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NOTROPIS BAILEYI, A NEW CYPRINID FISH FROM THE
PASCAGOULA AND MOBILE BAY DRAINAGES OF
MISSISSIPPI AND ALABAMA

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NOTROPIS BAILEYI, A NEW CYPRINID FISH FROM THE
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Intensive ichthyological field studies in southeastern United States in recent years have revealed several new forms of *Notropis*, the largest genus of North American Cyprinidae. One is described below and also included are studies of other closely related forms, especially *Notropis lutipinnis* (Jordan and Brayton) and *Notropis chrosomus* (Jordan), which are little known. The habits and ecology of these small fishes are suggested as interesting and worthwhile studies for regional ichthyologists.

Material of the new species has been collected by the authors and others listed below to whom we give hearty thanks for personal assistance in the field or for the loan of specimens. They are Bancroft Cooper, Ralph L. Chermock, Charles F. Cole, Robert H. Gibbs, Herbert D. Gibson, Charles D. Hancock, P. S. Handwerk, L. James Kezer, H. T. Rainwater, C. Richard Robins, Merlin G. Suttikus and William S. Woolcott. Vladimir Walters has made available tooth and anal ray counts for *Notropis lutipinnis*. Helen J. Illick has kindly supplied counts for the cephalic lateral line pores from an unpublished study of these structures in North American Cyprinidae. We are grateful to Reeve M. Bailey, Ernest A. Lachner, and Carl L. Hubbs for a critical review of the manuscript and other favors. This form is named for Dr. Reeve M. Bailey, Curator of Fishes, Museum of Zoology, University of Michigan, who has contributed much to the knowledge of North American freshwater fishes and who has been ever helpful in our studies. Counts and measurements were taken as described by Hubbs and Lagler (1947: 8-15).

NOTROPIS BAILEYI, sp. nov.

Figs. 1 and 2, Map 1

The type material consists of 222 specimens from 21 to 63 mm in standard length taken at seven localities in the Alabama River System. Other material examined consists of 338 specimens, 19-55 mm from 19 localities in the Tombigbee and Pascagoula drainages. Below in parentheses are indicated the number of specimens and the range of standard length in millimeters, e.g. (4, 35-56). In addition to stand-

¹ Aid for field studies and collections of fishes now at Cornell was obtained through awards from the Cornell University Faculty Research Grants Committee.

ard compass directions, with the following "of" deleted, these abbreviations are used: Co. = County, Cr. = Creek, mi. = mile or miles, R. = River, trib. = tributary (of), ANSP = The Academy of Natural Sciences of Philadelphia, CU = Cornell University, TU = Tulane University, UMMZ = University of Michigan, Museum of Zoology and USNM = United States National Museum.

Material.—Holotype, CU 28224, an adult female 59.6 mm in standard length, taken in the Alabama River system in a trib. Sawacklahatchee Cr., 1.7 mi. W. Society Hill on U. S. Route 80, Macon Co., Alabama, on June 12, 1949, by Royal D. Suttikus, Charles F. Cole and Robert H. Gibbs. Designated as paratypes (CU 16020) are 66 specimens from 29 to 63 mm in standard length which bear the same data as the holotype.

Other paratypes from the Alabama River system of Alabama are as follows: TU 3195 (4, 33-56), Pine Barren Cr., 2.5 mi. S. Forest Home, Butler Co., June 2, 1951; TU 2637 (30, 30-43), trib. Alabama R., 17.3 mi. S.S.W. Camden, Monroe Co., June 3, 1951; TU 3430 (75, 29-48), Pursley Cr., trib. Alabama R., 3.4 mi. S.W. Camden, Wilcox Co., June 3, 1951; TU 2965 (4, 21-46), Gravel Cr., trib. Pursley Cr., 6.3 mi. S.W. Camden, Wilcox Co., June 3, 1951; TU 3066 (41, 31-52), trib. Pursley Cr., 1.8 mi. E. Camden, Wilcox Co., June 3, 1951; USNM 163568 (1, 31), 5 mi. W. Attalla, Etowah Co., September 13, 1947; UMMZ 105526 (2, 59-61), branch 4 mi. W. Auburn, Wire Road, [Lee Co.], June 1938; UMMZ 105554 (73, 33-53), creek, 4 mi. W. Auburn, Wire Road, [Lee Co.], March 9, 1939; UMMZ 124018 (1, 27), Big Swamp, 5 mi. S.E. Tuskegee, [Macon Co.], September 13, 1937; UMMZ 124024 (1, 61), Long Branch, 1 mi. W. Marvyn (Columbus Road), [Lee Co.], September 20, 1937; UMMZ 124094 (41, 18-48), Loblockee Cr., N. Auburn, [Lee Co.], September 19, 1938; UMMZ 124117 (45, 27-55), Olin Cr., (= Odom Cr., S. Auburn), [Lee Co.], September 26, 1938; UMMZ 146517 (5, 42-47), Beaver Cr., 5 mi. W. Autaugaville, Autauga Co., June 13, 1942; UMMZ 146533 (16, 34-55), trib. Beaver Cr., 5 mi. W. Autaugaville, Autauga Co., March 20, 1942; UMMZ 146544 (97, 30-56), Beaver Cr., 5 mi. W. Autaugaville, Autauga Co., December 20, 1942.

Additional specimens examined are as follows: Black Warrior drainage, Alabama, CU 13991 (2, 36-37), Black Warrior R., 10.1 mi. N.E. Eutaw, Greene Co., March 31, 1948; CU 21165 (2, 26-30), 3.5 mi. N.W. Black Warrior R. bridge at Demopolis, Greene Co., March 10, 1951; CU 21166 (26, 19-46), Woods Cr. on Romulus Rd., Tuscaloosa Co., March 10, 1951; CU 13999 (6, 28-45), trib. Hurricane Cr., 1.6 mi. W. Vance, Tuscaloosa Co., March 31, 1948; CU 13785 (38, 19-51), trib. Black Warrior R. at Cottondale, Tuscaloosa Co., March 31, 1948; CU 19264 (20, 24-45), Hurricane Cr., 6 mi. E. Tuscaloosa, Tuscaloosa Co., October 21, 1950; CU 19259 (60, 28-54), Cottondale Cr. near Hurricane Cr., Tuscaloosa Co., May 19, 1950; UMMZ 166361 (60, 21-45), creek, 5 mi. N. Tuscaloosa,

detour US Hwy. 45, [Tuscaloosa Co.], May 4, 1952.

Tombigbee drainage, Alabama, CU 15544 (5, 32-45), trib. Alamuchee Cr., 2.2 mi. N.E. York, Sumter Co., March 31, 1948; CU 25705 (38, 29-41), Williams Cr., just N. Hamilton, Marion Co., August 17, 1953; UMMZ 113914 (42, 27-42), headwater of Luxapallila Cr., ¼ mi. S.E. Winfield, Fayette Co., June 4, 1932; UMMZ 135892 (2, 38-42), Vaughn Cr., 4 mi. N.E. Mount Sterling, Choctaw Co., September 4, 1942; UMMZ 141152 (1, 46), lake at Winfield (Winfield is on Luxapallila Cr.), [Marion Co.], 1943(?); UMMZ 166383 (275, 25-59), Luxapallila Cr., 2 mi. W. Winfield, US Hwy. 43, [Marion Co.], May 4, 1952.

Tombigbee drainage, Mississippi, UMMZ 113872 (3, 42-52), Ponta Cr., trib. Sucarnoochee Cr., 12 mi. S. Electric Mills, US Hwy. 45, Lauderdale Co., June 3, 1932.

Pascagoula drainage system, Mississippi, Covington Co.: CU 16261 (15, 27-50), trib. Okatoma Cr., 1.7 mi. E. Collins, June 14, 1949; CU 12578 (43, 22-55), trib. Bowie Cr., 10.9 mi. W. Collins, August 7, 1948; Clarke Co.: UMMZ 157782 (11, 23-57), small creek from US Hwy. 11 to mouth in Chickasawhay R., 1 mi. N. Enterprise, August 17, 1939; Wayne Co.: (all distances from Waynesboro Post Office, abbreviated W.P.O.) TU 8052 (2, 29-31), Patton Cr., 2 mi. W.P.O., Feb. 1954; TU 8031 (15, 26-47), Meadow Cr., 2.5 mi. W.P.O., Feb. 1954; TU 8047 (9, 21-44), Tatum Cr., 3 mi. W.P.O., March 17, 1954; TU 8073 (4, 32-48), 3.5 mi. W.P.O., Feb. 24, 1954; TU 8038 (15, 25-46), Limestone Cr., 4 mi. W.P.O., March 18, 1954; TU 8056 (25, 34-47), 3.5 mi. W.P.O., Feb. 18, 1954; TU 8063 (8, 31-48), Limestone Cr., 4 mi. W.P.O., March 24, 1954; TU 8066 (5, 34-50), Taylor Cr., 1.5 mi. W.P.O., March 9, 1954.

Diagnosis.—A species of *Notropis* with 2, 4—4, 2 teeth and 7 anal rays. Other fin rays: dorsal 8; pectoral 14, occasionally 15; pelvic 8. Scales: predorsal rows 15, rarely 16; above lateral line to dorsal origin 5 or 6; below lateral line to anal origin 4 or 3; in lateral line 36, sometimes 37; around body before dorsal 23 to 30, usually 24 to 28; around caudal peduncle 12, sometimes 13. Body moderately deep and compressed. Dorsal origin directly above pelvic origin. Mouth inclined, moderately large; upper jaw much longer than eye length. Lateral line complete. Anterior lateral line scales not elevated. Middorsal streak dark, continuous and encircles dorsal fin base. Moderate to strong dark lateral band on body. Prominent dark basicaudal spot. Size small, to 60 mm standard length. Apparently allied to but sharply differentiated from *Notropis chrosomus* and *Notropis lutipinnis*, both of which have 8 anal rays.

Description.—Besides the pertinent characters given above, counts and measurements are given in Tables 1-3 and include comparisons with *Notropis chrosomus* and *Notropis lutipinnis*. Measurements of the holotype are detailed in Table 1 and its fin ray and scale counts in Table 3 are the usual counts unless indicated otherwise by an asterisk. Additional characters are illustrated in Figures 1-4. Other

TABLE 1.

MEASUREMENTS OF *Notropis* IN THOUSANDTHS OF STANDARD LENGTH.
FOR EACH CHARACTER IS GIVEN THE RANGE OF VARIATION AND
BELOW (IN PARENTHESES) THE MEAN.

Species	<i>baileyi</i>		<i>lutipinnis</i>	<i>chrosomus</i>
Stream system	Alabama		Chattahoochee	Alabama
Catalog number, CU	28224	16020	28226	17743
No. and sex of specimens measured	Holotype ♀	Paratype* 5 ♀, 4 ♂	2 ♀, 8 ♂	5 ♀, 5 ♂
Standard length	60.3	42.5-62.9	43.5-54.5	42.0-62.9
Dorsal origin to snout tip	506	492-518 (510)	518-544 (533)	496-531 (518)
Dorsal origin to caudal base	532	514-535 (525)	474-531 (508)	500-533 (517)
Dorsal origin to occiput	318	304-323 (315)	314-346 (330)	312-343 (332)
Pelvic insertion to snout tip	520	491-520 (504)	460-506 (490)	480-518 (497)
Anal origin to caudal base	331	328-350 (338)	262-370 (344)	312-355 (335)
Body depth	255	228-261 (247)	220-252 (237)	217-252 (233)
Body width	159	140-162 (152)	137-167 (151)	151-183 (169)
Dorsal origin to lateral line	149	146-165 (158)	148-167 (156)	133-157 (146)
Pelvic insertion to lateral line	119	107-135 (115)	088-119 (106)	097-128 (114)
Caudal peduncle length	210	210-236 (225)	190-239 (220)	218-253 (234)
Caudal peduncle depth	106	097-116 (104)	097-107 (101)	087-102 (096)
Head length	253	244-258 (251)	267-288 (275)	218-238 (228)
Head depth	168	156-172 (168)	166-178 (173)	156-171 (174)
Head width	143	127-145 (136)	120-144 (136)	122-141 (131)
Interorbital, least fleshy	084	084-088 (085)	082-094 (089)	080-088 (083)
Snout length	074	074-083 (080)	085-093 (088)	068-078 (074)
Eye length	074	066-074 (070)	063-074 (067)	057-068 (062)
Upper jaw length	086	083-090 (086)	090-105 (100)	065-080 (073)
Suborbital, least width	032	030-036 (032)	028-034 (031)	028-033 (030)
Dorsal fin, depressed length	214	210-239 (219)	218-247 (231)	183-231 (204)
Anal fin, depressed length	194	177-194 (185)	218-232 (225)	179-200 (187)
Caudal fin length from mid-base to tip of longest ray	243	243-294 (269)	239-275 (257)	231-271 (249)
Pectoral fin length	173	173-209 (186)	201-223 (214)	176-217 (196)
Pelvic fin length	153	151-172 (160)	152-178 (168)	147-176 (161)

* The mean includes the measurement of the holotype.

descriptive features follow: The fusiform body is rather deep and somewhat compressed. Among the black banded species of *Notropis* with 2, 4—4, 2 teeth it most closely resembles *lutipinnis* but differs from it in many characters including the anal ray count (8 in *lutipinnis*). The mouth is terminal; the snout is slightly blunt. The head is subtriangular. The dorsum rises rather uniformly from the region of the nostrils and levels off only slightly before the dorsal fin origin. Posteriorly it descends gradually and ascends again just before the procurent caudal rays. The ventral outline anteriorly is only slightly less elevated than the dorsal. It curves abruptly upward beginning at the pelvic base and levels off midway on the caudal peduncle, which is rather stout. The lateral line is complete; anteriorly it begins only slightly below the upper margin of opercular opening and descends gradually to level off about one-third of the distance to the dorsal origin. It continues horizontally, slightly below the ventral edge of the dark lateral band, to a point below the posterior dorsal fin base. Here it rises gradually and continuously reaching the upper edge of the dark lateral band at about the narrowest part of the caudal peduncle only to descend again near the caudal base. In *lutipinnis* the course of the lateral line is similar to that of *baileyi* except that it does not dip as far ventrally on the anterior half nor reach as far dorsally on the posterior half of the lateral band. In *chrosomus* the lateral line is included within the lateral band for its entire length, but in its anterior half is closer to the ventral border of the band, while the reverse is true on the posterior half of the body.

In the following description of the lateral line canal and pores on the head, the number of specimens counted is given in parentheses. In counting pores the anteriormost is number one. In *N. baileyi*, the supratemporal canal is always incomplete, with two pores on each side (7) or with 3 on the left and 2 on the right (1). *N. chrosomus* is essentially the same: incomplete, with 2 pores on each side (6) or with 2 on the left and 3 on the right (1). *N. lutipinnis* differs from both in having the supratemporal usually complete with only 3 pores (4); one had an incomplete canal with 2 pores on each side.

The supraorbital canal is complete in the three species under consideration. *N. baileyi* usually has a pore count of 8 (6) or 9 (2); a line projected vertically from the posterior margin of the eye falls between pores six and seven when the count is 8 and between seven and eight when the count is 9. *N. lutipinnis* is similar with 8 (3) or 9 (2); a line from the posterior margin of the eye falls on or very close to the next to last pore. *N. chrosomus* differs in the small sample counted in having 8 (2), 9 (4), or 10 (1). A vertical from the posterior margin of the eye falls between pores six and seven when the count is 8, between pores seven and eight when count is 9, and between eight and nine when 10.

The infraorbital canal is complete in *baileyi* and *lutipinnis*. In *baileyi* the count is 15 (4), 14 (3), or 13 (1). A vertical projected from the anterior margin of the eye falls between pores five and six

TABLE 2.
ANAL RAY COUNTS IN THREE SPECIES OF *Notropis*

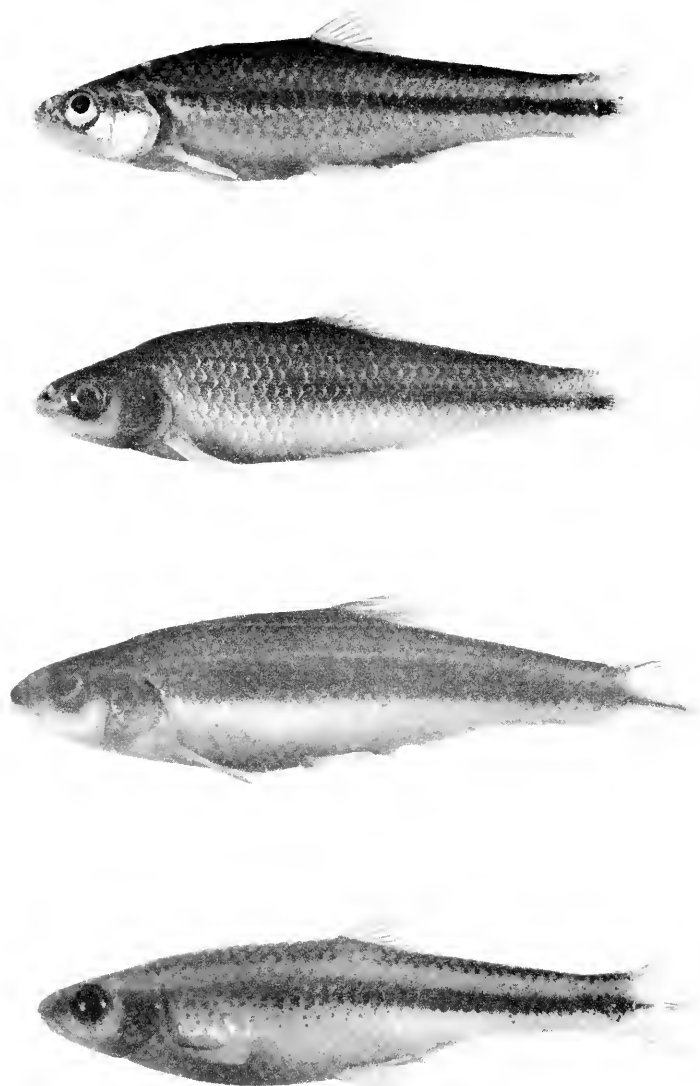
Species and drainage	6	7	8	9	Num- ber	Mean
<i>baileyi</i>						
Alabama R.	1	65	1	—	67	7.00
Black Warrior R.	—	137	18	—	155	7.12
Tombigbee R.	—	41	2	—	43	7.05
Pascagoula R.	—	58	—	—	58	7.00
Totals	1	301	21	—	323	7.06
<i>lutipinnis</i>						
Savannah, Altamaha and Chattahooche rivers	—	1	166	7	174	8.03
<i>chrosomus</i>						
Alabama R.	—	4	75	12	91	8.09

and four and five respectively. In *lutipinnis*, the count is lower, 14 (4) or 13 (1); a line from the anterior margin of the eye falls between pores five and six. The infraorbital in *chrosomus* is complete in four out of five specimens studied and shows the greatest variation in pore count with 13 (3), 14 (1), 15 (1), or 16 (1). One specimen with a pore count of 16 is incomplete with a break between pores twelve and thirteen in the temporal region. A line projected from the anterior margin of the eye falls between pores four and five.

The preoperculomandibular canal is complete in the three species. In *baileyi*, the pore count is usually 10 (4), but occasionally 9 (2) or 11 (2). In *lutipinnis* the count is 9 (3), 8 (1), or 10 (1). In *chrosomus* the number is 10 (4), 11 (1), or 12 (2). In *chrosomus* all pores, but especially those of the preoperculomandibular series are much larger than in either *baileyi* or *lutipinnis*. Also *lutipinnis* usually differs from *chrosomus* in having the preoperculomandibular pores more widely separated and has a particularly wide space between pores four and five.

Dorsal fin straight on posterior border; when depressed the anterior rays exceed the posterior rays. Anal fin slightly falcate; when depressed the posterior rays exceed the anterior rays.

The pharyngeal arch is fairly strong. The teeth in the main row are pointed and hooked at the tip. The serrulate grinding surface is well developed especially on the middle two teeth. The teeth in



Figures 1-4. 1. (top) *Notropis baileyi*, paratype, adult female, 56 mm in standard length, from the type locality, a trib. Sawacklahatchee Cr., 1.7 mi. W. Society Hill, Tallapoosa River drainage, Macon Co., Alabama; 2. (second) *Notropis baileyi*, adult male, 48 mm from a trib. Black Warrior River at east limits of Cottondale, Tuscaloosa Co., Alabama; 3. (third) *Notropis lutipinnis*, a mature female, 58 mm from Bushy Creek, 9 mi. S. Wrens, Savannah River drainage, Jefferson Co., Georgia; 4. (bottom) *Notropis chrosomus*, a mature female, 58 mm from a trib. Oostanaula River, 6.3 mi. S.W. Calhoun, Coosa River drainage, Gordon Co., Georgia. (Photographs by Douglass M. Payne)

the lesser row are about half as high as those in main row which are pointed and hooked slightly; the grinding surface is moderately developed. The gill rakers on the anterior gill arch number 4 to 6. They are short subtriangular in shape and only the two near the center of the arch are pointed. The nape is scaled. The breast is scaleless forward of a transverse line between the posterior margin of the pelvic bases.

As has been noted repeatedly for other species of *Notropis* slight but consistent color or pattern differences are present. Most of these are included in Table 3. Typically, *baileyi* is a black banded species. The band is prominent, is intensified posteriorly and if at all is only weakly marked by more intense spots above and below each lateral line pore. It continues on the head behind the eye but is less intense immediately before the eye and fades considerably on the anterior part of the snout. A sharp light stripe borders the dark band above. A prominent and diagnostic feature, except in some specimens from the Black Warrior system, is the series of dark ovals located on the first full scale row below the dark lateral band (fig. 1). A prominent quadrate basicaudal blotch is continuous with and somewhat darker than the band immediately in front. The blotch continues on to the 4 to 6 median caudal rays a distance about equal to the length of the spot on the caudal peduncle. The dark edging on the midcaudal rays continues to the fork but is weaker posteriorly. The prominent middorsal dark streak is continuous, although not intensified, around the base of the dorsal fin and although present behind the dorsal base is only about two-thirds as wide. It narrows somewhat about half way between the occiput and dorsal origin. The midventral dark band on the caudal peduncle is limited to the area at the base and immediately behind the depressed anal fin. The top of the head is dark. A light preorbital bar extends forward to include the area about the nostrils. A wedge-shaped dark blotch lies above the nostrils. A diamond-shaped dark bar crosses the head just anterior to the hind margin of the eyes. The heart-shaped mark on the rear of the head is more or less completely divided by a transverse light line and is outlined on its posterior lateral margin by another light bar. A dark subtriangular blotch overlays the temporal region anterior to a dark transverse occipital bar which continues laterally and downward behind the opercle to the pectoral fin base. The lips have scattered melanophores. The chin is peppered and has a lighter area near the center. The upper oral breathing valve bears a few melanophores.

The fins are generally light. The first pectoral ray is darkish and the second ray bears a few melanophores. The caudal fin rays, especially those in the center, are finely margined with black. The dorsal rays are margined with black and there are scattered melanophores on the membranes near the base of the fin. The anal and pelvic fins are white.

The dark lines which margin the scale pockets although not pro-

TABLE 3.
COMPARISON OF THREE SPECIES OF *Notropis*

Character	<i>baileyi</i>	<i>lutipinnis</i>	<i>chrosomus</i>
Mouth, side view	Oblique, rising anteriorly to middle or one-third of pupil. Slightly notched in center	Oblique, rising to middle of pupil. Front half or one-third somewhat curved downward	Evenly curved downward anteriorly, barely reaching lower level of pupil
Posterior tip of upper jaw in relation to a perpendicular from the anterior edge of eye	Reaches	Extends behind	Barely reaches
Middorsal stripe continuous about base of D. fin	Yes	No	No
Midventral peritoneum	Dusky with large scattered melanophores	Light	Light
Heart-shaped mark on back of head	Divided by a transverse light line	Not divided	Divided faintly into three sections
Lower border of dark lateral band on opercle	Limited to upper opercle	Limited to upper opercle	Extends far down on opercle
Oblique dark bar behind opercle	Well developed	Weak	Well developed
Dark color laterad and posterior to the anus	Present	Absent	Absent
Body about base of anal fin	Dark	Light with few small deep seated melanophores	Light with few melanophores at base of rays
Basicaudal spot	Present, subquadrate, continuous with and somewhat darker than the lateral band on body	Absent, although midcaudal rays are somewhat darkened to caudal fork	Small spot, central caudal rays dark

Dark lateral band on anterior half of body	Intense; weakly marked above and below lateral line pores	Strong; lacks intensifications above and below lateral line pores	Weak, with scattered melanophores; spots present above and below lateral line pores
Origin of dorsal fin in relation to anterior pelvic insertion	Directly over	Well behind	Slightly behind
Body depth in relation to head length	Slightly greater	Much less	Greater
Head length into standard length	Intermediate; about 4 times	Long; considerably less than 4	Short; considerably more than 4
Snout length as percentage of standard length	Intermediate; 7.4 - 8.3%	Long; 8.5 - 9.3%	Short; 6.8 - 7.8%
Upper jaw length as percentage of standard length	Intermediate; 8.3 - 9.0%	Long; 9.0 - 10.5%	Short; 6.5 - 8.0%
Fin rays			
Anal (typically)	7	8	8
Pectoral	14, often 15	15, occasionally 16	14 or 15
Pelvic	8	8, rarely 9	8, occasionally 9
Scales			
Predorsal rows	15, rarely 16	16 to 21, usually 17-18	16, occasionally 17
Dorsal origin to lateral line	5, often 6	6 to 8, usually 6-7	5, occasionally 6
Anal origin to lateral line	4, often 3 *	4, often 5	3, often 4
In lateral line	36, occasionally 37 *	37-39, usually 38	36-38, usually 37-38
Around body before dorsal fin	23-30, usually 24-28	26-31, usually 27-30	22-24, usually 22-23
Around caudal peduncle	12, occasionally 13	14-17, usually 14-16	12

* Count of holotype.

nounced cross the light stripe which lies above and parallels the dark lateral band of the midside. The scale centers are somewhat lighter than their borders. The breast and belly are white; occasionally the dark of the peritoneum shows through.

In the field males from Black Warrior system taken on March 31 were observed to have a wide whitish or lead colored line along the side. C. Richard Robins notes that specimens taken on August 12 had a metallic lateral band and that the caudal fin and the pectoral fin base were orange. At breeding time it is brightly colored with shades of red through yellow. Detailed color notes on specimens contained in UMMZ 105554, 146533 and 166383 were furnished by Reeve M. Bailey. Specimens in UMMZ 105554 had a deep-lying light orange area above the steel blue-black lateral band which graded to yellow over the back. The orange and the black were separated superficially by a leaden-white line. The lateral band was also bordered on its lower side by a silver white streak which petered out toward the caudal but was broadened on the trunk and anteriorly graded into the silvery side of the face. The mid-dorsal stripe and scale borders above were deep moss-green. There was considerable orange-red on the lower sides posteriorly. Bright red colored the axil of the pectoral fin but not about the pelvics. A red line bordered the dorsal margin of the lateral band on the side of the head; was interrupted by the eye but reappeared as a watery rose stripe around the snout. There was a wash of rose color on the fins which was strongest on the areas immediately above and below the basicaudal spot. Specimens in UMMZ 146533 were essentially the same in color as above, however the sides anteriorly were bright red which shaded into orange posteriorly. The dorso-lateral white line was broadened anteriorly and obscured the lateral band. The red on the sides faded dorsally but was strong on the breast, about the base of the pelvics, and down to and posterior to the anal fin. The pectoral axil was deep red as were the markings behind the eye and on the snout. The body and fins of the males in UMMZ 166383 were bright yellow instead of washed with red. The females lacked the bright yellow on the body and fins. The sex products were easily expressed from the breeding individuals.

Nuptial tubercles are well developed in both sexes. In the male the top and sides of the head bear fine or moderate sized scattered tubercles with rather coarse ones prominently interspersed. Both types of tubercles are present on the opercle but only fine ones appear on the cheek. Fine tubercles cover the underside of the head. Large pointed ones occur on the lower jaw. Scattered fine tubercles with a few interspersed large pointed ones are found on the snout. *N. lutipinnis* differs in having only fine or moderately developed tubercles on these parts. *N. chrosomus* has large coarse tubercles scattered over the top of the head and snout, with a well developed row on edge of the latter; scattered large tubercles and numerous small ones on the opercles, cheek and preorbital area; and moderate

tubercles scattered on the dentary and underside of head. *N. baileyi* has small tubercles on the edge of the scales and has 2 to 3 larger ones in vertical row near the scale base. On the ventral scales there are fewer tubercles posteriorly. In *lutipinnis* the scales are densely tuberculate, with large ones on the margin. Tubercles are common posteriorly and on the underside of the body. In *chrosomus* there is a prominent row on the posterior margin of each scale. Those on the second row below the lateral line are not as well developed. Those on upper and lower pectoral rays are in one or two rows. In *lutipinnis* a row of sharp tubercles line the rays on the upper side of the pectoral fin. *N. chrosomus* is like *lutipinnis* but lacks tubercles on the first ray. The pelvic and anal fins of *baileyi* and *lutipinnis* have a row on the upper side of the rays and on either side of the dorsal rays while these are absent in *chrosomus*. Tubercles are abundant along the caudal rays of *lutipinnis* but are absent in *baileyi* and *chrosomus*.

Sexual dimorphism.—In males of *baileyi*, the pelvic fins are longer and nearly always reach to the origin of the anal fin, and in the exceptions always extend posterior to the urogenital elevation. In females the shorter pelvic fins barely, if at all, extend beyond the distal end of urogenital elevation. In males the pectoral fins are broader than in females. However they are not as broad proportionally as in males of *lutipinnis*. In females the pectoral fins are narrower and have more acute distal tips. In females the nuptial tubercles are less developed than in males although some tubercles on the head are nearly as large. There are none or only a few small tubercles on the dorsal and lateral scales. Transverse rows of fine tubercles line the belly scales. The head is finely tuberculate, with a scattering of large tubercles.

In males of *lutipinnis* the pelvic fin nearly always reaches the origin of the anal fin and commonly extends well beyond, whereas in the female the pelvic fin may reach the posterior edge of the urogenital elevation, but seldom if ever to the origin of the anal fin. In *lutipinnis* the pectoral fin in the male has a rounded distal tip and is much broader than in the female. Nuptial tubercles are less developed in the female; some are found on the margins of dorsal and lateral scales; none or only a few occur on the lower sides and belly, and fine tubercles are scattered on the head. Some may be seen on parts of all fins.

The sexual dimorphism is similar in *chrosomus*. The pelvic fins are longer in the male and extend posteriorly beyond the urogenital elevation and often nearly to the origin of the anal fin, whereas in the female the pelvics do not reach the former point. The pectoral fin of the male is longer and more pointed. In females some large tubercles are scattered over the head and anterior body, but are lacking on the fins. Both sexes are brightly colored with red and orange at spawning time. This is one of the most attractive species of *Notropis*.

Intraspecific variation.—The dark ovals typically found immediately below the dark lateral band are missing in adult specimens taken in the Black Warrior River system (fig. 2). They also show a higher average number of circumferential scales (26 to 30, usually 26 to 28) while those from the Pascagoula and Alabama River systems range from 23 to 27, usually 24 to 26. Black Warrior specimens also have larger and coarser nuptial tubercles.

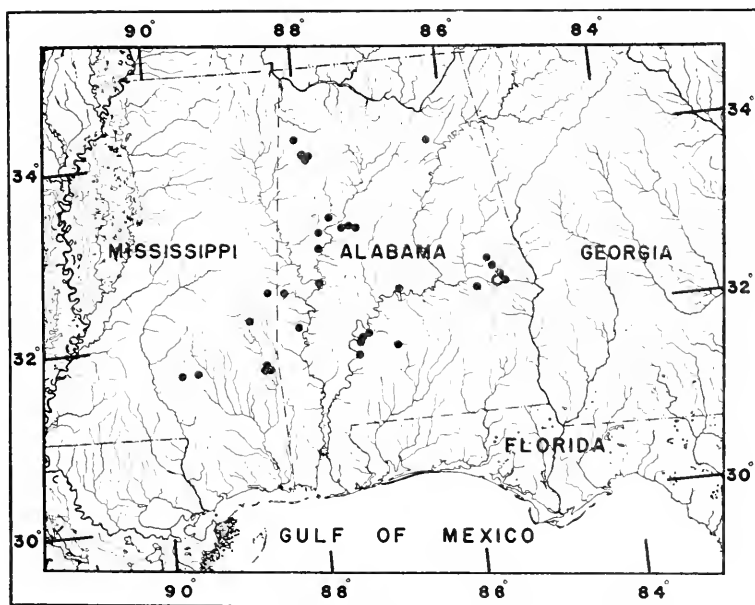
Relationships.—Among the species of *Notropis* with 2, 4—4, 2 teeth and a dark lateral band, *baileyi* is similar to and probably related to *lutipinnis* which is not found in the same drainage. It is also related to *chrosomus* which is found in the upper reaches of the Alabama River system and which was taken in the same collection with *baileyi*. *N. baileyi* differs trenchantly from both in the anal ray count, which is 8 in *lutipinnis* and *chrosomus*, and in many details of pattern, proportions, fin ray and scale counts given for the three species in comparative form in Tables 1 and 3.

On re-examination the types of *N. norrisi* Fowler (1945: 235, figs. 114 and 116), which were said in the original description to resemble *lutipinnis*, prove to be *Hybopsis harperi* (Fowler) the types of which were also studied. The teeth are 4—4 and the anal rays 8 in the type, ANSP 70705, and in 5 paratypes, ANSP 70706-10. Ernest A. Lachner has pointed out that the types of *norrisi* which are listed as being collected from near Fitzgerald, Georgia, are more likely to have been taken from the Suwannee River system than from the "basin of the Altamaha River". This seems certainly to be true if taken in or near Fitzgerald where the drainage system is to the south via the Apalachee River system. A re-examination of the types of *N. williamsi* Fowler (1945: 236, figs. 117, 118, 119) shows this to be *N. petersoni* Fowler (types also examined), as was surmised by Hubbs and Raney (1951: 9). The teeth of *williamsi* on re-examination are 2, 4—4, 2 in the "type", ANSP 70702, not 1, 4—4, 1 as given in the original description. Fin ray counts on the three types of *williamsi* are anal 7, dorsal 8, pectorals 13 and pelvics 8 (7 on one side of one specimen). Scale counts on the type and largest paratype follow: predorsal rows 16, 15; scales around body before dorsal fin 23, 22; scales around caudal peduncle 12 and lateral line scales 35.

N. baileyi may be separated from *petersoni*, *xaenocephalus*, *roseus* and an undescribed species from the Mobile Bay drainage, all of which have a dark lateral band, 7 anal rays and 2, 4—4, 2 teeth by the following characters: 1. middorsal stripe dark and continuous, encircling the dorsal fin base and extending as far as the procurent caudal rays, rather than being poorly developed or absent posteriorly, not encircling the dorsal base; 2. mouth large, with the upper jaw much longer than the eye, rather than of equal length or smaller; 3. dark lateral band immediately behind the eye continuous and of the same intensity and width as the band on the opercle, rather than being broken immediately behind eye and represented by scattered melanophores; 4. dark lateral band on body fairly uniform in density

throughout, with the lower margin entire, rather than being of varying density, especially on the anterior half, and with small spots associated with the lateral line pores. As determined from an examination of the types, *baileyi* is not the "wide mouth" variety of "*Notropis xanocephalus*" of Jordan (1877: 335).

Distribution and ecology.—Upper Coastal Plain and nearby Pied-



Map 1. Distribution of *Notropis baileyi*. (Circle indicates type locality)

mont from the Leaf and Chickasawhay rivers of the Pascagoula drainage of Mississippi eastward through the Mobile Bay drainage of Alabama where it has been taken in the Tombigbee, Black Warrior, and Alabama rivers; in the Alabama basin it extends eastward as far as the Tallapoosa River (Map 1). A single specimen from the upper Piedmont, 5 mi. W. of Attalla in the Coosa River system indicates the possibility of scattered populations throughout the Piedmont.

All of our material comes from small wooded streams which were seldom more than 15 feet and often only 5 to 10 feet wide with a moderate flow. Bottom was almost always sand and gravel. The water was white where noted and vegetation was usually absent.

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