy. 20, Calhoun Co.; CU 18126, 43 mm., Sweetwater Cr., 0.9 mi. N Kinard, Calhoun Co.; CU 18148 (10), 24 to 43 mm., Sugar Cr., 0.5 mi. S Frink, Calhoun Co.; TU 1078 (15), 19 to 29 mm., and TU 1707 (101), 28 to 44 mm., Pine Cr. (Four Mile Cr.), 0.7 mi. N Clarksville, Calhoun Co.; TU 1705 (75), 30 to 51 mm., Ten Mile Cr., 4.7 mi. N Clarksville, Calhoun Co.; and CU 18134 (2), 32 and 35 mm., Alligator Cr., 2.1 mi. N Hwy. 22, NW Wewahitchka, Gulf Co.

DIAGNOSIS.—A species of *Notropis* with a very broad, dark, lateral band; median fins yellow and red-orange with black marginal rays; teeth 2, 4–4, 2; anal rays 9 to 13; body deep and compressed; lateral line complete; dorsal origin behind pelvics; and nuptial tubercles that form a saw-edged comb on mandible. *N. signipinnis* is allied to *N. hypselopterus* but is sharply different from that species (Table II and Pl. II).

DESCRIPTION.—Pharyngeal teeth 2, 4–4, 2 in the 10 specimens counted, moderately hooked, the grinding surface narrow or obsolete, and the cutting edge entire. Anal rays 9 to 13, typically 10 or 11 (Table III). Dorsal placed far behind pelvic insertion, its origin equidistant from base of caudal and a point between front of pupil and back of eye, usually on posterior half of pupil. Dorsal fin rather high and slightly pointed, the margin straight, anterior rays exceeding others in the depressed fin; height contained 1.4 to 1.6 times in distance from dorsal origin to occiput. Lateral line complete, moderately decurved above pelvic fin. Scales rather large, 33 to 37 along lateral line, in 19 to 29 (typically 22 to 26) rows around body before dorsal and pelvic fins, in 12 to 15 rows around caudal peduncle, in 5 or 6 rows from dorsal origin to lateral line, in 3 or 4 rows from anal region to lateral line, and in 15 to 18 predorsal rows. Predorsal scales not crowded; 15 to 21 crossing middorsal line. Lateral-line scales not notably elevated, but the scales of the rows above lateral line, especially the first, are moderately elevated except near their anterior and posterior ends. Mouth terminal, upper lip about equal to snout and equal to or slightly exceeding lower lip; maxilla nearly straight but with a scarcely perceptible angle in advance of the middle of its length, extending to below anterior border of eye; mouth oblique, at an angle of 28° to 35° with the horizontal axis of the body. Head contained 3.6 to 4.1 times in standard length, body depth 3.4 to 4.4 in length; body com-

pressed, its width 2.0 to 2.4 in depth (measured over curve of body), depth of caudal peduncle 1.7 to 2.0 in its length. Eye contained 2.8 to 3.7 times in head length. Measurements and certain meristic counts on the holotype and 20 paratopotypes are summarized in Table I. Measurements and counts were taken as described by Hubbs and Lagler (1947: 8-15).

Vertebrae were counted from X rays of 16 paratopotypes (UMMZ 155447). In the enumeration the elements of the Weberian apparatus, which is presumed to consist of 4 vertebrae, are included, as is the urostylar vertebra. In all specimens the fifth vertebra is the first to bear ribs, and there are  $4 + 13 = 17$  precaudal vertebrae. The last is ribless, and its transverse process is much shorter than the hemal spine of the first caudal vertebra. The first hemal spine is subequal in length with the spines of the following vertebrae, and its tip is in apposition to that of the first developed interhemal spine. On dissection the first caudal vertebra, as defined above, was found to be the anteriormost with a closed hemal canal. The caudal vertebrae number 18 in 3 specimens, 19 in 12, and 20 in 1; thus, the total vertebral count is 35 in 3 fish, 36 in 12, and 37 in 1.

Nuptial tubercles are well developed only in adult males (Pl. IIB). These structures, arranged in a striking and characteristic pattern, are best developed on the mandible and the pectoral fin. The other fins, the body, the opercle, and the cheek behind the eye are devoid of tubercles. Most often the top of the head lacks tubercles, but large males may have a few minute protuberances between the nostrils and on the upper rim of the orbit near the nostril. The lower part of the cheek has a few small scattered tubercles, and the preorbital has a concentration of tubercles along its edge above the lip; these extend forward to about the angle of the maxilla. On the outer edge of the mandible there is a row of 22 to 32 enlarged and interconnected tubercles, the acute tips of which are directed laterally to form a saw-edged comb extending from just behind the symphysis almost to the posterior end of the bone (Pl. IIB). On the inner half of the mandible there are 2 or 3 irregular series of blunt tubercles which project ventrally; these tubercles extend farther forward toward the symphysis than does the outer comb, but posteriorly they are found only about as far as the tip of the maxilla. The pectoral tubercles are confined to the upper surface of the fin on the proximal two-thirds of the second to sixth or seventh rays. The tubercles are small, sharp, and close-set. Near the center of the tubercular patch they are placed in double rows on the rays, but near the edges they are in single rows.

TABLE II

Comparison of Notropis hypselopterus and Notropis signipinnis

Drawn largely from a series of the 2 species (UMMZ Nos. 155461 and 155462) taken 5.5 miles SE Semmes, Mobile Co., Alabama, on April 4, 1948. The specimens of hypselopterus are subtotypic. A color comparison was drawn in the field and is here supplemented with laboratory data.

Character	<u>hypselopterus</u>	<u>signipinnis</u>
Dorsal fin shape . . . . .	Slightly rounded, the tip forming an angle of more than 80°; anterior rays subequal to or shorter than posterior rays in the depressed fin	Acute, the tip forming an angle of about 60°; anterior rays much exceeding posterior rays in the depressed fin
Body-circumference scale rows:		
Above lateral lines . . . . .	15 or 16	11 to 13 (rarely 12 or 13)
Below lateral lines . . . . .	10 or 11	9 to 11 (infrequently 9)
Total (including lateral-line rows) . . . . .	27 to 29	22 to 26 (usually 23 or 24)
Scales in row above lateral line (near mid-body) . . . . .	Not elevated, vertical extent of exposed field about 1.5 times horizontal dimension	Notably elevated, vertical extent of exposed field about 2 to 3 times horizontal dimension
Lateral-line scales . . . . .	33 to 38, usually 36 or 37	33 to 36, usually 34 or 35
Predorsal scales . . . . .	20 to 29, usually 22 to 24	15 to 21, usually 16 to 18
Nuptial tubercles (in prespawning adult males):		
Outer edge of mandible . . . . .	Few (7 to 16), large, directed ventrolaterally; separated, not confluent, to form a saw-edged comb	Many (22 to 32), small, directed laterally; confluent to form a saw-edged comb
Inner part of mandible . . . . .	Few, large, in a single series	Many, small, in 2 or 3 irregular series



TABLE II (Cont.)

	Of moderate size	Very small
Preorbital . . . . .		
Cheek . . . . .	Small, many on lower part; present as a circumorbital series to upper edge of eye	Very small, confined to lower part
Opercle . . . . .	Present, few and scattered	None
Body . . . . .	Present on anterior part of sides	None
Predorsal streak . . . . .	Conspicuous	Faint
Dark lateral band . . . . .	Uniform steel blue	Almost black, with narrow vertical golden dashes
Dorsolateral light stripe . . . . .	Golden pink with pale green iridescence; not red posteriorly	Golden yellow anteriorly, shading to red posteriorly
Basal caudal spots . . . . .	Small, bright red, upper more prominent	Large, sulphur yellow
Dorsal fin color . . . . .	Distal half of anterior rays clear white; middle and back of fin heavily suffused with black on membranes; basal part of fin pale olive, the first ray darkened posteriorly	Distal half of fin red-orange; basal half pale yellow; proximal half of first ray black anteriorly
Caudal fin color . . . . .	Distal two-fifths olive-yellow or pinkish yellow, shading gradually into dusky olive in proximal three-fifths of fin; marginal rays not appreciably darkened; middle rays little darkened, no secondary dark spot	Distal two-fifths red-orange, the proximal part bright yellow; marginal and procurrent rays black, narrowly edged with red; middle rays conspicuously darkened to form a prominent secondary dark spot
Anal fin color . . . . .	Rather uniformly olive-yellow, the anterior rays whitish; heavily suffused with melanophores	Distal two-fifths red-orange; basal part pale yellow; anterior border dusky, the rest of fin with few melanophores
Pelvic fin color . . . . .	With much dark pigment	With little dark pigment

In some breeding females the outer series of mandibular tubercles is feebly or moderately developed, but tubercles are apparently not present elsewhere.

**COLORATION.**—This is one of the most colorful species in a genus which includes many gaudy representatives. The dominant feature in preserved specimens is the very broad, black lateral band, which is sharply delimited from the surrounding color only on its upper edge along the caudal peduncle (Pl. I). In life this band is deep gun-metal blue-black, with narrow vertical golden dashes along its upper part on the trunk. The ventral surface of the head and body is white, washed with pale gold on the lower sides. The light dorsolateral stripe is golden pink anteriorly and shades gradually into red just anterior to the caudal base. The upper surface is deep olive golden; the mid-dorsal streak is dark, but is not sharply contrasting. There is no mid-ventral dark streak on the caudal peduncle. On the head the dark lateral band covers most of the opercle, the lower two-thirds of the eye and the cheek just below the eye, and extends forward around the upper lip and on the chin. A pinkish gold bridle extends from above the eye through the nostril and around the tip of the snout. The iris is dusky below, golden tinted with pink above.

The vernacular name, flagfin shiner, is selected because the striking coloration of the fins is so characteristic that the species can be recognized in clear water and is easily distinguished from its near relative *N. hypselopterus* at a distance of 15 or more feet. Most distinctive is the tricolored caudal fin. There are two large, bright, sulphur-yellow spots near the base; between them the middle part of the fin is notably darkened and forms a large spot about one-third of the distance to the fork. The orange-red of the distal one-half to two-fifths of the fin grades through dull yellow in the middle part. The procurrent rays and the proximal half of the marginal rays, both above and below, are black, narrowly edged with red. Orange-red in their distal halves, the dorsal and anal fins shade imperceptibly into yellow or yellowish pink in the proximal parts. Except for a few on the base of the dorsal the membranes of these fins are devoid of melanophores, but each of the rays is dark margined before and behind; the black anterior edge of each fin is notable. The pectoral is light, washed with yellowish, and the pelvic is pinkish yellow shading to orange-yellow distally on the two anterior rays. None of the fins is marked with white. In pigmentation females differ from males only in that the colors are slightly less intense. The color description given above was drawn in the field from examples taken in a tributary to Wolf River, Mississippi, on

April 3, 1948, by M. K. and R. M. Bailey (UMMZ 155386). Specimens collected at other localities appeared to be identical.

Some differences in pigmentation may be correlated with geography. Males from the Choctawhatchee Bay drainage have very few or no melanophores on the ventral surface anterior to the pelvic fins. Males from all other drainages are relatively heavily pigmented with small melanophores.

GEOGRAPHIC VARIATION.—In his unpublished doctoral dissertation on the cyprinid fishes related to *Notropis hypselopterus* (Cornell University, 1951), Suttkus has assembled an extensive body of data on

TABLE III

Frequency Distribution of the Number of  
Principal Anal Fin Rays in *Notropis signipinnis*

The drainage systems are arranged from west to east.

Drainage	Number of Anal Rays					Number	Mean	Percentages	
	9	10	11	12	13			9-10	11-13
Pearl River	1	83	169	4	..	257	10.68	33	67
Wolf River	..	34	90	12	..	136	10.84	25	75
Biloxi Bay	..	7	8	3	..	18	10.78	39	61
Pascagoula River	1	82	274	37	1	395	10.89	21	79
Mobile Bay	..	13	96	8	..	117	10.96	11	89
Perdido Bay	1	63	47	..	..	111	10.41	58	42
Pensacola Bay	..	165	124	3	..	292	10.44	57	43
Choctawhatchee Bay	5	111	25	..	..	141	10.14	82	18
St. Andrews Bay	4	97	9	1	..	111	10.06	91	9
Apalachicola River	1	80	71	2	..	154	10.48	53	47
Total	13	735	913	70	1	1732	10.60	43	57

variation in *N. signipinnis*. From this the geographic differences in anal and pectoral ray counts are here mentioned as of particular interest.

In those drainage basins from the Pearl River to Mobile Bay the modal number of anal rays is 11, although 10 is of common occurrence and 12 is frequent (Table III). From Perdido Bay to the Apalachicola River the modal count is 10, but 11 rays are counted in many speci-

mens. Despite a general decrease from west to east the gradient is highly irregular; the extremes are in the drainages of Mobile and St. Andrews bays although neither is at the periphery of the range. It may be noted that these two populations, compared without reference to other stocks, exhibit a morphologic difference on the level accepted as subspecific by many workers, since 89 and 91 per cent, respectively, of the samples are identifiable on a line of separation between 10 and 11 rays. Other samples are variously intermediate in count if not in geography.

Pectoral ray counts show even less regularity in their geographic variation (Table IV). The adjacent Pearl and Wolf River systems have

TABLE IV

Frequency Distribution of the Number of Pectoral Fin Rays in *Notropis signipinnis*

The drainage systems are arranged from west to east.

Drainage	Number of Pectoral Rays (Both Fins)						Number	Mean	Percentages	
	12	13	14	15	16	17			12-14	15-17
Pearl River	..	6	73	222	68	3	372	14.97	21	79
Wolf River	1	50	143	45	3	..	242	14.00	80	20
Biloxi Bay	..	5	15	14	..	..	34	14.26	59	41
Pascagoula River	1	50	342	233	32	..	658	14.37	60	40
Mobile Bay	1	8	76	97	14	..	196	14.59	43	57
Perdido Bay	..	3	35	10	..	..	48	14.15	79	21
Pensacola Bay	..	40	181	92	11	..	324	14.23	68	32
Choctawhatchee Bay	7	58	153	19	1	..	238	13.79	92	8
St. Andrews Bay	7	76	118	15	..	..	216	13.65	93	7
Apalachicola River	..	74	169	17	..	..	260	13.78	93	7
Total	17	370	1305	764	129	3	2588	14.24	65	35

populations which differ by almost a full pectoral ray, permitting identification of 79 and 80 per cent of the counts at a line of separation between 14 and 15 rays. Except for the three at the eastern end of the range, however, all other drainages are intermediate. Employing currently approved procedures one might assign the population of the Pearl River to one subspecies, those from the Choctawhatchee Bay, St. Andrews Bay, and Apalachicola River to another. In line with such

action, however, it would be necessary to allocate the stocks from the Wolf River and Perdido Bay drainages to the eastern subspecies; those from the basins of Biloxi Bay, Pascagoula River, Mobile Bay, and Pensacola Bay would then be identified as intergrades!

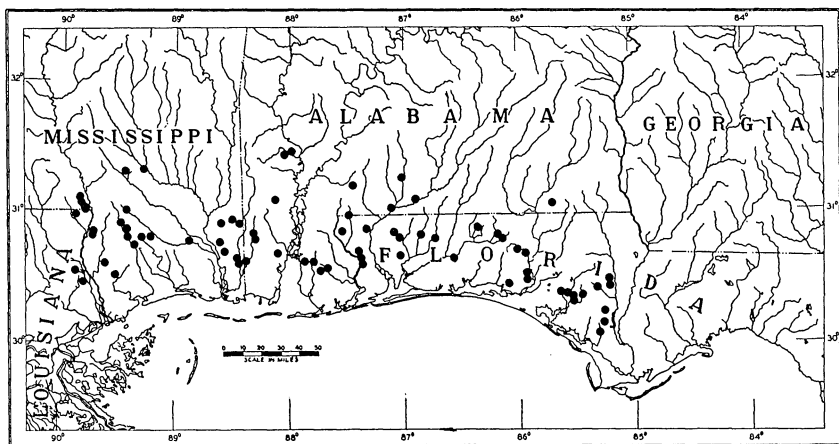
In view of the irregularity in geographic pattern of these two fin counts, a searching reappraisal of the validity of these characters in cyprinid taxonomy seems to be required. A possible explanation is that the deviations have a purely genetic basis, but that the several populations arose from stocks so small that through chance they deviated appreciably from one another and transmitted their characteristics to their descendants (the Sewall Wright effect). When the two fin counts are compared it may be noted that, with the exception of the low pectoral ray count in the Wolf River system, the variation in counts is closely and positively correlated. This makes especially plausible an alternative explanation that the observed variations reflect the imprint of deviations in some environmental factor or factors. In the light of the growing body of evidence to demonstrate that the morphology of fishes—numbers of vertebrae, scale rows, fin rays, and various body proportions—can be molded by extrinsic factors, this explanation becomes increasingly credible. In line with this suggestion it may perhaps be significant that those samples which have the lowest fin ray counts are from the lowest elevations and the lowest latitude in the range of the species. The need for experimental testing of the basic tools of the taxonomic ichthyologist's trade becomes increasingly urgent. Until an adequate evaluation of characters can be established through experimentation, the wiser course would be to practice conservatism rather than excessive splitting in the recognition of subspecies.

RELATIONSHIPS.—Among the known species of *Notropis*, *signipinnis* is most closely allied to *hypselopterus*. These species live together from the vicinity of Mobile, Alabama, to the eastern limit of the range of *signipinnis*, but their ranges are not coextensive. In view of the frequent mutual association and the striking morphological differentiation (Table II and Pl. II), the relationship is not regarded as especially close. *Notropis stonei* Fowler, which also fits into this group, appears to be a distinct species that is much closer to *hypselopterus* than to *signipinnis*. The three species constitute a species group in *Notropis* for which the subgeneric name *Pteronotropis* Fowler is available if it proves profitable to recognize subgenera.

HABITAT AND HABITS.—*N. signipinnis* is an inhabitant of tiny to moderate-sized creeks, extending to about 20 feet in width, with a consider-

able gradient. The species is gregarious, schooling in mid-water in clear, deep pools with a substantial current. It is unwary and is captured readily with a small net since it makes no active attempt to escape and usually remains away from vegetation or other protective cover.

Typically, the streams inhabited by *signipinnis* flow through tupelo and magnolia swamps, often with an admixture of maple and cypress. The streams themselves usually contain much aquatic vegetation, but, as indicated above, the flagfin shiner is not closely associated with it. *N. signipinnis* has such a high associational incidence with the golden club (*Orontium aquaticum*) that observation of this plant from the highway provided a clue to the occurrence of *signipinnis* at several localities which otherwise might not have been investigated.



MAP 1. Distribution of *Notropis signipinnis* by record stations.

RANGE.—*N. signipinnis* is distributed from the Pearl River drainage of southeastern Louisiana and southern Mississippi, east to the Chipola River, western Florida (Map 1). None of the localities is in tidewater, but all are relatively near the Gulf Coast.

NOMENCLATURE.—*Alburnus formosus* Putnam (1863: 9) is complex; cotypes in the Museum of Zoology include one specimen of *N. signipinnis* and 8 of *N. hypselopterus* (auct.). The name is preoccupied by *Montana formosa* Girard (1856: 201), also a species of *Notropis*; for nomenclatorial purposes Putnam's name may be listed in the synonymy of *hypselopterus*. The substitute name *Leuciscus hypselopterus*

Günther (1868: 255) is properly allocated to the species herein termed *N. hypselopterus* because Günther's description of a specimen in the British Museum which came from Mobile plainly refers to that form only. All subsequent authors have applied this name correctly to the species.

Because Putnam's species was complex and in order to obviate any possible future confusion, we herewith designate as lectotype of *Alburnus formosus* Putnam a specimen (UMMZ 162442) of *N. hypselopterus* (auct.), 43 mm. in standard length, from the series of Putnam's cotypes from Mobile, Alabama.

The name *signipinnis* is derived from *signum*, banner, *pinna*, fin, and the adjectival suffix *-is*, in reference to the striking coloration of the caudal and other median fins.

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PLATE I

*Notropis signipinnis*. The holotype, a male 49.5 mm. in standard length. William L. Brudon delineator.



PLATE I

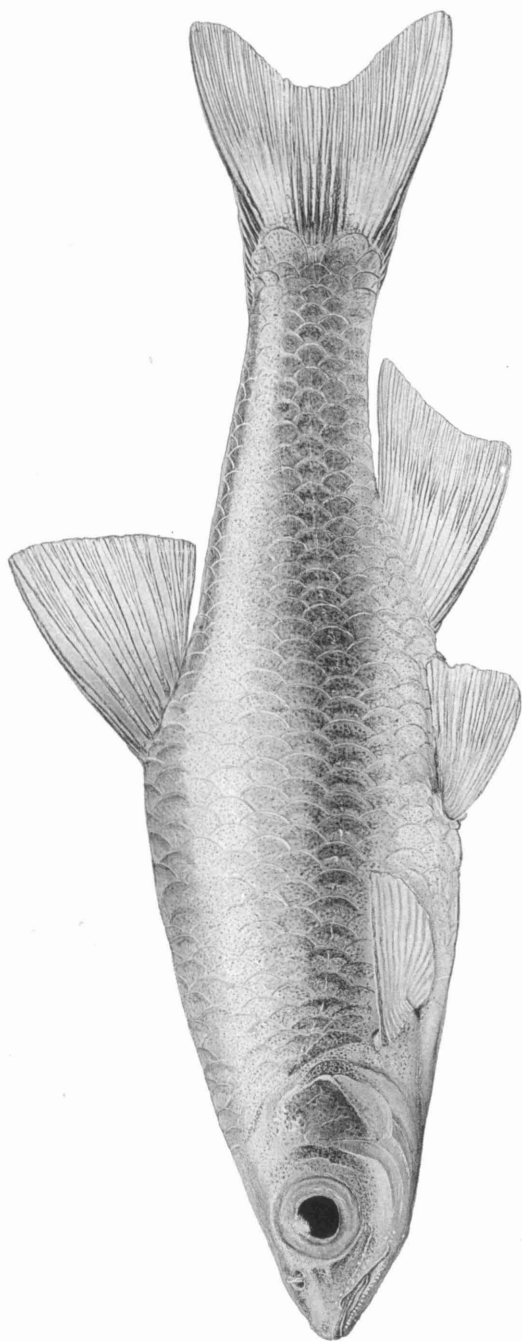
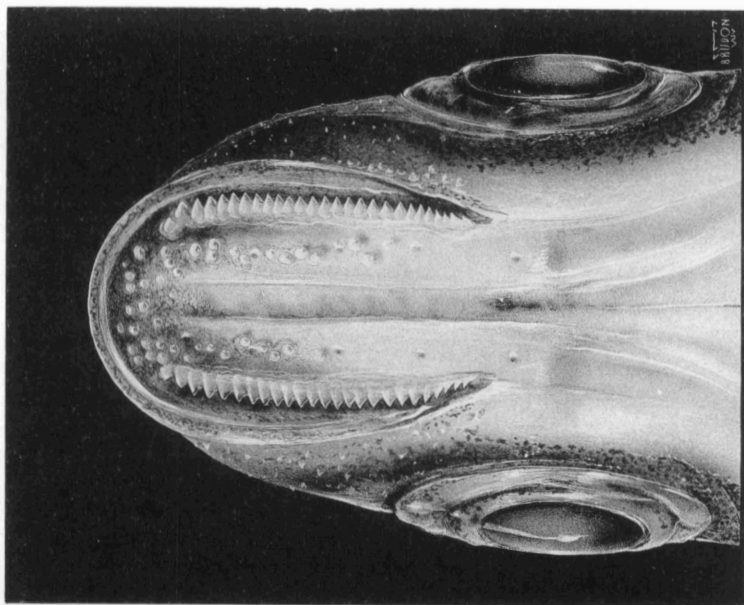


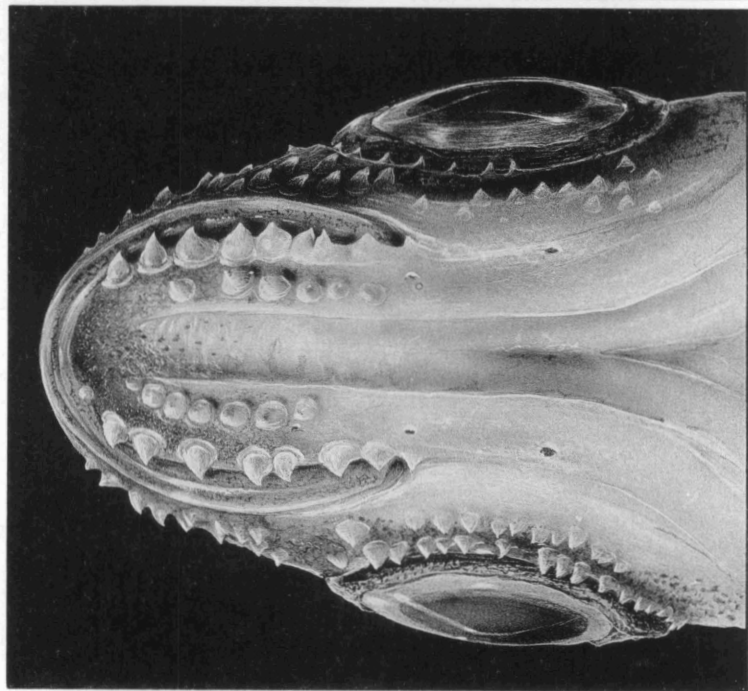
PLATE II

Ventral aspects of heads of prespawning males of *Notropis hypselopterus* (A) and *Notropis signipinnis* (B) to show the differences in size, arrangement, and distribution of the nuptial tubercles. William L. Brudon delineator.

PLATE II



B



A

