THREE NEW SPECIES OF *ETHEOSTOMA*, SUBGENUS *ULOCENTRA*, FROM THE GULF COASTAL PLAIN OF SOUTHEASTERN UNITED STATES

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ABSTRACT

Etheostoma raneyi, *E. lachneri*, and *E. ramseyi*, three new darters of subgenus *Ulocentra* occurring allopatrically in the Yazoo, Tombigbee, and Alabama River systems, respectively, are described herein. The new species are distinguished primarily on the basis of colors and color patterns of nuptial males. In *E. raneyi*, the lateral stripe is composed of elongate blotches with even ventral margins that barely extend below the lateral line. The lower side below the stripe is a uniform red-orange. *Etheostoma lachneri* males have slightly oblique green bars on the side of the body and caudal peduncle with bright orange in the interspaces between bars. *Etheostoma ramseyi* males have ovoid to quadrate lateral blotches that are connected with the dorsal saddle blotches. The orange ventrolateral coloration has dorsal extensions between the posterior lateral blotches. Males and females of the three new species also exhibit slight differences in body proportions. The three new *Ulocentra* lack a premaxillary frenum and typically have one to several teeth on the head of the vomer, as is typical of members of the *E. duryi* species group. The new forms plus *E. colorosum* and *E. tallapoosae* are suggested to form a unique subgroup within the *E. duryi* group in that they lack a red ocellus in the first interradial membrane and have incomplete bands of red and black blotches in the spinous dorsal fin. A principal components analysis revealed differences in fin dimensions among species in the five-member subgroup.

INTRODUCTION

The three species of darters described herein occur allopatrically in the Yazoo, Tombigbee, and Alabama River systems. Until formal proposal of the coastal darter (*Etheostoma colorosum* Suttkus and Bailey, 1993) one or both of the easterly distributed forms were often thought to be conspecific with that species (e.g., Kuehne and Barbour, 1983; Page and Burr, 1991). The three new species share certain characteristics that suggest a close affinity with *E. colorosum* and another nearby geographical representative, *E. tallapoosae*.

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Etheostoma colorosum occurs in coastal streams of southern Alabama and the Panhandle of Florida from the Perdido through the Choctawhatchee rivers. Populations of *E. colorosum* in western tributaries to the Escambia River system are on the east side of a low drainage divide between the Escambia River and lower eastern tributaries to the Alabama River. Thus, *E. colorosum* is isolated from the new Alabama River system species.

Etheostoma tallapoosae Suttkus and Etnier (1991) occurs in the Tallapoosa River system above the Fall Line and thus also is isolated from the new Alabama River system species, which only occurs below the Fall Line in the Alabama River system below the confluence of the Coosa and Tallapoosa rivers. However, the new Alabama River species occurs below and above the Fall Line in the Cahaba River system, a major tributary to the middle section of the Alabama River.

Identification of the three new species is based primarily on color and color pattern of nuptial males. The subgenus, *Ulocentra*, as here used, follows Bouchard (1977) and Bailey and Etnier (1988).

Materials and Methods

Specimens of the new species and comparative material used are primarily from the collections of Academy of Natural Sciences of Philadelphia (ANSP); Auburn University (AUM); Cornell University (CU); Mississippi State University (MSU); Tulane University Museum of Natural History (TU); University of Alabama (UAIC); University of Florida (UF); University of Michigan Museum of Zoology (UMMZ); National Museum of Natural History (USNM); and University of Tennessee (UT).

Counts and measurements were made as described in Hubbs and Lagler (1958) except as follows. Transverse body scales were counted from the origin of the anal fin diagonally upward to the base of the spinous dorsal fin. Gill rakers, counted on the anterior arch of either the left or the right side, include both dorsal and ventral rudiments. Measurements were made with needle-point dial calipers and recorded to the nearest 0.1 mm. Trans-pelvic width was measured between the outer bases of the pelvic spines. Our measurements of the length of the spinous dorsal, soft dorsal, and anal fins are the total lengths of these fins which is equal to the depressed lengths. Names used for associated fish species follow Robins et al. (1991), except *Etheostoma chlorosoma* (Simons, 1992).

In the listing of type material, each catalog number is followed by the number of specimens seen and the range of standard length (SL) in millimeters, e.g. (10, 22 – 56). In addition to standard compass directions (with the following "of" deleted), the following abbreviations are used: mi. = mile(s), airmi. = airmile(s), hwy. = highway, rd. = road, Cnty. = County, T = Township, R = Range, Sec = Section. In lists of materials not designated as types, the catalog number is followed by the number of specimens examined, enclosed in parentheses. Highway numbers refer to state highways unless otherwise indicated.

Etheostoma raneyi Suttkus and Bart, new species
Yazoo Darter
Figures 1, 6, 8, and 9

Etheostoma (*Ulocentra*) Bouchard, 1974: 41 (distribution). Randolph and Kennedy, 1974: 128-134 (Tippah River, Mississippi, records).

Etheostoma sp. Clemmer et al., 1975: 8 (undescribed darter species, upper Yazoo River system, Mississippi, rare). Jenkins, 1976: 644 (undescribed species, distribution).
Etheostoma (*Ulocentra*) sp. Deacon et al., 1979: 42 ("Yazoo darter," color illustration, male and female from Puskus Creek, Lafayette Cnty., Mississippi). Kuehne and Barbour, 1983: 99-100 ("Yazoo darter," briefly characterized, distribution).
Etheostoma sp. Page and Burr, 1991: 302, pl. 43, map 345 ("Yazoo darter," briefly characterized, range).

HOLOTYPE: Adult male, TU 162795, 48.3 mm standard length, Hurricane Creek, tributary to Tallahatchie River (Yazoo River system) at Mississippi Highway 7, 2.5 miles north of Oxford (T7S, R3W, Sec 28), Lafayette Cnty., Mississippi, 12 April 1992, R. D. Suttkus and H. L. Bart, Jr.

PARATOPOTYPES: TU 162796 (14, 33 – 44), collected with holotype, distributed as follows: TU 162796 (12), UMMZ 222911 (2); TU 152358 (6, 27 – 31), 19 May 1988; UT 91.3542 (64, 22 – 47), 11 March 1989, distributed as follows: UT 91.3542 (44), ANSP 170039 (2), CU 73780 (2), UMMZ 222912 (14), and USNM 325768 (2); TU 158069 (8, 32 – 41), 18 May 1990; TU 163325 (13, 34 – 44), 24 May 1992.

OTHER PARATYPES: Tallahatchie River system, Mississippi. Lafayette Cnty.: TU 152351 (18, 29 – 39), Graham Mill Creek, 0.7 mi. E Abbeville (T7S, R3W, Sec 2), 19 May 1988, distributed as follows: TU 152351 (13), UMMZ 222910 (5); TU 158058 (3, 36 – 43), 18 May 1990; TU 162809 (4, 31 – 46), 12 April 1992; TU 66140 (17, 32 – 42), Puskus Creek, tributary to Little Tallahatchie River at Hwy. 30, 7.9 mi. ENE Oxford (T8S, R2W, Sec 2), 8-9 October 1970, distributed as follows: TU 66140 (13), UAIC 10681.01 (2), UF 100285 (2); TU 77310 (2, 35 – 47), 7 April 1972; TU 83595 (4, 31 – 48), 7 September 1973; TU 84419 (11, 33 – 47), 13 October 1973, distributed as follows: TU 84419 (9), CU 73781 (2); TU 87705 (2, 37 – 43), 7 May 1974; MSU 6038 (22, 32 – 44), 5 May 1976; AUM 20651 (4, 37 – 45), spring tributary to Puskus Creek at former Minnows Inc. (T7S, R2W, Sec 34), 14 March 1980. Marshall Cnty.: TU 152338 (5, 34 – 40), Oak Chewalla Creek at Hwy. 310, 1.8 mi. W Malone (T6S, R3W, Sec 9), 18 May 1988; TU 152346 (5, 38 – 44), 19 May 1988; TU 158054 (1, 29), 18 May 1990; TU 87058 (6, 30 – 41), Little Spring Creek at Hwy. 7, 0.5 mi. SW Waterford (T5S, R3W, Sec 13), 27 October 1973; TU 87721 (1, 48), 7 May 1974; TU 152060 (1, 41), 10 May 1988; TU 84445 (1, 39), Little Spring Creek at spillway out of Little Spring Lake, 1.6 mi. N Waterford (T5S, R3W, Sec 12), 13 October 1973; TU 152328 (4, 34 – 47), Big Spring Creek at US Hwy. 78, 3.8 mi. SE of junction US Hwy. 78 and Hwy. 7 (T4S, R2W, Sec 22), 18 May 1988; UT 91.2176 (8, 31 – 47), 20 May 1981; UT 91.2167 (1, 27), Chewalla Creek, tributary to Tippah River about 5 airmi. E Holly Springs (T4S, R1W, Sec 6), 20 May 1981.

ADDITIONAL MATERIAL EXAMINED, NOT DESIGNATED AS TYPES: **Yocona River system, Mississippi.** LAFAYETTE CNTY.: TU 152109 (10), tributary to Taylor Creek at Old Taylor Rd., 1.5 mi. N Taylor (T9S, R4W, Sec 14), 11 May 1988; TU 87665 (3), Pumpkin Creek at Hwy. 334, 6.7 mi. SE Oxford (T9S, R2W, Sec 19), 6 May 1974; TU 3116 (11), Pumpkin Creek at US Hwy. 6, 6.5 mi. E Oxford (T9S, R2W, Sec 3), 24 May 1952, TU 57136 (7), 17 April 1969, TU 152051 (22), 10 May 1988, UT 91.3496 (14), 22 October 1988, TU 155716 (4), 27 July 1989, and TU 158086 (3), 18 May 1990. YALOBUSHA CNTY.: TU 155210 (26), tributary to Otoucalofa Creek at Hwy. 32, 2.5 mi. E Water Valley (T11S, R4W, Sec 15), 14 June 1989, distributed as follows: TU 155210 (21), UMMZ 222909 (5), TU 158100 (2), 18 May 1990, and TU 162832 (1), 12 April 1992; TU 155225 (3), Gordon Branch, 17.2 mi. E Water Valley (T11S, R3W, Sec 7), 15 June 1989.

DIAGNOSIS: *Etheostoma raneyi* is a member of subgenus *Ulocentra* as diagnosed by Bouchard (1977) and Bailey and Etnier (1988). Further, *E. raneyi* lacks a premaxillary frenum and the vomer usually bears a small cluster of slender teeth and in these respects is typical of members of the *E. duryi* species group of Bailey and Etnier (1988). *Etheostoma raneyi* lacks a red ocellus in the first interradial membrane of the spinous dorsal fin, as do the other two new species included in this study. The diagnostic features that distinguish the Yazoo darter are the shape and position of the blotches in the lateral stripe and the ventral-lateral coloration of the nuptial male. The more or less elongate brownish blotches are aligned along the lateral line and have rather even ventral margins that barely extend below the lateral line. The entire ventral-lateral area below the lateral stripe of the nuptial male is a uniform reddish-orange. The red coloration in the spinous dorsal fin is restricted to the posterior three to five interradial membranes. There is an incomplete band of black blotches that extends from the first to the seventh or eighth interradial membrane. These black blotches are closer to the base of the fin than the aforementioned red blotches.

DESCRIPTION: *Etheostoma raneyi* reaches a maximum of 45 mm SL (females) to 50 mm SL (males). Sexual dimorphism and apparent sexual maturity occur at the end of the first year at a minimum of 28 mm SL (females) and 30 mm SL (males).

Frequency distributions of scale and fin ray counts are presented in Tables 1-5. Number of vertebrae, branchiostegal rays, gill rakers, and preoperculomandibular pores are given in Tables 6-7. The lateral line is usually complete with (41 –) 43 – 49 (– 53) scales, occasionally the last scale is unpored. Transverse scales 11 (2 specimens), 12 (36), 13 (57), 14 (51), 15 (16), or 16 (3). Caudal peduncle scale rows number 15 (16), 16 (57), 17 (75), 18 (13) or 19 (4). Dorsal fin has (9 –) 10 – 11 (– 12) spines and (9 –) 10 – 11 (– 12) soft rays. Anal fin has 2 spines and (6 –) 7 – 8, modally 7, soft rays. Pectoral fin has (13 –) 14 – 15 rays. Vertebrae number 37 (8), 38 (41), or 39 (7); branchiostegal rays number 5—5 (149), 6—5 (4), 5—6 (6), or 6—6 (6); and gill rakers on first arch number 8 (6), 9 (19), or 10 (5). The sum of left and right preoperculomandibular pores is nearly constant at 18 (in 26 of 30 specimens), of the remaining four, one has 16 pores and three have 17 pores. The opercle, cheek, and nape typically are

TABLE 1. Frequency distribution of transverse scale rows (anal to spinous dorsal) in three species of *Ulocentra*.

	11	12	13	14	15	16	17	N	$\bar{x}$	S.D.
Etheostoma raneyi	2	36	57	51	16	3		165	13.3	1.0
Etheostoma lachneri	2	21	45	45	33	8	1	155	13.7	1.1
Etheostoma ramseyi		11	48	44	35	8	4	150	13.9	1.1

TABLE 2. Frequency distribution of number of scales around caudal peduncle in three species of *Ulocentra*.

	14	15	16	17	18	19	20	N	$\bar{x}$	S.D.
Etheostoma raneyi		16	57	75	13	4		165	16.5	0.8
Etheostoma lachneri	1	23	35	97	37	18	2	213	17.0	1.1
Etheostoma ramseyi	2	20	45	85	45	12	3	212	16.9	1.1

TABLE 3. Frequency distribution of lateral-line scale counts in three species of *Ulocentra*.

	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	N	x̄	S.D.
Etheostoma raneyi			1	7	15	24	34	25	32	11	11	1	2	1	1	165	45.7	2.1
Etheostoma lachneri	3	5	17	18	24	25	37	30	22	15	11	3	2			212	44.8	2.5
Etheostoma ramseyi		1	4	12	20	22	30	41	35	24	12	6	1	2	2	212	45.8	2.3

TABLE 4. Frequency distribution of dorsal fin ray counts in three species of *Ulocentra*.

	Dorsal spines								Dorsal soft rays							
	8	9	10	11	12	N	x̄	S.D.	9	10	11	12	13	N	x̄	S.D.
Etheostoma raneyi		14	114	35	2	165	10.1	0.5	1	50	105	9		165	10.7	0.5
Etheostoma lachneri		11	136	50	4	201	10.2	0.5		5	130	64	2	201	11.3	0.5
Etheostoma ramseyi	1	4	78	88	3	174	10.5	0.6		9	117	47	1	174	11.2	0.5

TABLE 5. Frequency distribution of fin ray counts in three species of *Ulocentra*.

	Anal soft rays							Left pectoral rays						
	6	7	8	9	N	x̄	S.D.	13	14	15	16	N	x̄	S.D.
Etheostoma raneyi	11	133	21		165	7.1	0.4	11	126	28		165	14.1	0.4
Etheostoma lachneri	2	123	74	1	201	7.4	0.5	4	106	90	1	201	14.4	0.5
Etheostoma ramseyi	20	118	12		150	6.9	0.4	20	114	16		150	13.9	0.4

covered with exposed scales. The prepectoral area typically is covered with scales. The breast is usually naked but occasionally has one or a few scales, and the belly is completely covered with exposed scales.

In 10 specimens dissected for dentition, the vomer lacks teeth in one, the head of the bone has two slender teeth in two, three in two, four in two, five in two, six in one, mean 3.4 teeth. All 10 lack palatine teeth.

Proportional measurements appear in Tables 8-9. The 25 males were from thirteen collections representing six different small stream systems. These collections were obtained during the months of April, May, June, September, and October and thus represent nuptial and non-nuptial conditions. All proportional measurements of the holotype are within the ranges given in Table 8. The 10 females were from six collections representing five different stream systems obtained during April, May, and June and thus also represent nuptial and post-nuptial conditions.

Colors of live and freshly preserved nuptial males, collected in March and April are described from Hurricane Creek (Figure 1). Additional color descriptions are provided for specimens collected in May from Hurricane, Graham Mill, Pumpkin, Big Spring, and Taylor creeks. The entire lower side from the midventral area up to the lower margin of the lateral stripe is orange to red-orange color in large nuptial males. Small males, particularly in May collections, have a varying amount of orange on the lower side, ranging from a narrow stripe to a broad band that extends from axil of pectoral fin to the mid-area of the caudal peduncle. The lateral stripe is composed of either a single or double row of quadrate to oblong blotches. The single series exhibits a gradation from red posteriorly to russet to brown anteriorly. This single row of blotches is aligned along the upper margin of the lateral line in the posterior section but more nearly straddles the lateral line anteriorly. Where a double row of blotches occurs, the secondary series is composed of small brown blotches that border the lower edge of the lateral line and typically occur in the interspaces between the larger blotches. These two series of blotches are more or less suffused into a single band at the height of nuptial coloration. This suffusion tends to dull the brightness of the red-colored blotches in the posterior section of the primary series. Posteriorly, some of the interspatial areas are overlaid with greenish-gray pigment that extends ventrad from the dorsal-lateral area. The greenish-gray pigment is usually in bar-shaped blotches on the caudal peduncle and base of caudal fin and may extend slightly below the lower margin of the lateral stripe. There is a scattering of irregularly shaped brown blotches along the dorsal-lateral area. The mid-dorsal saddle blotches usually number eight and have a greenish tinge in the nuptial male. The top of the head is dark brown. The ventral surface of the head from the breast to the snout tip is pale and overlaid with turquoise. The cheek, breast, gill membranes, lower part of opercle, and side of snout are turquoise in color. There is a dark brown preorbital bar, a dark brown suborbital bar, and several brown blotches along upper margin of opercle.

Nuptial males have turquoise color in all fins except the pectorals. Nearly the entire anal and pelvic fins are turquoise, with tips of the spines and soft rays milky white. Two nuptial males from Hurricane Creek had a small red spot in the posterior basal part of the anal fin. The margins of the caudal and first and second dorsal fins are turquoise. The procurrent margins of the caudal fin are more intense turquoise than the posterior margin. There are two orange to red-orange blotches at the base of the caudal fin. The marginal band of tur-

quoise in the second dorsal fin is considerably broader than that in the spinous dorsal fin. Proximally from the turquoise margin of the spinous dorsal fin there are two distinct series of blotches. Posteriorly in the mid-portion of the fin there is a series of red blotches; these number from three to six and are centered on the interradial membranes. The posterior blotches are relatively large and diminish abruptly in size in the successive membranes anteriorly; there is some pale cream to yellow color around the distal and proximal margins of the red blotches. The other series of blotches is black; it extends from the first interradial membrane to the sixth or seventh, and occurs in the basal half of each interradial membrane (Figure 1). The posterior one to three black blotches are proximal to the anteriormost red blotches described above.

Nuptial females have very little chromatic coloration. Occasionally a female will have a few flecks of red in the posterior interradial membranes of the first dorsal fin, three or four flecks of red in posterior interradial membranes of the second dorsal fin, and more often will have upper and lower orange blotches at the caudal fin base. Nearly all the pigmentation involves different shades of brown. The blotches that compose the lateral stripe or band often are in one series but occasionally form an interconnected double series. The latter pattern usually has extensions above and below the lateral line. Females with a single series of blotches have most of the pigment extending below the lateral line. Regardless of whether the single or double pattern is present, the ventral margin of the lateral stripe is more uneven in females than in nuptial males. Perhaps the primary reason is that no suffusion or overlay of pigmentation occurs in the females.

DISTRIBUTION: *Etheostoma raneyi* is confined to tributaries to the Tallahatchie and Yocona river systems in north-central Mississippi (Figures 6, 9). Both rivers drain into the Yazoo River system. All of our material (five sites in the Yocona River system and ten in the Tallahatchie River system) is from the northern part of the North Central Plateau physiographic district (Lowe, 1925: 22-27). Our earliest record is that by R. D. Suttkus and two students on 24 May 1952, when eleven specimens were obtained from Pumpkin Creek, a tributary to Yocona River. Additional collections were made periodically up to the present time. Randolph and Kennedy (1974), in a study of the Tippah River system, reported samples from several sites in the upper part of that system. Their easternmost locality occurs in the northern part of the Flatwoods physiographic district (Figure 6). Kenneth W. Thompson and Robert J. Muncy were sponsored by the U. S. Fish and Wildlife Service to compile a status report of the "Yazoo River Darter," *Etheostoma* (*Ulocentra*) sp. Collections were obtained during the period from 1980 to 1984. The report is undated but was submitted to the contractor early in 1985. They found the "Yazoo River Darter" at three sites in the Yocona River system and 14 sites in the Little Tallahatchie River system. They reported a total of 195 specimens, ranging from 20 – 61 mm SL. None of the specimens collected by Randolph and Kennedy nor by Thompson and Muncy was available to us. No other species of subgenus *Ulocentra* occurs within the range of *E. raneyi*.

HABITAT AND BIOLOGY: Hurricane Creek at Hwy. 7 (type locality) is a multiple-channel stream that flows through a marsh area that varies from about 80 to more than 100 feet in width. There are several sets of beaver dams on the upstream side of the highway. Much of the area is laden with a thick layer of loose organic debris. There is an abundance of bur reed, *Sparganium* sp., along

TABLE 6. Frequency distribution of number of vertebrae and number of branchiostegal rays in three species of *Ulocentra*.

	Vertebrae							Branchiostegal rays							
	37	38	39	40	N	x̄	S.D.	4—4	5—3	5—4	5—5	6—5	5—6	6—6	N
Etheostoma raneyi	8	41	7		56	38.0	0.5				149	4	6	6	165
Etheostoma lachneri	11	66	13	2	92	38.1	0.6			1	201	4	3	4	213
Etheostoma ramseyi	23	88	19		130	37.9	0.5	1	1	3	181		2	1	189

TABLE 7. Number of gill rakers on first left arch and total number of preoperculomandibular pores (both sides) in three species of *Ulocentra*.

	Gill rakers									Preoperculomandibular pores (both sides)						
	6	7	8	9	10	11	N	x̄	S.D.	16	17	18	19	N	x̄	S.D.
Etheostoma raneyi			6	19	5		30	9.0	0.6	1	3	26		30	17.8	0.4
Etheostoma lachneri	7	32	90	44	8	1	182	8.1	0.8	1	8	187	2	198	17.9	0.2
Etheostoma ramseyi	6	20	43	78	36	3	186	8.7	1.0	1	7	171		179	17.9	0.2

TABLE 8. Measurements in thousandths of standard length for *Etheostoma raneyi, E. lachneri, E. ramseyi, E. colorosum*, and *E. tallapoosae* males.

	E. raneyi (N = 25)			*E. lachneri* (N = 25)			*E. ramseyi* (N = 25)			*E. colorosum* (N = 25)			*E. tallapoosae* (N = 25)		
	Range	x̄	S.D.	Range	x̄	S.D.	Range	x̄	S.D.	Range	x̄	S.D.	Range	x̄	S.D
Standard length (mm)	39.1-49.8	44.4	2.8	37.2-51.5	42.9	3.5	40.4-47.5	44.1	2.2	40.6-53.5	47.9	3.5	43.2-61.2	48.8	3.8
Head length	248-273	260	7.2	237-273	257	9.2	239-265	252	5.9	242-272	257	8.3	236-262	249	8.1
Body depth	193-223	205	8.7	186-218	206	7.2	177-215	198	11.3	177-224	194	9.8	191-220	203	8.6
Snout length	65-79	70	3.6	60-78	70	5.4	66-76	71	2.5	66-81	73	3.3	66-79	72	4.0
Orbit length	62-72	68	3.0	61-76	69	3.5	61-69	66	2.4	63-75	68	2.8	57-67	63	2.6
Spinous dorsal fin length	276-309	292	9.9	255-314	291	14.2	259-310	291	13.3	273-319	300	12.3	265-308	290	10.6
Longest dorsal spine	121-151	131	7.0	113-158	136*	11.1	112-143	125	8.0	133-182	154	11.1	99-142	120	10.9
Soft dorsal fin length	249-298	273	13.7	266-322	291	16.2	238-303	276	17.5	281-338	308	16.1	242-276	260	9.3
Longest dorsal soft ray	123-167	151	10.4	122-174	154	11.9	126-160	148	8.3	150-191	166	10.9	114-146	134	7.7
Caudal peduncle length	273-319	292	10.8	264-307	287	11.1	278-325	306	11.2	291-317	305	7.2	293-328	310	9.0
Caudal peduncle depth	95-112	103	4.7	98-114	105	4.3	97-113	104	4.7	92-112	98	5.0	99-113	106	3.7

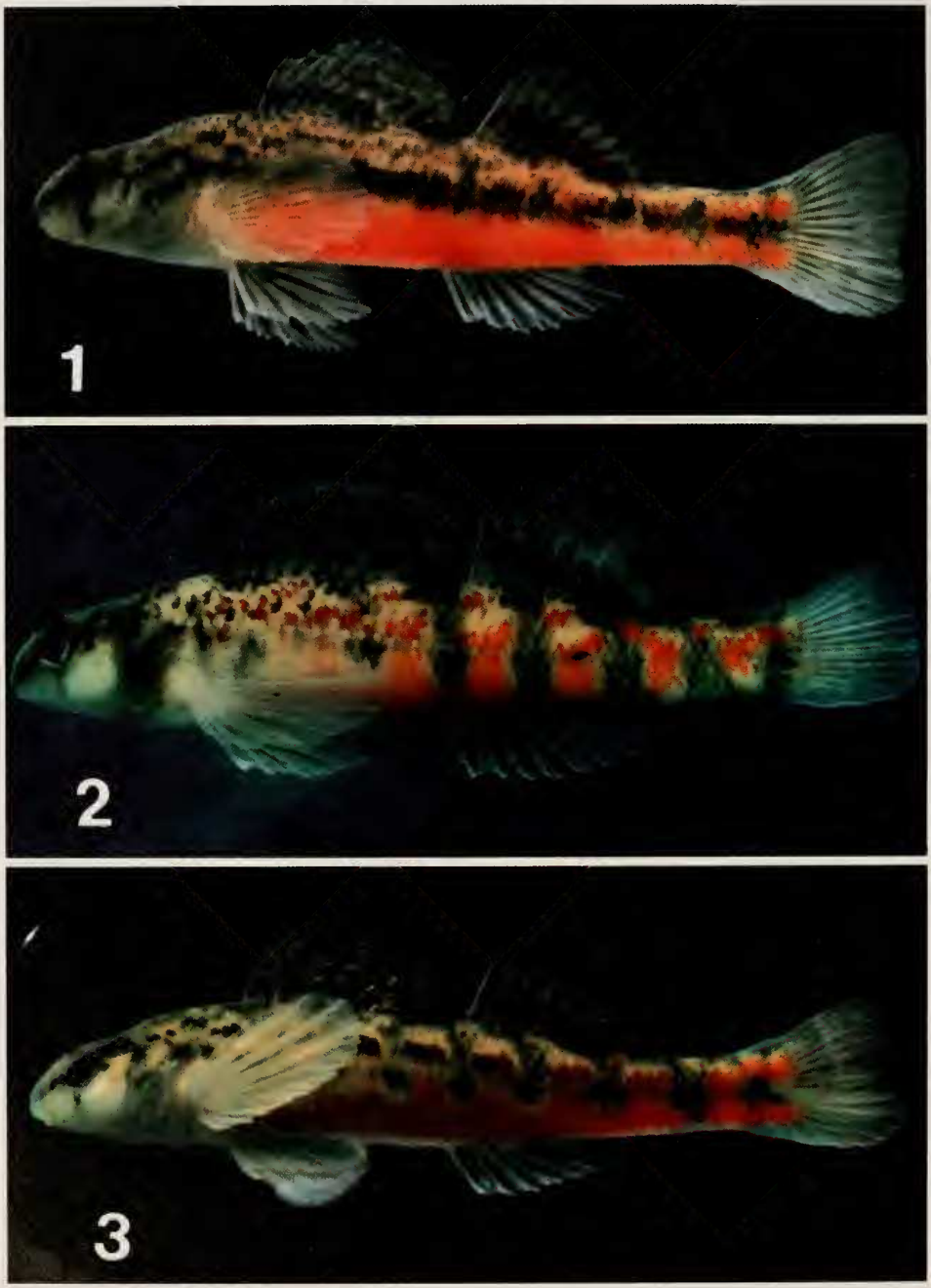
Anal fin length	237-279	263	10.1	247-288	265	12.1	224-265	248	14.0	264-307	280	10.5	227-276	246	11.4
First anal spine length	67-84	77	5.4	67-92	80	6.6	66-83	75	5.2	50-91	72	8.5	61-76	66	3.7
Longest anal soft ray	114-155	141	10.3	118-156	137	11.2	112-146	130	10.0	134-168	146	8.0	111-144	129	7.8
Caudal fin length	204-241	224	9.8	203-263	226	13.5	181-233	217	10.8	210-245	228	9.6	176-216	202	10.9
Pectoral fin length	246-295	271	12.5	238-295	275	14.5	222-292	270	15.1	260-343	290	18.7	221-271	250	14.3
Pelvic fin length	201-242	224	10.1	185-238	219	12.5	190-233	219	10.3	200-250	221	11.6	194-245	220	10.6
Trans-pelvic width	83-96	88	3.1	75-90	84	3.4	78-91	86	3.4	77-93	84	4.1	74-87	82	2.7
Maximum body width	122-156	134	9.4	119-174	132	7.0	112-155	138	11.4	123-156	137	7.2	126-164	142	7.4
Interorbital width	42-51	46	2.2	39-52	46	3.1	43-49	46	1.6	39-50	44	2.7	41-48	44	1.9

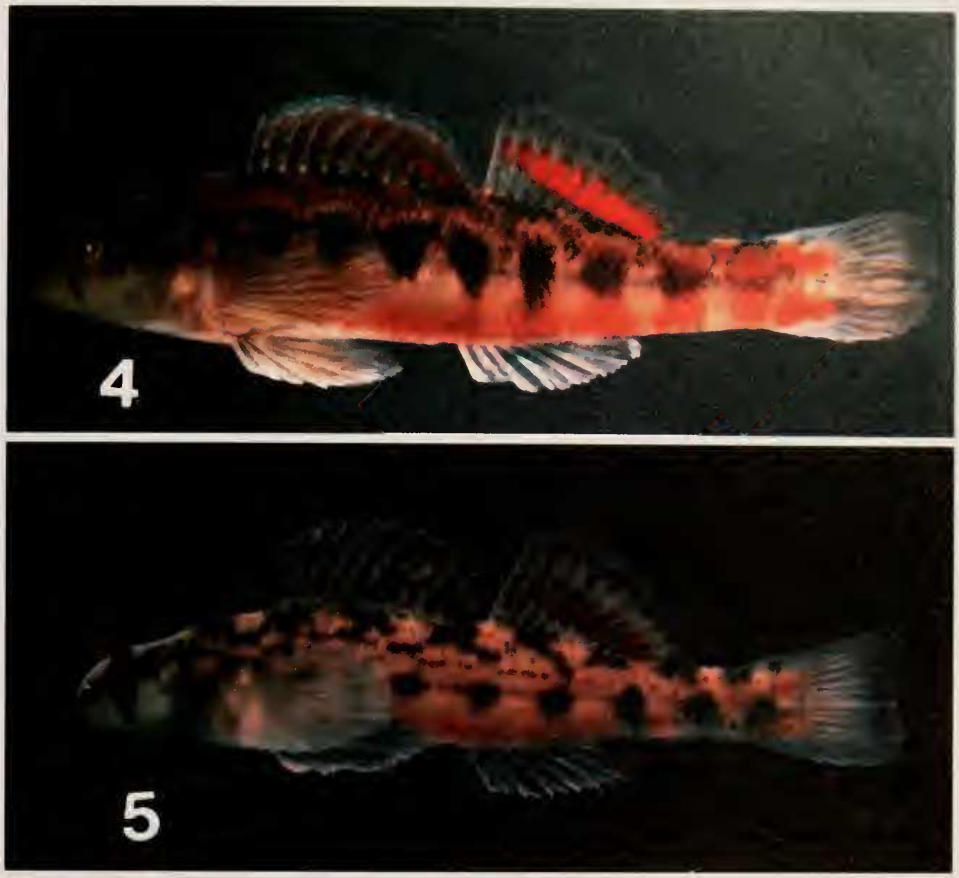
*based on 24 specimens

TABLE 9. Measurements in thousandths of standard length for *Etheostoma raneyi, E. lachneri, E. ramseyi, E. colorosum,* and *E. tallapoosae* females.

	E. raneyi (N = 10)			*E. lachneri* (N = 10)			*E. ramseyi* (N = 10)			*E. colorosum* (N = 10)			*E. tallapoosae* (N = 10)		
	Range	x̄	S.D.	Range	x̄	S.D.	Range	x̄	S.D.	Range	x̄	S.D.	Range	x̄	S.D.
Standard length (mm)	40.0-45.1	42.3	1.7	39.2-45.5	41.4	1.8	40.5-44.2	42.8	1.2	38.6-47.1	43.4	2.5	38.2-45.5	42.6	2.3
Head length	239-266	254	7.7	243-266	252	7.7	241-256	247	5.1	238-267	255	9.3	238-257	245	6.1
Body depth	184-232	218	14.5	202-245	216	13.5	197-216	208	5.5	181-224	199	16.6	198-219	211	9.1
Snout length	65-76	69	3.5	61-72	66	4.1	64-73	69	2.8	63-76	71	3.6	68-73	70	1.9
Orbit length	67-76	73	3.2	63-71	66	2.6	63-69	66	2.0	71-83	74	3.7	63-68	65	1.5
Spinous dorsal fin length	260-295	280	12.6	265-294	279	9.3	265-302	282	11.8	265-302	280	12.6	263-290	275	8.9
Longest dorsal spine	115-140	124	8.2	103-125	111	6.1	97-116	105	6.4	107-130	116	6.9	96-114	108	5.9
Soft dorsal fin length	264-282	267	10.4	234-290	268	15.9	259-280	267	7.3	269-307	286	11.8	240-262	251	6.9
Longest dorsal soft ray	149-165	157	5.4	122-156	143	10.5	136-151	140	4.8	142-158	151	5.1	126-156	138	8.9
Caudal peduncle length	279-316	294	10.6	267-301	281	12.0	284-303	292	6.0	280-314	293	10.0	299-316	305	9.2
Caudal peduncle depth	93-103	99	3.8	90-106	96	5.8	95-102	99	2.1	84-101	91	6.0	97-104	101	1.9
Anal fin length	242-268	252	9.7	233-270	244	13.2	231-252	240	7.4	232-272	248	13.6	220-261	237	13.6
First anal spine length	62-88	78	7.7	63-76	68	4.8	60-76	67	5.3	54-68	60	4.2	61-70	65	2.8
Longest anal soft ray	127-163	145	10.5	107-147	125	11.7	118-141	131	7.5	116-140	128	8.1	113-142	126	9.2
Caudal fin length	208-234	221	8.2	175-236	210	21.4	210-225	217	5.6	213-241	222	9.6	194-222	204	8.0
Pectoral fin length	250-297	271	11.9	230-294	266	20.3	274-301	285	11.6	261-331	294	18.6	236-273	255	11.3
Pelvic fin length	213-237	223	7.2	185-230	213	14.5	195-217	209	6.3	197-242	209	13.1	201-233	215	9.7
Trans-pelvic width	81-91	87	3.8	75-84	82	2.7	81-88	86	1.8	77-83	80	2.1	80-87	83	2.3
Maximum body width	134-166	150	10.8	125-174	147	17.3	141-162	156	7.0	130-159	143	8.8	139-170	153	13.1
Interorbital width	45-49	47	1.7	42-51	45	3.2	42-50	47	2.3	39-47	44	2.6	42-47	44	1.6

the main channel (10 – 15 feet in width) and along short stretches of lesser channels. Also, there is an abundance of emergent aquatic plants along the margins of the marshy stream system. Intermittently there are patches of sand substrate along the main and lesser channels. Most of the Yazoo darters were collected from near these patches of sand substrate.





Figures 1-5. *Etheostoma* species from Mississippi, Alabama, and Florida. 1. *E. raneyi*, TU 162795, holotype, adult male, 48 mm SL. Hurricane Creek, tributary to Tallahatchie River at Hwy. 7, 2.5 mi. N Oxford, Lafayette Cnty., Mississippi. Photo by Suttkus and Bart. 2. *E. lachneri*, TU 157555, paratopotype, adult male, 45 mm SL. Wolf Creek, tributary to Little Souwilpa Creek at Hwy. 17, 1.0 mi. N Silas at US Hwy. 84, Choctaw Cnty., Alabama. Photo by Pierson. 3. *E. ramseyi*, TU 162574, holotype, adult male, 49 mm SL. Beaver Creek at Wilcox Cnty. Rd. 27, 0.8 mi. W Sunny South, Wilcox Cnty., Alabama. Photo by Suttkus. 4. *E. tallapoosae*, TU 157803, paratype, adult male, 55 mm SL. Gold Branch, tributary to Channahatchee Creek at Hwy. 63, 6.0 mi. N Eclectic, Elmore Cnty., Alabama. Photo by Suttkus and Pierson. 5. *E. colorosum*, TU 162508, holotype, adult male, 50 mm SL. Pine Barren Creek, tributary to Escambia River, Escambia Cnty., Florida. Photo by Suttkus.

Water temperature in Hurricane Creek rises earlier in the spring than in other nearby tributaries. On 11 March 1989 the water temperature was 16° C and numerous Yazoo darters, nuptial males and females, were collected. On the same day, Pumpkin (8° C) and Graham Mill (12° C) creeks were sampled. No males and only a few females were collected. Other temperature records for Hurricane Creek during which Yazoo darters were collected are as follows: 12 April 1992, 16° C; 18 May 1990, 21° C; 19 May 1988, 19° C; and 24 May 1992, 19° C. Water temperature records for 31 collections (including those cited above) of Yazoo darters taken between 24 May 1952 and 24 May 1992 range from 16°

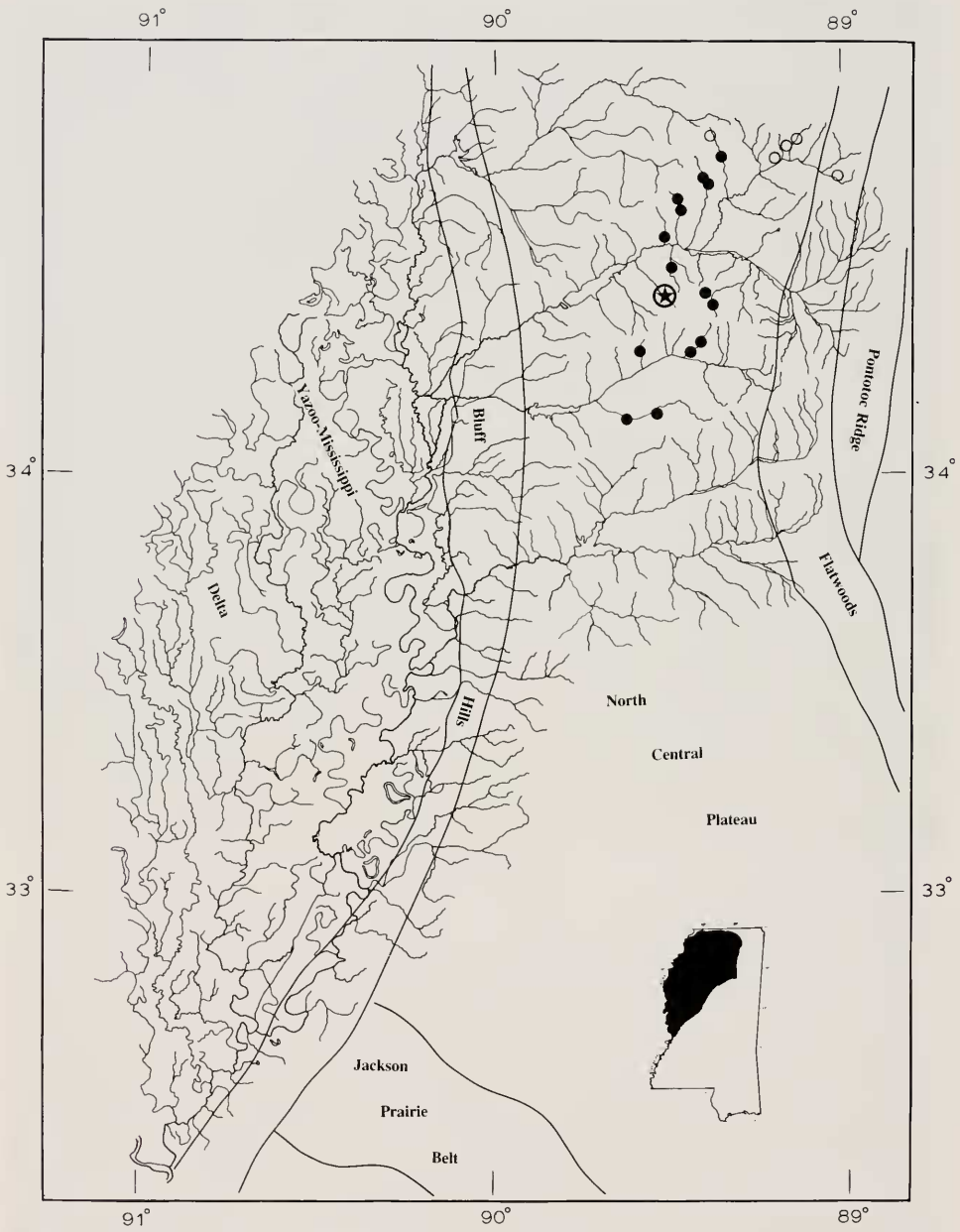


Figure 6. Distribution of *Etheostoma raneyi* in Mississippi (solid dots = material used in our study; star in open circle = type locality; open circles = Randolph and Kennedy collection sites).

to 26° C. Two collections made at 25° C yielded four specimens each and one collection at 26° C resulted in a single specimen. Observations on site, color notes, and photos indicate that most spawning takes place during early spring (March and April into May) with rising temperatures and tapers off or ceases when water temperatures go above 20° or 21° C.

Little and Big Spring creeks are similar to Hurricane Creek in that both have an abundance of vegetation, primarily bur reed. Puskus and Oak Chewalla creeks have primarily sand substrates with few or no aquatic plants. Graham Mill and Taylor creeks have a mixture of sand and gravel substrate with man-deposited rubble at the bridge crossings and no aquatic vegetation. The tributary to Otoucalofa Creek, 2.5 miles E Water Valley, has rubble at the bridge crossing (where the Yazoo darters were obtained), sand and silted bottom upstream, and sand and some hard clay bottom downstream with no aquatic vegetation. Most of the streams inhabited by Yazoo darters are spring-fed as pointed out by Thompson and Muncy in their status report. Many other sites within the Tallahatchie and the Yocona river systems were sampled without obtaining Yazoo darters. Invariably these sites were distant from spring sources, were disturbed frequently by channelization, or had most or all the marginal vegetation removed from banks. Individually and together these factors contribute to higher water temperatures and unstable substrate, both conditions that appear to be unsuitable for Yazoo darters.

The species associates of *Etheostoma raneyi* at the type locality based on four collections are as follows: *Lampetra aepyptera, Esox americanus, Erimyzon oblongus, Cyprinella venusta, Lythrurus fumeus, Notemigonus crysoleucas, Noturus phaeus, Fundulus olivaceus, Aphredoderus sayanus, Lepomis cyanellus, L. gulosus, L. macrochirus, L. marginatus, L. punctatus, Micropterus salmoides, Etheostoma chlorosoma, E. lynceum, E. nigrum, E. parvipinne, E. proeliare, E. swaini*, and *Percina sciera*.

ETYMOLOGY: We take pleasure in naming this darter, *Etheostoma raneyi*, for the late Edward C. Raney in recognition of his numerous contributions to our knowledge of the systematics and biology of darters. He had an intense interest in darters and passed on his enthusiasm for them to a number of his students. Dr. Raney authored or coauthored seven original descriptions of darters between the years 1939-1967.

Etheostoma lachneri Suttkus and Bailey, new species
Tombigbee Darter
Figures 2, 7, 8, and 9

Etheostoma (*Ulocentra*) sp. Smith-Vaniz, 1968: 136 (in part, reports from Black Warrior, upper and lower Tombigbee rivers). Jenkins, 1976: 644 (in part, distribution). Knight and Cooper, 1987: 31, 33, 36, 38 (records in Otoucalofa Creek, Mississippi, habitat). Hubbard, et al. 1991: 3-8, 11 (records in Sucarnoochee River system). Boschung, 1992: 122 (in part, "orangestripe darter," a complex of species).

Etheostoma sp. Mettee et al., 1983: 24 (in part), 26, 79, 82, 84, 86 (records from Citronelle and Gilbertown oil fields, Alabama). O'Neil et al., 1984: 26 (distribution and abundance in Citronelle oil field, Alabama). Mettee et al., 1986: 19, 32 (records and abundance in Gilbertown oil field, Alabama). Page, 1983: pl. 16G, 16H (in part, Minter Creek, Alabama, record). Boschung, 1987: 187, 191 (distribution in upper Tombigbee River system, frequency of occurrence, relative abundance). Page and Burr, 1991: 302, pl. 43, map 346 ("Coastal Plain Darter," in part, briefly characterized, range).

Etheostoma sp. A. Mettee, 1978: 149 (habitat, distribution). Mettee et al., 1987: map (distribution, species associates, habitat). Mettee et al., 1989a: 18, 19, 33-46, 188, map (Black Warrior River system records, species associates, habitat). Mettee et al., 1989b: 152 (distribution).

Etheostoma sp. (*colorosum*) Hubbard, 1987: 24-26 (*nomen nudum*; misidentification; Noxubee River system, Mississippi).

HOLOTYPE: Adult male, TU 162631, 41.6 mm standard length, Wolf Creek, tributary to Little Souwilpa Creek at Alabama Highway 17, 1.0 mile north of Silas at US Highway 84 (T10N, R3W, Sec 31), Choctaw Cnty., Alabama, 1 April 1992, R. D. Suttkus.

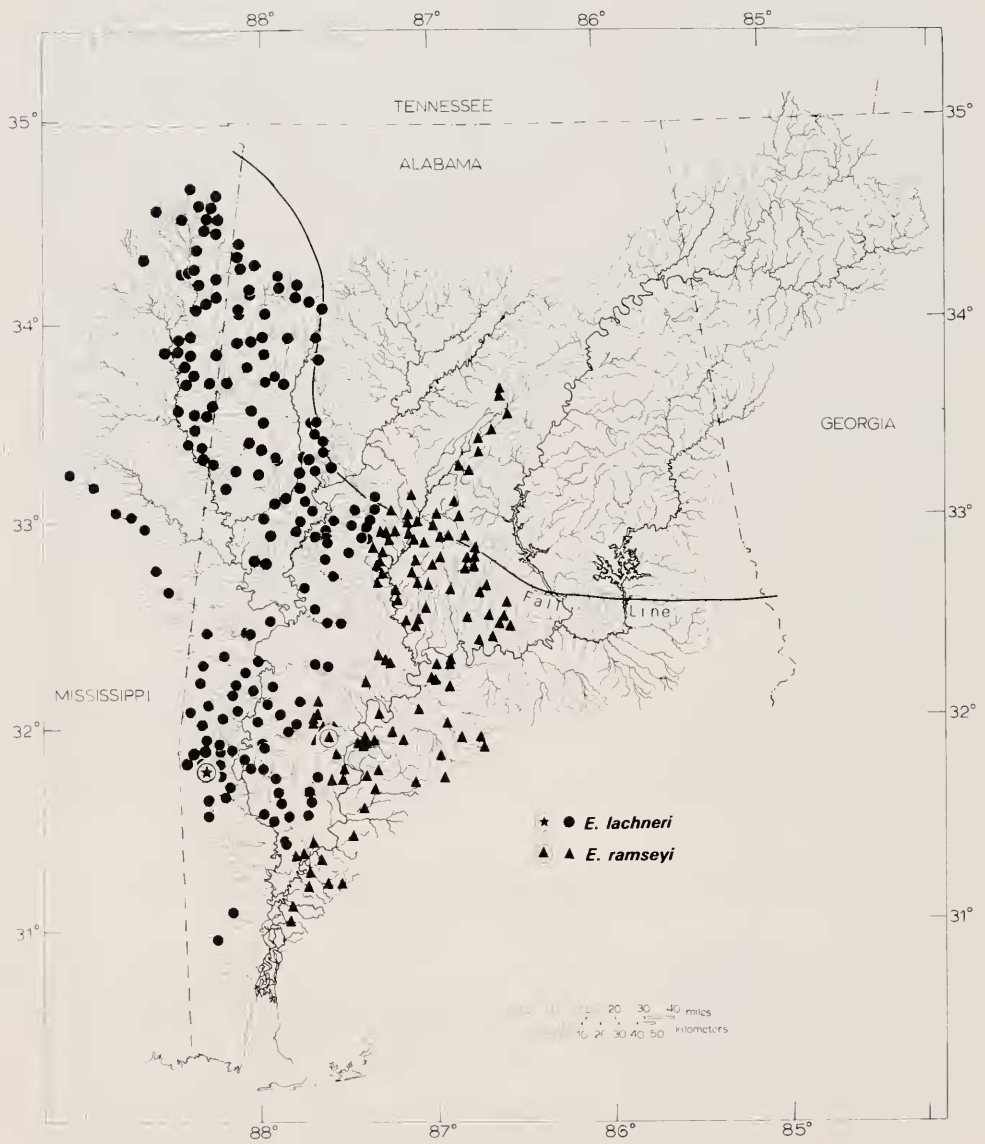


Figure 7. Distribution of *Etheostoma lachneri* and *E. ramseyi* in the Mobile River Basin of Mississippi, Alabama, Georgia, and Tennessee (star or triangle in open circle = type localities).

PARATOPOTYPES: TU 162632 (30, 33 – 44), collected with holotype, distributed as follows: TU 162632 (26), UMMZ 222913 (4); TU 56964 (43, 27 – 43), 22 March 1969, distributed as follows: TU 56964 (33), ANSP 170040 (2), CU 73782 (2), UAIC 10682.01 (2), UF 100286 (2), USNM 325769 (2); TU 151624 (50, 26 – 41), 9 April 1988; TU 152517 (75, 28 – 41), 26 May 1988, distributed as follows: TU 152517 (65), UMMZ 222914 (10); TU 154427 (30, 32 – 46), 2 February 1989; UT 91.3567 (64, 33 – 45), 12 March 1989; TU 154488 (8, 35 – 46), 22 March 1989; TU 157555 (34, 33 – 45), 22 March 1990; TU 162344 (12,

35 – 48), 1 March 1992; TU 162558 (17, 35 – 49), 30 March 1992; TU 166059 (11, 30 – 46), 22 November 1992; TU 166419 (31, 32 – 46), 7 February 1993; TU 166579 (57, 29 – 40), 25 March 1993; TU 166720 (31, 31 – 44), 16 April 1993.

Other Paratypes: TU 56990 (21, 28 – 42), Souwilpa Creek at Hwy. 17, 3.9 mi. S Gilbertown (T10N, R3W, Sec 19), 22 March 1969; TU 76820 (1, 41), Puss Cuss Creek, tributary to Okatuppa Creek at Hwy. 14, 4.2 mi. W Gilbertown (T11N, R4W, Sec 28), 31 March 1972; TU 57007 (1, 32), Bogueloosa Creek at Hwy. 17, 0.8 mi. N Toxey (T11N, R3W, Sec 17), 22 March 1969; TU 76831 (4, 31 – 39), tributary to Bogueloosa Creek at Hwy. 18, 0.6 mi. W Needham (T12N, R4W, Sec 26), 31 March 1972.

Additional material examined, not designated as types: **Tombigbee River system. Alabama.** Mobile Cnty.: TU 2598 (2), Sand Hill Creek, tributary to Chickasaw Creek at US Hwy. 45, 6.7 mi. S Citronelle (T1S, R3W, Sec 12), 4 June 1951, TU 32392 (51), 27 May 1964, and TU 162332 (3), 1 March 1992; TU 162324 (5), Cedar Creek at Hwy. 96, 4.8 mi. ENE Citronelle (T2N, R2W, Sec 22), 1 March 1992. Washington Cnty.: TU 32409 (4), Taylors Creek, tributary to Santa Bogue Creek at Hwy. 17, 10.2 mi. N Chatom (T7N, R3W, Sec 8), 27 May 1964; TU 162652 (7), Dunbar Creek at Hwy. 17, 1.7 mi. N Millry (T8N, R3W, Sec 17), 1 April 1992. Clarke Cnty.: TU 41434 (161), Salt Creek at Clarke Cnty. Rd. 15, 4.5 mi. S Jackson (T6N, R2E, Sec 34), 30 June 1966, TU 151775 (25), 16 April 1988, and TU 162395 (17), 2 March 1992; TU 32519 (20), tributary to Salt Creek at Clarke Cnty. Rd. 15, 4.4 mi. S Jackson (T6N, R2E, Sec 34), 29 May 1964; TU 45503 (3), Rabbit Creek, tributary to Bassett Creek, 2.7 mi. NE Jackson (T7N, R2E, Sec 14), 16 April 1967; TU 32466 (30), Bassett Creek, 2.0 mi. W Suggsville (T7N, R3E, Sec 12), 28 May 1964; TU 35314 (82), Bassett Creek at US Hwy. 84 at Allen, 8.0 mi. SE Grove Hill (T7N, R3E, Sec 12), 2 July 1964; TU 152481 (19), Little Bassett Creek at Clarke Cnty. Rd. 30, 1.1 mi. E Dickinson (T9N, R4E, Sec 8), 26 May 1988; TU 59930 (29), Stave Creek at Hwy. 69, 5.4 mi. NW Jackson (T7N, R1E, Sec 25), 24 September 1969; TU 59959 (45), Jackson Creek at Hwy. 69, 9.7 mi. NW Jackson (T7N, R1E, Sec 9), 25 September 1969, and MSU 1437 (13), 2 July 1970; TU 56939 (4), Tattilaba Creek at US Hwy. 84, 7.4 mi. W Grove Hill (T9N, R2E, Sec 32), 19 March 1969; TU 43195 (2), Ulkinask Creek at Clarke Cnty. Rd. 1, 2.0 mi. WNW Coffeeville (T10N, R1W, Sec 33), 3 February 1967; TU 52128 (28), Pace Creek at Hwy. 69, 5.2 mi. N Coffeeville (T10N, R1W, Sec 20), 23 May 1968; TU 52145 (34), Tallahatta Creek at Hwy. 69, 1 mi. SW Campbell (T11N, R1E, Sec 20), 23 May 1968. Choctaw Cnty.: TU 52111 (5), Bladen Springs Run at Bladen Springs Park, 1 mi. NE town of Bladen Springs (T9N, R2W, Sec 20), 23 May 1968, and TU 56951 (5), 19 March 1969; TU 76878 (8), Wahalak Creek at Hwy. 17 at south edge of Butler (T13N, R2W, Sec 30), 31 March 1972. Marengo Cnty.: TU 24539 (6), North and South Double Creek at Hwy. 69, 3 mi. N junction of Hwy. 69 and Hwy. 10 (T14N, R1E, Sec 34), 27 March 1961; TU 60931 (13), Beaver Creek at Hwy. 69, 11.9 mi. SW Linden (T15N, R1E, Sec 36), 18 December 1969; TU 163228 (20), Beaver Creek at US Hwy. 43, 5.8 mi. N Dixons Mill (T14N, R3E, Sec 34), 11 May 1992, TU 166593 (3), 26 March 1993, and TU 166748 (6), 17 April 1993. Sumter Cnty.: UMMZ 97797 (29), Sucarnoochee Creek, SE Coatopa (T17N, R1W, Sec 6), 1 July 1931. Greene Cnty.: AUM 26795 (1), Brush Creek at Greene Cnty. Rd. 133, SW Eutaw (T21N, R1E, Sec 3), 19 August 1990; TU 166606 (13), Minters Creek at Greene Cnty. Rd. 213, 9.7 mi. N Eutaw (T23N, R2E, Sec 13), 26 March 1993, and TU 166762 (8), 17 April 1993. Hale Cnty.: TU 61373 (50), Elliotts Creek at Hwy. 69 at Moundville (T23N, R5E, Sec 6), 20 December 1969, and AUM 26308 (7), 2 February 1990. Tuscaloosa Cnty.: UMMZ 177746 (17), tributary to Black Warrior River at Hwy. 69, 2.5 mi. N Tuscaloosa (T21S, R5E, Sec 10), 23 May 1956; TU 30194 (12), Carroll Creek at Hwy. 69, 5 mi. N Northport (T20S, R10W, Sec 22), 10 April 1963; UMMZ 166363 (12), Carroll Creek at detour US Hwy. 43, 5 mi. N Tuscaloosa (T20S, R10W, Sec 20), 4 May 1952; UMMZ 166373 (8), Binnion Creek at US Hwy. 43, 5.5 mi. S Samantha (T19S, R10W, Sec 16), 4 May 1952. Pickens Cnty.: TU 154442 (1), Little Bear Creek just off US Hwy. 82 at western edge of Gordo (T20S, R13W, Sec 9), 11 March 1989; TU 77044 (21), Bear Creek, tributary to Lubbub Creek, 2.0 mi. NNW Gordo (T20S, R13W, Sec 5), 3 April 1972; TU 76961 (1), Lindsey Branch, tributary to Tombigbee River, 6.6 mi. N Pickensville (T20S, R17W, Sec 13), 2 April 1972. Lamar Cnty.: MSU 3882 (5), Luxapalila River at Hwy. 17, N Millport (T17S, R15W, Sec 14), 17 November 1973; TU 163077 (3), Hells Creek at Lamar Cnty. Rd. 41 (T15S, R14W, Sec 23), 30 April 1992. Fayette Cnty.: TU 163098 (2), Hells Creek at Hwy. 18, NW Fayette (T15S, R13W, Sec 17), 30 April 1992. Marion Cnty.: TU 30225 (10), New River at US Hwy. 78 about 4 mi. W Elridge (T13S, R11W, Sec 10), 10 April 1963; TU 19080 (2), North Fork Creek at US Hwy. 43, 10.2 mi. NNE Hamilton (T9S, R13W, Sec 33), 22 August 1958. **Missis-**

sippi. LAUDERDALE CNTY.: UMMZ 113865-6 (15), Ponta Creek, tributary to Sucarnoochee Creek at US Hwy. 45, 12 mi. S Electric Mills (T8N, R17E, Sec 24), 3 June 1932. KEMPER CNTY.: TU 127832 (4), Sucarnoochee Creek at Hwy. 16, 8.7 mi. W Scooba (T11N, R17E, Sec 19), 10 October 1982. WINSTON CNTY. MSU 999 (6), tributary to Hashuqua Creek at Hwy. 14, 2 mi. W Noxubee Cnty. line (T14N, R14E, Sec 3), 24 May 1970. CHOCTAW CNTY.: MSU 722 (9), tributary to Noxubee River about 2 mi. SE Choctaw Lake (T16N, R11E, Sec 2), 21 November 1969. LOWNDES CNTY.: TU 76945 (2), Ellis Creek, tributary to Tombigbee River about 6 mi. S Columbus (T19S, R17W, Sec 17), 2 April 1972; TU 83698 (1), Tombigbee River at Buzzard Island (before impoundment) (T19S, R18W, Sec 9), 8 September 1973; AUM 3349 (2), tributary to Buttahatchie River about 5 mi. N Caledonia (T15S, R17W, Sec 22), 2 October 1968.

DIAGNOSIS: *Etheostoma lachneri* is a member of subgenus *Ulocentra* as diagnosed by Bouchard (1977) and Bailey and Etnier (1988). *Etheostoma lachneri* lacks a premaxillary frenum and the vomer usually has a small cluster of two to five or six teeth, occasionally lacking, as is typical of members of the *E. duryi* species group of Bailey and Etnier (1988). *Etheostoma lachneri* lacks a red ocellus in the first membrane of the spinous dorsal fin. The unique diagnostic features of *E. lachneri* are the slightly oblique, dark green bars on the side of body and caudal peduncle, and the bright orange interspaces of the nuptial males. *Etheostoma lachneri* is similar to the other two species described herein in that the red coloration in the spinous dorsal fin is restricted to the posterior three to five interradial membranes, and there is an incomplete band of black blotches that extends from the first to the sixth or seventh interradial membrane. Both the spinous and the soft dorsal fins of *E. lachneri* are moderately elevated, in comparison to other members of the *colorosum* subgroup.

DESCRIPTION: *Etheostoma lachneri* reaches a maximum of 47 mm SL (females) to 52 mm SL (males). Frequency distributions of scale and fin-ray counts are presented in Tables 1-5. Number of vertebrae, branchiostegal rays, gill rakers, and preoperculomandibular pores are given in Tables 6-7. The lateral line is usually complete with (39 –) 41 – 49 (– 51) scales, but occasionally the last scale is unpored. Transverse scales number 11 (2 specimens), 12 (21), 13 (45), 14 (45), 15 (33), 16 (8), or 17 (1). Transverse scales from origin of second dorsal fin to anal fin (an alternative count, see Bailey and Etnier 1988: 30) number 10 (1), 11 (31), 12 (19), 13 (7), mean of 58 counts, 11.5. Caudal peduncle scale rows number 14 (1), 15 (23), 16 (35), 17 (97), 18 (37), 19 (18), or 20 (2). Dorsal fin has (9 –) 10 – 11 (– 12) spines and (10 –) 11 – 12 (– 13) soft rays. Anal fin has 2 spines and (6 –) 7 – 8 (– 9), modally 7, soft rays. Pectoral fin has (13 –) 14 – 15 (– 16) rays. Vertebrae number 37 (11), 38 (66), 39 (13), or 40 (2); branchiostegal rays number 5—4 (1), 5—5 (201), 6—5 (4), 5—6 (3), or 6—6 (4); and gill rakers on first arch number 6 (7), 7 (32), 8 (90), 9 (44), 10 (8), or 11 (1). In general there is a weak clinal increase in the number of rakers from the northern or headwater tributaries southward to the southern or lower tributaries to the system. The sum of left and right preoperculomandibular pores is nearly constant at 18 (in 187 of 198 specimens); of the remaining 11, one has 16 pores, eight have 17 pores, and two have 19 pores. The opercle, cheek, and nape are nearly or completely covered with exposed scales. The nape is the most likely of the three areas to be incompletely covered with scales, and the cheek is the least likely to be incompletely covered. The breast is consistently scaleless.

In 10 specimens dissected, the vomer is toothless in three, has two slender teeth in three, three teeth in three, and a cluster of five or six in one, mean 2.05 teeth; the palatines are uniformly toothless.

Proportional measurements appear in Tables 8-9. Twelve of the 25 males were collected at the type locality during March and May. The remainder of the specimens came from six additional sites during March, April, and May. The ten females came from seven different sites including the type locality. Three specimens from the type locality were collected during March and the specimens from the six other sites were collected during March, May, and August.

Colors of live and freshly preserved nuptial specimens, collected in March and April, are described from Wolf Creek (type locality), tributary to Little Souwilpa Creek of the Tombigbee River system (Figure 7). Nuptial males at peak coloration have four to six, slightly oblique, dark green bars on the side of body and caudal peduncle. The posterior bar occurs near the middle of the caudal peduncle. Its broad base on the ventral part of the peduncle is usually continuous posteriorly with the dark green or turquoise on lower procurrent edge of caudal fin. Its dorsal extension on the side of peduncle narrows in width to form a more or less triangular bar. Occasionally nuptial males have this posterior bar connected to lower edge of a dorsal saddle blotch and rarely this posterior, triangular bar is branched to form two dorsal projections. The penultimate bar has a narrower base than the ultimate bar and extends from the anterior ventral part of caudal peduncle dorsad to the dorsal saddle blotch at the posterior insertion of second dorsal fin. The next bar anteriorly lies between the middle of the base of the anal fin and dorsal saddle blotch slightly anterior to the middle of the second dorsal fin base. The next bar anteriorly extends from the anterior base of anal fin dorsad to dorsal saddle blotch at posterior base of spinous dorsal fin. Frequently this bar does not extend to dorsal saddle blotch but instead only about half way between lateral line and dorsum, whereas other nuptial males (Figure 2) have a partial bar that extends ventrad from dorsal saddle blotch to slightly below lateral line and not all the way to the base of anal fin. Occasionally, large males have one or two more bars anterior to the ones described above but these invariably are incomplete, extending from dorsal saddle blotches ventrad to lateral line area or more or less centered vertically across the lateral line. Prenuptial males from February and early March usually have the triangular, ultimate bar well developed but the other bars are only partially developed. The interspaces between the green bars of the nuptial males are bright orange. This orange extends over entire ventral-lateral area anterior to the anal fin insertion. The coloration of the dorsal-lateral area of body and caudal peduncle varies considerably. Nuptial males have a row of orange to red-orange blotches just above the lateral line although more frequently this coloration is in a loose network pattern rather than discrete blotches. In addition there are scattered flecks of orange or red-orange on the remainder of the dorsal-lateral area. Other nuptial males have a reduced number of orange flecks and blotches. The dorsal saddle blotches (typically eight) and the top of head are dark brown with an overlay of green. There is a dark preorbital bar, a suborbital bar, and several post-orbital dark brown blotches. The snout, lips, gill membranes, isthmus, breast, as well as lower margins of cheek and opercle, are green or turquoise.

The pectoral fins are clear in the upper two-thirds and light green or olive on the lower third. The pelvics and all the median fins have some turquoise color. The pelvic fins except for the tips of the spines and soft rays are deep turquoise. The tips of rays are milky white. The anal fin is deep turquoise except for a pale "window" in the posterior central area. The caudal fin typically has bright turquoise procurrent marginal areas that are continuous with a broad

distal band of turquoise. The central basal area of the caudal fin is pale turquoise or nearly clear. There are two orange blotches, one above and one below the dark brown basi-caudal spot. The lower orange blotch is smaller and less distinct than the upper. Both the spinous and soft dorsal fins have turquoise margins and that on the soft dorsal fin is broader. Occasionally the turquoise will extend over the distal half of the anterior part of the spinous dorsal fin. The complete or nearly complete band of red blotches in the second dorsal fin and the incomplete, posteriorly located, red band in the first dorsal fin are similar to those described for *E. raneyi*. The cream and yellow color around the red blotches in both dorsal fins and the short band of black blotches in the first dorsal also are similar in position, as described for *E. raneyi*.

Nuptial females have little or no chromatic coloration. Small nuptial females lack chromatic coloration or have slight development of basi-caudal orange blotches. Some large females have basi-caudal orange blotches plus greenish lower procurrent margin of caudal fin and ventral posterior part of caudal peduncle; a light green wash on chin, gill membranes, and breast; light green along base of anal fin; and one or two small red blotches in the posterior membranes of the spinous dorsal fin.

DISTRIBUTION: *Etheostoma lachneri* is confined to the Tombigbee River system, from slightly above the Fall Line in several headwater tributaries to the lower part of the system in Mobile Cnty., Alabama (Figures 7, 9; Mettee et al., 1987: map, p. 173; Mettee et al., 1989a: map, p. 188; Boschung, 1989: map 107, p. 93; Mettee et al., 1989b: map, p. 152). Most of the records in the upper Tombigbee River system are in tributaries draining into the river from the east. The reason for the abrupt demarkation of the western distribution is undoubtedly correlated with the fact that the Tombigbee River is the common border for the western edge of the Fall Line Hills physiographic district and the eastern border of the Black Belt physiographic district (Mettee et al., 1989a: 18, Figure 7). Moreover, each physiographic district has a distinct geological base.

HABITAT AND BIOLOGY: *Etheostoma lachneri* occurs in a variety of habitats: small streams with a mixture of sand and gravel substrate; rubble-strewn areas at road crossings; and mixtures of sand, gravel, and hard clay or bedrock bottoms. The type locality, Wolf Creek, tributary to Little Souwilpa Creek, is a small stream 15 to 20 feet in width with sections of bedrock and sand bars upstream of Hwy. 17. There are some deep potholes in the bedrock sections. Downstream of Hwy. 17 the stream cascades down numerous ledges of bedrock. Wolf Creek enters Little Souwilpa Creek at the lower end of an extensive cascade on the Little Souwilpa, and has an overhanging canopy of shrubs and trees except at the highway crossing.

Based on recent observations, prenuptial conditions were evident in February and spawning occurs from early March to late April in the more southerly areas and perhaps into late May in the more northerly areas. The sex ratio is skewed toward more females in spawning aggregations. Based on nine collections of topotypes taken during February, March, and April, the 289 specimens include 124 (42.9%) males and 165 (57.1%) females. The 124 males range from 27.0 to 48.6 mm in SL with a mean of 37.9 mm; the 165 females range from 26.1 to 43.7 mm, mean 35.6 mm.

The species associates of *Etheostoma lachneri* at Wolf Creek (type locality), are as follows: *Erimyzon oblongus, Hypentelium etowanum, Moxostoma erythrurum, Moxostoma poecilurum, Campostoma* sp., *Cyprinella callistia, C. venusta, Luxilus*

chrysocephalus, Lythrurus bellus, Nocomis leptocephalus, Notropis ammophilus, N. baileyi, N. buccatus, Pimephales notatus, Semotilus atromaculatus, Ameiurus natalis, Noturus gyrinus, N. leptacanthus, N. nocturnus, Fundulus olivaceus, Lepomis cyanellus, L. macrochirus, L. megalotis, Etheostoma rupestre, E. stigmaeum, E. whipplei, and *Percina nigrofasciata.*

VARIATION: The number of gill rakers, in general, varies from low in the upstream tributaries to higher in the downstream tributaries to the Tombigbee River. However, the lowermost tributary sampled showed a reverse trend.

ETYMOLOGY: The name, *Etheostoma lachneri*, is in recognition of Ernest A. Lachner, a few of whose early publications were concerned with detailed studies of the biology of darters. Too, we recognize Dr. Lachner's exhaustive studies of the systematics, zoogeography, and biology of the genus *Nocomis*, but perhaps of equal importance to some of us (R. D. S.) was his seemingly untiring, unselfish expenditure of time and energy to help young ichthyologists during their formative professional years while he was Curator of Fishes at the United States National Museum.

Etheostoma ramseyi Suttkus and Bailey, new species
Alabama Darter
Figures 3, 7, 8, and 9

Etheostoma simoterum. Gilbert, 1891: 155 (misidentification, "abundant in Alabama basin, and varying more or less from the typical form").

Etheostoma (*Ulocentra*) sp. Smith-Vaniz, 1968: 136 (in part, reports from Cahaba and Alabama r. systems). Jenkins, 1976: 644 (in part, distribution). Kuehne and Barbour, 1983: 97 ("Gulfcoast Snubnose Darter," in part, characterized, range map, in part). Pierson et al., 1989: 1, 14, 15, 17, 26-50, 171 (habitat, map of localities in Cahaba River system, Alabama). Boschung, 1992: 122 (in part, "orangestripe darter," a complex of species).

Etheostoma sp. Suttkus and Boschung, 1990: 60 (Chilatchee Creek, Alabama record, species associates). Page and Burr, 1991: 302, map 346 (in part, characterized, range map in part).

HOLOTYPE: Adult male, TU 162574, 49.2 mm standard length, Beaver Creek, tributary to Alabama River at Wilcox Cnty. Road 27, 0.8 mile west of Sunny South (T11N, R4E, Sec 3), Wilcox Cnty., Alabama, 31 March 1992, R. D. Suttkus.

PARATOPOTYPES: TU 162575 (138, 29 – 46), collected with holotype, distributed as follows: TU 162575 (126), CU 73783 (2), UMMZ 222915 (4), USNM 325770 (2), UT 91.4345 (4); TU 158276 (48, 30 – 49), 26 May 1990, distributed as follows: TU 158276 (42), ANSP 170041 (2), UAIC 10683.01 (2), UF 100287 (2); TU 166073 (20, 33 – 49), 22 November 1992; TU 166090 (15, 34 – 47), 23 November 1992; TU 166398 (33, 32 – 45), 7 February 1993; TU 166625 (19, 35 – 47), 27 March 1993; TU 166737 (20, 36 – 49), 17 April 1993; TU 167014 (29, 35 – 46), 17 May 1993.

OTHER PARATYPES: Alabama. Clarke Cnty.: TU 158262 (7, 38 – 42), Beaver Creek at dirt road, 0.8 mi. SE Atkinson (T11N, R4E, Sec 3), 26 May 1990. Wilcox Cnty.: UAIC 2040 (20, 18 – 47) Beaver Creek, 2 mi. SE Pine Hill at Cnty. Rd. (T12N, R5S, Sec 33), 30 May 1966; TU 44496 (26, 27 – 38), Turkey Creek at Hwy. 5, 1.0 mi. S Kimbrough (T12N, R5E, Sec 10), 18 March 1967; TU 154710 (12, 32 – 43), 9 May 1989. Marengo Cnty.: TU 32429 (142, 14 – 44), Dry Creek, tributary to Turkey Creek at Hwy. 10, 1.0 mi. E Vineland or

4.7 mi. W Hwy. 5 at Pine Hill (T12N, R4E, Sec 11), 28 May 1964; TU 151854 (33, 28 – 42), 17 April 1988; TU 157582 (35, 29 – 46), 22 March 1990; TU 157751 (29, 30 – 44), 11 April 1990, distributed as follows: TU 157751 (19), UMMZ 222916 (10); TU 161920 (22, 30 – 45), 24 November 1991; TU 162361 (11, 30 – 40), 2 March 1992; TU 162615 (15, 34 – 45), 31 March 1992; and TU 166409 (35, 34 – 49), 7 February 1993; TU 158313 (2, 40 – 46), Dry Creek at Hwy. 25, 0.9 mi. S Vineland (T12N, R4E, Sec 10), 26 May 1990; TU 158293 (26, 32 – 46), Little Creek, tributary to Dry Creek at Hwy. 25, 0.3 mi. N Vineland (T12N, R4E, Sec 3), 26 May 1990; TU 161862 (13, 30 – 41), 24 November 1991; and TU 162377 (8, 33 – 39), 2 March 1992; TU 161881 (6, 33 – 38), Baptizing Creek, tributary to Turkey Creek at Hwy. 25, 1.4 mi. N Vineland (T13N, R4E, Sec 35), 24 November 1991; and TU 162601 (1, 34), 31 March 1992; TU 161904 (5, 32 – 40), Turkey Creek at Hwy. 25, 3.5 mi. N Vineland (T13N, R4E, Sec 23), 24 November 1991.

Additional material examined, not designated as types: **Alabama River system. Alabama.** Baldwin-Monroe Cnty.: TU 32551 (1), Little River at Hwy. 59 at Chrysler, 13.5 mi. W Uriah (T4N, R4E, Sec 19), 30 May 1964, TU 44399 (1), 17 March 1967, and TU 44419 (1), 18 March 1967. Escambia-Monroe Cnty.: TU 99950 (29), Little River at Escambia Cnty. Rd. 1, 7.9 mi. NW McCullough (T3N, R5E, Sec 7), 20 October 1976; TU 153964 (10), Little River at Hwy. 21, 4.1 mi. S Uriah (T3N, R6E, Sec 5), 4 November 1988, TU 154479 (4), 21 March 1989, and TU 162548 (1), 30 March 1992. Clarke Cnty.: TU 34012 (4), Sand Hill Creek 1.1 mi. W Choctaw Bluff (T5N, R3E, Sec 27), 1 July 1964, and TU 41447 (8), 30 June 1966; TU 32500 (6), Big Reedy Creek at Clarke Cnty. Rd. 19, 1.5 mi. N Choctaw Bluff (T5N, R3E, Sec 22), 28 May 1964; TU 125380 (3), 14 May 1982, TU 163242 (13), 11 May 1992, and TU 165506 (3), 30 August 1992; TU 165527 (1), Sizemore Creek at Clarke Cnty. Rd. 2 (T5N, R4E, Sec 7), 30 August 1992; TU 137048 (12), Silver Creek, 5 mi. W Chance or 3.5 mi. E Scyrene (T9N, R5E, Sec 17), 8 August 1984, and TU 152495 (8), 26 May 1988. Monroe Cnty.: TU 43254 (3), Wallers Creek, 5.7 mi. E Eureka Landing on Alabama River (T5N, R4E, Sec 33), 5 February 1967; TU 153937 (1), Randons Creek at Monroe Cnty. Rd. 23, 5 mi. NW Frisco City (T6N, R6E, Sec 15), 4 November 1988; UAIC 2357 (27), Randons Creek, approximately 2 mi. S US Hwy. 84, 25 September 1966. Wilcox Cnty.: TU 32454 (24), Bear Creek at Wilcox Cnty. Rd. 1, 3.1 mi. NW Lower Peach Tree (T11N, R5E, Sec 33), 28 May 1964, TU 60866 (32), 16 December 1969, TU 87039 (11), 21 March 1974, and TU 107599 (2), 26 March 1976; TU 47391 (1), Alabama River at Tait Bar, River Mile 122.4 (T11N, R6E, Sec 24), 7 August 1967; TU 3420 (2), Pursley Creek at Hwy. 11, 3.4 mi. SW Camden (T11N, R7E, Sec 2), 3 June 1951; TU 3067 (2), tributary to Pursley Creek at Hwy. 10, 1.8 mi. E Camden (T12N, R8E, Sec 27), 3 June 1951; TU 47379 (1), Alabama River at Reeves Bar, River Mile 128.5 (T11N, R7E, Sec 5), 7 August 1967; TU 47769 (2), Alabama River at Lower Canton Bar, River Mile 156.7 (T13N, R7E, Sec 23), 18 August 1967; TU 2575 (19), Turkey Creek, tributary to Pine Barren Creek at Hwy. 10, 0.8 mi. W Awin (T10N, R11E, Sec 16), 2 June 1951, and TU 32606 (66), 30 May 1964; TU 60890 (154), Chilatchee Creek at Hwy. 5, 0.3 mi. N Alberta (T15N, R7E, Sec 30), 18 December 1969, TU 121394 (14), 15 May 1981, TU 125405 (44), 15 May 1982, TU 140941 (23), 24 May 1985, TU 145528 (4), 20 May 1986, TU 151640 (21), 9 April 1988, TU 153093 (12), 2 August 1988, TU 153195 (26), 3 August 1988, TU 154403 (17), 3 February 1989, TU 154740 (33), 9 May 1989, TU 157470 (22), 1 March 1990, TU 157591 (13), 22 March 1990, TU 162585 (7), 31 March 1992, TU 162984 (24), 27 April 1992, TU 163218 (17), 11 May 1992, and TU 166792 (20), 18 April 1993. Dallas Cnty.: TU 159006 (2), Tatum Creek, tributary to Bogue Chitto Creek at Dallas Cnty. Rd. 11 (T16N, R8E, Sec 28), 18 August 1990; TU 158962 (3), Dry Creek, tributary to Bogue Chitto Creek at Dallas Cnty. Rd. 3 (T16N, R8E, Sec 17), 18 August 1990; TU 158982 (2), Bogue Chitto Creek at Dallas Cnty. Rd. 182 (T16N, R7E, Sec 12), 18 August 1990; UAIC 2402 (14), Soapstone Creek at US Hwy. 80, 7 mi. E Selma, 7 December 1966; TU 32648 (30), White Oak Creek at Hwy. 41, 13.3 mi. NE Camden (T13N, R10E, Sec 8), 30 May 1964, TU 35376 (61), 29 June 1964, TU 157494 (9), 1 March 1990, TU 158887 (25), 17 August 1990, and TU 162970 (53), 26 April 1992; TU 158926 (5), Musk Creek at Hwy. 41, 2.9 mi. S Sardis (T15N, R11E, Sec 29), 17 August 1990; TU 35171 (6), Pine Flat Creek (Six Mile Creek) at Hwy. 41, 6 mi. S Selma (T16N, R11E, Sec 32), 27 June 1964, and TU 158945 (1), 17 August 1990. Autauga Cnty.: UAIC 2043 (13), Swift Creek, Autaugaville on Hwy. 14 (T17N, R14E, Sec 22), 31 May 1966; UMMZ 146523 (1), Beaver Creek, 5 mi. W Autaugaville (T17N, R13E, Sec 14), 13 June 1942, and UMMZ 146547 (1), 20 December 1942; UMMZ 146539 (6), tributary to Beaver Creek, 5 mi. W Autaugaville (T17N, R13E), 20 March

1942; UMMZ 124134 (1), Autaugaville (T17N, R14E); UAIC 2311 (19), Autauga Creek between Oak Grove and White City (T19N, R15E, Sec 16), 1 July 1966. Chilton Cnty.: TU 157605 (15), Bear Creek, tributary to Benson Creek at Chilton Cnty. Rd. 15, 4.8 mi. ENE Maplesville (T21N, R13E, Sec 16), 23 March 1990; TU 27347 (4), Mahan Creek, tributary to Little Cahaba River at Chilton Cnty. Rd. 3213, 0.7 mi. NW Jemison (T23N, R13E, Sec 15), 20 December 1961. Perry Cnty. UMMZ 212385 (3), Silver Creek, 1 mi. E Suttle at US Hwy. 43 (T18N, R9E, Sec 21), 6 February 1965; TU 32711 (39), Ellards Creek, tributary to Taylor Creek, tributary to Cahaba River at Hwy. 5, 10.6 mi. SW Brent or 1.3 mi. S Bibb Cnty. line (T21N, R8E, Sec 10), 31 May 1964, TU 151661 (30), 9 April 1988, TU 151809 (57), 16 April 1988, TU 162997 (28), 27 April 1992, TU 166615 (1), 26 March 1993, and TU 166783 (8), 18 April 1993. Bibb Cnty.: TU 15297 (1), Cahaba River, 2.2 mi. N Centreville (T23N, R9E, Sec 14), 17 May 1957, and TU 35085 (1) 26 June 1964; TU 151818 (68), Little Schultz Creek, 7.2 mi. N Centreville (T24N, R9E, Sec 24), 16 April 1988, TU 163006 (14), 27 April 1992, and TU 166774 (11), 18 April 1993; TU 19414 (1), Cahaba River at Hwy. 27, 8.5 mi. N Centreville (T24N, R10E, Sec 33), 8 September 1958; TU 106753 (9), Coffee Creek, tributary to Cahaba River at Bibb Cnty. Rd. 24 at Blocton (T22S, R6W, Sec 24), 14 April 1978; TU 25994 (14), Six Mile Creek, tributary to Little Cahaba River at Hwy. 25, about 10 mi. NE Centreville (T23N, R11E, Sec 6), 17 April 1962; TU 152178 (5), Cooperas Creek, tributary to Six Mile Creek (T23N, R11E, Sec 16), 12 May 1988; TU 152158 (24), Six Mile Creek (T23N, R11E, Sec 15), 12 May 1988; TU 106776 (2), Little Cahaba River at Bulldog Bend at Bibb Cnty. Rd. 65 (T24N, R11E, Sec 19), 14 April 1978. Shelby Cnty.: TU 27376 (7), tributary to Shoal Creek, tributary to Little Cahaba River, 2 mi. NNW Montevallo (T22S, R3W, Sec 19), 21 December 1961; UMMZ 198756 (3), Big Cahawba River, Helena (T20S, R3W, Sec 15), 20 May 1889; AUM 9571 (1), Little Cahaba River at Coal Branch, 2.0 airmi. SE Cahaba Heights (T18S, R1W, Sec 19), 30 October 1971. Jefferson Cnty.: UMMZ 168646 (38), Little Cahaba River at US Hwy. 78 at Leeds (T17S, R1E, Sec 21), 3 September 1954, and UMMZ 177738 (56), 22 May 1956. St. Clair Cnty.: TU 166768 (6), Little Cahaba River at Oliver Rd. in Leeds (T17S, R1E, Sec 15), 18 April 1993.

Diagnosis: *Etheostoma ramseyi* is a member of subgenus *Ulocentra* as diagnosed by Bouchard (1977) and Bailey and Etnier (1988). *Etheostoma ramseyi* lacks a premaxillary frenum and the head of the vomer usually has one or a few slender teeth and therefore is typical of members of the *Etheostoma duryi* species group of Bailey and Etnier (1988). *Etheostoma ramseyi*, like *E. lachneri* and *E. raneyi*, lacks a red ocellus in the first interradial membrane of the spinous dorsal fin. The unique features of nuptial male *E. ramseyi* are the size and disposition of the dark lateral blotches along the lateral line, the presence of a series of orange to russet blotches dorsad of the lateral blotches, the interconnection of lateral blotches with respective dorsal saddle blotches, and the continuous orange coloration of the ventral lateral part of the body and caudal peduncle with dorsal extensions between posterior lateral blotches on caudal peduncle. The lateral blotches are of moderate size and are ovoid to rounded quadrate in shape.

Description: *Etheostoma ramseyi* reaches a maximum of 45 mm SL (females) to 51 mm SL (males). Sexual dimorphism and apparent sexual maturity occur at the end of the first year at a minimum of 29 mm SL for both females and males. Frequency distributions of scale and fin-ray counts are presented in Tables 1-5. Number of vertebrae, branchiostegal rays, gill rakers, and preoperculomandibular pores are given in Tables 6-7. The lateral line is usually complete with (40 –) 42 – 49 (– 53) scales, occasionally the last one or two scales are unpored. Transverse scales number 12 (11 specimens), 13 (48), 14 (44), 15 (35), 16 (8), or 17 (4). Transverse scales from origin of second dorsal fin to anal fin (an alternative count, see Bailey and Etnier 1988: 30) number 11 (10), 12 (33), 13 (17), 14 (2), mean of 62 counts, 12.2. Caudal peduncle scale rows number 14 (2), 15 (20), 16 (45), 17 (85), 18 (45), 19 (12), or 20 (3). Dorsal fin has (8 –) 10 – 11 (– 12) spines and (10 –) 11 – 12 (– 13) soft rays. Anal fin has 2 spines

and 6 – 7 (– 8), modally 7, soft rays. Pectoral fin has 13 – 15 rays. Vertebrae number 37 (23), 38 (88), or 39 (19); branchiostegal rays number 4—4 (1), 5—3 (1), 5—4 (3), 5—5 (181), 5—6 (2), or 6—6 (1), and gill rakers on first arch number 6 (6), 7 (20), 8 (43), 9 (78), 10 (36), or 11 (3). In general there is a decrease in the number of gill rakers from the northern or headwater tributaries southward to the southern or lower tributaries to the Alabama River system. The sum of left and right preoperculomandibular pores is nearly constant at 18 (171 of 179 specimens), of the remainder, one has 16 pores, seven have 17 pores. The opercle, cheek, nape, and prepectoral area typically are covered with exposed scales. Occasionally the opercle, cheek, or nape has slightly reduced scale coverage and in a few individuals some of the cheek scales are embedded. The belly is consistently covered with exposed scales whereas the breast is consistently scaleless.

In 10 specimens examined for dentition, the vomer lacks teeth in one, the head of the vomer bears a single slender tooth in three, there are two teeth in two, three teeth in three, and four teeth in one, mean 2.0; all 10 lack palatine teeth.

Proportional measurements appear in Tables 8-9. The 25 males represent specimens from five different months: March (9 specimens), May (10), June (1), July (2), and December (3). The ten females represent specimens from two months: March (6) and May (4).

Colors of live and freshly preserved specimens, collected in February, March, and May, are described from Beaver Creek, the type locality. We preface our descriptive remarks by saying that perhaps *E. ramseyi* is the most variable of the three new species in its nuptial coloration, especially when considering different sub-populations. Nuptial males have orange coloration on nearly the entire lower side of body and caudal peduncle. Except for extreme anterior part of body the orange extends dorsad to the ventral margin of lateral brown blotches (typically eight) and up to lateral line between lateral blotches. The orange from the venter fuses or merges with orange blotches above the lateral line in the last two interspaces on the caudal peduncle. The orange on the last interspace is continuous with two elongate orange blotches at base of caudal fin. The penultimate, lateral, brown blotch, plus the next four anteriorly, have an overlay of green that extends diagonally down from a respective dorsal saddle blotch (Figure 3). Occasionally the green overlay extends downward over the penultimate lateral brown blotch to the midventral line. A similar extension of the next anterior lateral blotch is rare. The lateral brown blotches are moderate in size and are centered along the lateral line. There is a series of distinct oblong blotches on the dorsal lateral area just above the lateral line. These occur between the diagonal green bars that extend from dorsal saddle blotches to the lateral brown blotches along the lateral line. This series of blotches above the lateral line grades from bright red or red-orange posteriorly to russet anteriorly. As mentioned above, the last two red or red-orange blotches merge with the orange of the ventral lateral area. The red or red-orange blotches are brighter in large prenuptial males and in small nuptial males than in large nuptial males. Moreover the posterior two blotches on the caudal peduncle in prenuptial males are separate from the ventral lateral orange on the caudal peduncle. Thus the ventral lateral coloration becomes more extensive and the blotches in the series above the lateral line become darker with the approach of the height of nuptial condition. Nuptial males have a variable amount of red or orange pigment high on the dorsal lateral area on the otherwise pale areas between the dorsal saddle

blotches. Additional information regarding coloration is given in the section on variation. The dorsal saddle blotches (typically eight) are dark brown with an overlay of green. The breast, gill membranes, cheek, lower part of opercle, and side and anterior tip of snout are light to dark turquoise. There are dark brown preorbital and suborbital bars, as well as several brown blotches along upper margin of the opercle. The turquoise, red, black, yellow, and cream pigmentation on both the spinous and soft dorsal fins of the nuptial male *E. ramseyi* is similar to that described for *E. raneyi* and *E. lachneri*. The caudal fin of *E. ramseyi* nuptial male has turquoise edging on procurrent margins and light turquoise on outer part of both upper and lower lobes. The two elongate orange blotches at base of the caudal fin are prominent and are continuous with orange on caudal peduncle. The anal fin is a uniform turquoise and seldom has a pale "window" as is common in nuptial male *E. lachneri*. The pelvic fins are turquoise with milky white tips on the anterior rays. The pectoral fins of nuptial males from the type locality lack turquoise but do have some yellowish pigment along the lower rays.

Nuptial females have some bright coloration although greatly reduced in coverage compared to that of the nuptial male. Large females have brighter coloration than small females and the smallest sexually mature females may completely lack bright colors. A sample taken from White Oak Creek, Dallas Cnty., Alabama on 26 April 1992 contained 39 females. These specimens were examined in detail for presence of red or orange coloration, and were tallied under six categories. Thirty eight of the 39 specimens had several blotches of orange in the lateral series just above lateral line; 37 of 39 had the two basicaudal orange blotches; 34 had one or more red spots in spinous dorsal fin; 24 had some orange on lower side of body; 22 had some red spots in second dorsal fin; and only six of the 39 females had some flecks or small blotches of red or orange high on the upper side between the dorsal saddle blotches.

DISTRIBUTION: *Etheostoma ramseyi* is distributed mostly below the Fall Line in the Alabama River system but is relatively common in headwater tributaries to the Cahaba River above the Fall Line (Figures 7, 9). No other species of subgenus *Ulocentra* occurs within the range of *E. ramseyi*. We do not believe the absence of *E. ramseyi* in the north-westerly flowing tributaries to the upper Alabama River and the lower Tallapoosa River below the Fall Line is an artifact due to lack of collecting effort. The reason for the absence in this area is not fully understood, but perhaps it is because this area represents the eastern extension of the Black Belt district and there is limited suitable habitat (Harper, 1943).

HABITAT AND BIOLOGY: Beaver Creek at the type locality has a diversity of habitats. In general there is an alternation of pools and riffles, raceways or cascades. Pools vary from one to three feet in depth during low flow and have sand or bedrock substrates. The substrate elsewhere is gravel, sand, rock, clay rubble, or bedrock. There are patches of *Justicia* on some of the small gravel bars. The stream is 15 to 20 feet in width at low flow and is bordered by steep banks, especially at the road crossing. The banks are wooded and thus the stream is shaded during the summer months.

Based on recent observations, spawning occurs from early March to late April or early May at the type locality, however the spawning period may extend earlier into late February at some more southern localities or later into May farther north. Air temperature at any particular time has little correlation with reproductive activities. However, water temperature is directly related to nuptial

development and spawning activities. Although water temperatures are related to air temperature, the proximity of spring flow, nature of stream substrate, and the vegetation coverage in the watershed, particularly in the riparian strip, enhance or decrease the impact on stream temperature. Within the same 24 hour period (17-18 April 1993) water temperature of Little Cahaba River at Leeds, St. Clair Cnty. (above the Fall Line) was 15° C, Little Schultz Creek, 7.2 mi. N Centreville, Bibb Cnty. was 17° C, Ellards Creek, 10.6 mi. S Centreville, Perry Cnty., was 16° C, Chilatchee Creek, 0.3 mi. N Alberta, Wilcox Cnty. was 20° C, and at Beaver Creek, the type and most southern locality, was 14° C. Most spawning is completed before the water temperature reaches 20° C. Short periods of 20° C may not terminate spawning activities but when temperatures of 20° C or higher are sustained then termination of spawning is almost sure to occur.

The sex ratio is skewed toward more females in spawning aggregations. Based on five collections of topotypes taken during February to May, the 259 specimens include 91 (35.1%) males and 168 (64.9%) females. The males range from 29.1 to 49.2 mm SL, mean 39.8 mm; the females from 28.9 to 44.2 mm SL, mean 37.4 mm.

The species associates of *E. ramseyi* at the type locality are as follows: *Ichthyomyzon gagei, Moxostoma erythrurum, M. poecilurum, Campostoma* sp., *Hybognathus nuchalis, Luxilus chrysocephalus, Lythrurus bellus, Nocomis leptocephalus, Notropis ammophilus, N. baileyi, N. buccatus, Pimephales notatus, Semotilus atromaculatus, Ictalurus punctatus, Noturus funebris, N. leptacanthus, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, L. megalotis, Etheostoma nigrum, E. whipplei, Percina maculata*, and *P. nigrofasciata.*

VARIATION: Number of gill rakers is the only meristic character that shows some geographic variation. We did not detect any geographical trends in the morphometrics that are presented in Tables 8 and 9. Although not fully investigated by us, we believe that nuptial males in the upper part of the Cahaba River system display more and larger blotches of red on the dorsal lateral area of body, between the dark brown dorsal saddle blotches, than the lower Cahaba and Alabama river populations. Females display a similar trend. Also we observed that, in some samples, both males and females were darker than in other samples, however, we believe this to be a direct correlation with substrate color and perhaps water clarity.

ETYMOLOGY: We take pleasure in naming this darter for John S. Ramsey, who contributed to our knowledge of the systematics, zoogeography, and biology of the darters and other fishes in the southeastern United States. Dr. Ramsey generously contributed his field notes and preliminary analyses.

COMPARISONS

The typical nuptial coloration of males of *Etheostoma raneyi, E. lachneri*, and *E. ramseyi* is illustrated in Figures 1-3 respectively. The lateral stripe of *E. raneyi* is composed of two sets of blotches. One set of oblong or elongate blotches aligned along the lateral line is more or less interposed by a second set of oval or quadrate blotches. Although blotches in both of these series are variable in shape and density of pigmentation, their ventral borders form a continuous rather smooth margin. The entire lower side below this margin is orange to red-orange (Figure 1). *Etheostoma ramseyi* has a single series of blotches along the

lateral line and the orange or red-orange of the lower side extends dorsad between the blotches, that is, covering the interspaces and thus producing a scalloped pattern along the lateral blotches. The second set of blotches occurs well above the lateral line. Occasionally the penultimate blotch along the lateral line is continuous with green or turquoise coloration on the ventral part of the caudal peduncle (Figure 3). *Etheostoma lachneri* is unique in the presence of two to five complete, slightly oblique green bars on the posterior half of the body. Those males with fewer than four complete bars usually have one or more incomplete bars. The interspaces between the bars and the anterior ventral lateral area of body are deep orange. The orange coloration above the lateral line is not in the form of compact blotches but instead is an irregular network of color (Figure 2).

The illustration of the male *E. raney*i (Yazoo darter) in Deacon et al. (1979: 42) does not show the typical bright nuptial coloration. The color illustration of the male *E. raneyi* (Yazoo darter) in Page and Burr (1991: plate 43) is an accurate depiction of the lateral blotches and the ventral lateral coloration, however, the spinous dorsal fin does not have a complete band of red blotches across the entire fin as shown in their illustration. Also there is an incomplete band of black blotches (not shown in their illustration) along the proximal part of anterior membranes of the spinous dorsal fin.

We are somewhat perplexed with the illustration of the "Coastal Plain darter" (Page, 1983: plate 16G). The locality data given are Minter Creek, Greene Cnty., Alabama and date of collection 17 April 1977. Our first collection of 13 specimens (4 males) from Minter(s) Creek, Greene Cnty., Alabama was obtained on 26 March 1993. All four males had the green-barred pattern as shown in Figure 2. Our second collection (8 specimens) from the same site was taken on 17 April 1993 and the three males also had the barred pattern, although none was as developed as illustrated in Figure 2. The pale "window" in the anal fin, the noticeably elevated spinous dorsal fin, and the network of orange coloration above the lateral line lead us to confirm the Page (1983: plate 16G) illustration as *Etheostoma lachneri*. We suspect that the photo was taken quite a while after capture and as a result much of the green and turquoise color had already faded. We are unaware of any published illustrations of *Etheostoma ramseyi*.

A review of the eight scale, fin-ray, and vertebral counts (Tables 1-6) reveals that *Etheostoma raneyi, E. lachneri*, and *E. ramseyi* are quite similar in these meristics. The number of gill rakers on first arch in *E. raneyi* ranged from 8 to 10, mean, 9.0; the number in both *E. lachneri* and *E. ramseyi* ranged from 6 to 11, means, 8.1 and 8.7 respectively (Table 7).

Thirteen of nineteen proportional measurements on 25 adult males and 10 adult females of each of the three species (Tables 8-9) show differences that we interpret as independent species variation and not a clinal geographic pattern of a single species. For males, the westernmost species, *E. raneyi*, is intermediate between *E. lachneri* and *E. ramseyi* in eight of thirteen proportions. *Etheostoma raneyi* has the longest head, anal soft ray, pelvic fins, and greatest trans-pelvic width but the shortest soft dorsal fin. *Etheostoma lachneri*, which is intermediate geographically, has the longest or greatest measurement for eight of the proportions (longest dorsal spine, soft dorsal fin, dorsal soft ray, anal fin, first anal spine, caudal fin, pectoral fin, and greatest body depth); is intermediate in length of head and length of longest anal soft ray; is equal to *E. ramseyi* in length of pelvic fins; and has the shortest caudal peduncle, and least trans-pelvic width. *Etheostoma ramseyi* has the shortest or least average measurement for nine of the

thirteen proportions (longest dorsal spine, dorsal soft ray, anal fin, first anal spine, anal soft ray, caudal fin, pectoral fin, head length, and the least body depth measurement); intermediate in length of soft dorsal fin and trans-pelvic width, equal to *E. lachneri* in length of pelvic fins; and has the longest caudal peduncle.

For females (Table 9), *Etheostoma raneyi* has the longest or greatest measurement for 11 of the thirteen proportions (longest head, dorsal spine, dorsal soft ray, caudal peduncle, anal fin, first anal spine, and soft ray, caudal fin, pelvic fins, greatest body depth, and trans-pelvic width) but intermediate pectoral fin length. *Etheostoma lachneri* (intermediate geographically), has the shortest or least measurement for 12 of the 13 proportions (recall that *E. lachneri* males have the longest or greatest measurements of the three species for eight of the 13 proportions). Females of all three species have nearly identical soft dorsal fin length measurements. *Etheostoma ramseyi* females have the longest pectoral fins.

Comparison of species in a five-member subgroup: We here propose that *Etheostoma raneyi, E. lachneri, E. ramseyi, E. colorosum*, and *E. tallapoosae* (Figures 1-5) form a subgroup of the *E. duryi* species group of Bailey and Etnier (1988). The combination of the absence of the red ocellus in the first membrane of the spinous dorsal fin, the incomplete band of red blotches in the spinous dorsal fin (primarily on posterior membranes only) and the incomplete band of black blotches in the spinous dorsal fin (on all anterior membranes but lacking on posterior few) unites these five species but at the same time distinguishes them from all other described species of the subgenus (*Ulocentra*). Separate principal components analyses (PCA) were performed on morphometric data for 25 males and 10 females of the three new species plus *E. tallapoosae* and *E. colorosum* to characterize overall shape relationships. The analyses were performed with Statistical Analysis System (SAS) software. Log-transformed data for 19 morphometric variables were first regressed on standard length and the residuals retained for PCA. This partial regression procedure effectively removed a strong size-related trend in the data evidenced by highly inter-correlated variables and a high degree of variability explained by the first principal component axis (PC1). After partialling out the effect of standard length, variables were largely uncorrelated and PC1 accounted for only 34% of the variability in the data for males and 24% of the variability for females.

Results of the PCAs are presented in Figure 8 as polygons representing projections of data for males and females of each of the five species in the space of the first two principal components. In both sets of plots, species are separated mainly along PC1 which relates primarily to fin dimensions (positive values representing long and elevated fins). There is considerable overlap among species, but overlap is greater among males than among females. The greatest separation among species is between *E. tallapoosae* and *E. colorosum*, with the latter tending to have the longer and more elevated fins. Also of interest is that *E. colorosum* is completely separate (both males and females) from *E. tallapoosae* and *E. ramseyi* in shape characteristics (Figure 8) although the latter two species are close geographical associates in an adjacent drainage system. The new species exhibit considerable overlap in shape characteristics with *E. ramseyi* being more similar to *E. tallapoosae*, and *E. lachneri* and *E. raneyi* being intermediate between the two extremes.

The five species of the subgroup are allopatric and no one of them is known to be sympatric with any other species of subgenus *Ulocentra* (Figure 9). Two (*E. raneyi* and *E. colorosum*) inhabit discrete drainage areas. The other three live in separate areas of the Mobile Basin; of these *E. lachneri* lives in the Coastal Plain

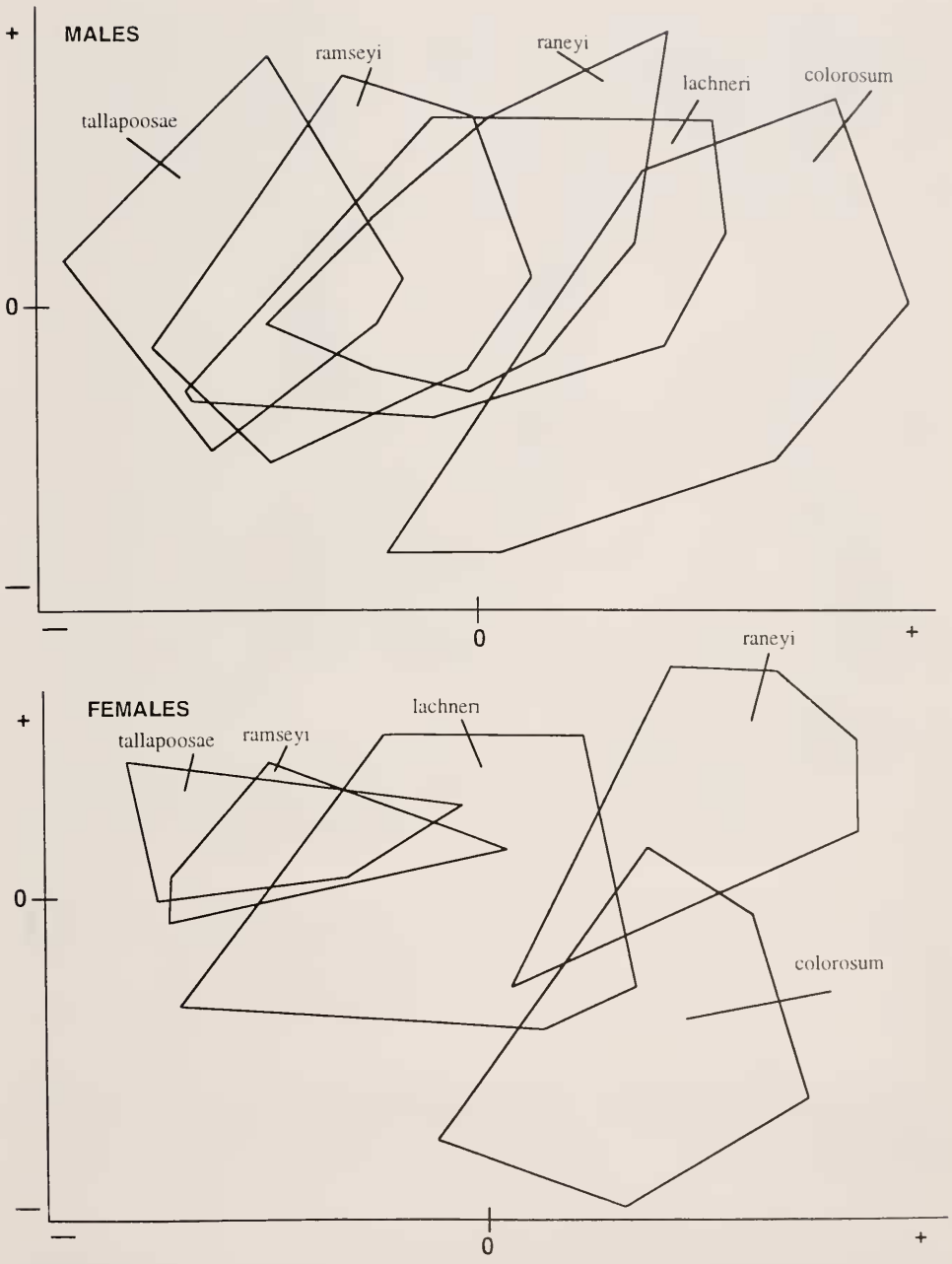


Figure 8. PCA polygons representing projections of morphometric data for *Etheostoma raneyi, E. lachneri, E. ramseyi, E. tallapoosae*, and *E. colorosum*.

to the Fall Line in the Tombigbee River system, *E. ramseyi* occurs in the Alabama River system largely below the Fall Line, but crosses that line in the Cahaba River system. *Etheostoma tallapoosae* inhabits the Tallapoosa River system above the Fall Line. Six additional species of subgenus *Ulocentra* (one yet unnamed) occur in the Mobile River system, all above the Fall Line.

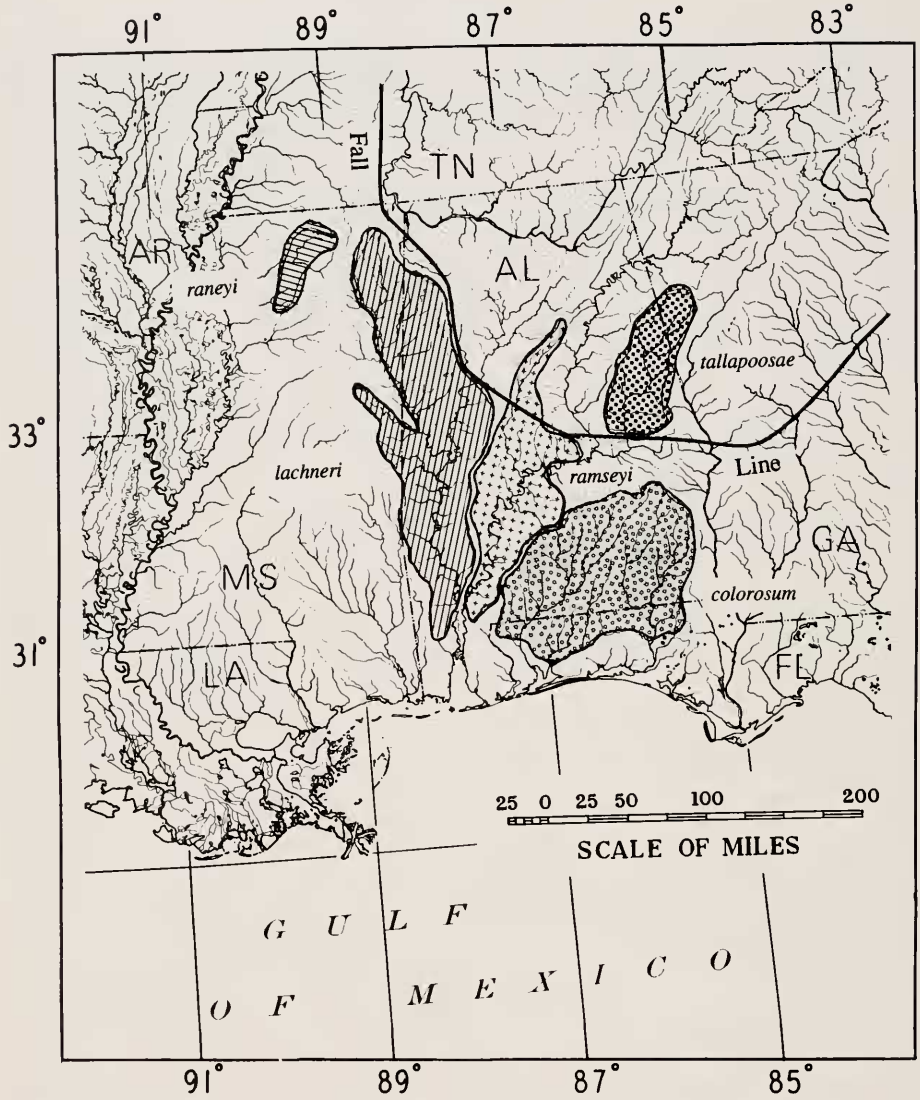


Figure 9. Distribution of five darters of *duryi* species group of *Etheostoma* subgenus *Ulocentra*: *E. raneyi*, *E. lachneri*, *E. ramseyi*, *E. colorosum*, and *E. tallapoosae* in Mississippi, Alabama, and parts of adjacent states.

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Literature Cited

Bailey, R. M. and D. A. Etnier. 1988. Comments on the subgenera of darters (Percidae) with descriptions of two new species of *Etheostoma* (*Ulocentra*) from southeastern United States. Misc. Publ. Mus. Zool. Univ. Michigan 175: 1-48.

Boschung, H. T. 1987. Physical factors and the distribution and abundance of fishes in the upper Tombigbee River system of Alabama and Mississippi, with emphasis on the Tennessee-Tombigbee Waterway. *In* W. J. Matthews and D. C. Heins, eds. Community and Evolutionary Ecology of North American Stream Fishes (pp. 184-192). Univ. Oklahoma Press, Norman.

Boschung, H. T. 1989. Atlas of fishes of the upper Tombigbee River drainage, Alabama-Mississippi. Proc. Southeast. Fishes Council 19: 1-104.

Boschung, H. T. 1992. Catalog of freshwater and marine fishes of Alabama. Bull. Alabama Mus. Nat. Hist. No. 14 (266 pp.).

Bouchard, R. W. 1974. The subgenus *Ulocentra* (Percidae, Etheostomatini) in western Kentucky, western Tennessee and northern Mississippi. Assoc. Southeast. Biologists Bull. 21: 41 (abstract).

Bouchard, R. W. 1977. *Etheostoma etnieri*, a new percid fish from the Caney Fork (Cumberland) River system, Tennessee, with a redescription of the subgenus *Ulocentra*. Tulane Stud. Zool. Bot. 19: 105-130.

Clemmer, G. H., R. D. Suttkus, and J. S. Ramsey. 1975. A preliminary checklist of endangered and rare fishes of Mississippi. *In* Mississippi Game and Fish Comm. Preliminary list of rare and threatened vertebrates in Mississippi (pp. 6-11). Jackson, Mississippi.

Deacon, J. E., G. Kobetich, J. D. Williams, and S. Contreras. 1979. Fishes of North America endangered, threatened, or of special concern: 1979. Fisheries 4(2): 29-44.

Gilbert, C. H. 1891. Report on explorations made in Alabama during 1889 with notes on the fishes of the Tennessee, Alabama, and Escambia rivers. Bull. U. S. Fish Commission (1889) 9: 143-159.

Harper, R. M. 1943. Forests of Alabama. Geological Survey of Alabama Monograph 10 (230 pp.).

Hubbard, W. D. 1987. Distribution and diversity of fishes in the Noxubee River drainage, Mississippi. J. Mississippi Acad. Sci. 32: 19-29.

Hubbard, W. D., C. E. Tucker, and H. Boschung. 1991. Fishes of the Sucarnoochee River system, Alabama and Mississippi. Proc. Southeast. Fishes Council 24: 1-11.

Hubbs, C. L. and K. F. Lagler. 1958. Fishes of the Great Lakes region. Cranbrook Inst. Sci. Bull. 26 (213 pp.).

Jenkins, R. E. 1976. A list of the undescribed freshwater fish species of continental United States and Canada, with additions to the 1970 checklist. Copeia 1976: 642-644.

Knight, S. S. and C. M. Cooper. 1987. Fishes of Otoucalofa Creek, Mississippi prior to major channel modifications. J. Mississippi Acad. Sci. 32: 31-38.

Kuehne, R. A. and R. W. Barbour. 1983. The American Darters. Univ. Kentucky Press, Lexington (201 pp.).

Lowe, E. N. 1925. Geology and mineral resources of Mississippi. Mississippi State Geol. Survey Bull. 20 (140 pp.).

Mettee, M. F. 1978. The fishes of the Birmingham-Jefferson County region of Alabama with ecologic and taxonomic notes. Geol. Survey Alabama Bull. 115 (182 pp.).

Mettee, M. F., S. C. Harris, and P. E. O'Neil. 1986. Biological diversity and water quality of streams draining the Gilbertown oil field area. Geol. Survey Alabama Circular 120 (32 pp.).

Mettee, M. F., P. E. O'Neil, and S. C. Harris. 1983. A biological inventory of streams draining the Citronelle, Pollard, and Gilbertown oil fields in Alabama. Geol. Survey Alabama Circular 108 (101 pp.).

Mettee, M. F., P. E. O'Neil, J. M. Pierson, and R. D. Suttkus. 1989a. Fishes of the Black Warrior River system in Alabama. Geol. Survey Alabama Bull. 133 (201 pp.).

Mettee, M. F., P. E. O'Neil, J. M. Pierson, and R. D. Suttkus. 1989b. Fishes of the western Mobile River basin in Alabama and Mississippi. Geol. Survey Alabama Atlas 24 (170 pp.).

Mettee, M. F., P. E. O'Neil, R. D. Suttkus, and J. M. Pierson. 1987. Fishes of the lower Tombigbee River system in Alabama and Mississippi. Geol. Survey Alabama Bull. 107 (186 pp.).

O'Neil, P. E., S. C. Harris, and M. F. Mettee. 1984. The distribution and abundance of aquatic organisms inhabiting streams draining the Citronelle oil field, Alabama. Geol. Survey Alabama Circular 99 (26 pp.).

Page, L. M. 1983. Handbook of Darters. T. F. H. Publications, Inc. Neptune City, New Jersey (271 pp.).

Page, L. M. and B. M. Burr. 1991. A Field Guide to Freshwater Fishes, North America, North of Mexico. Houghton Mifflin Co., Boston, Mass. (432 pp.).

Pierson, J. M., W. M. Howell, R. A. Stiles, M. F. Mettee, P. E. O'Neil, R. D. Suttkus, and J. S. Ramsey. 1989. Fishes of the Cahaba River system in Alabama. Geol. Survey Alabama Bull. 134 (183 pp.).

Randolph, K. N. and M. L. Kennedy. 1974. The fishes of the Tippah River system Mississippi, with notes on habitats and distribution. J. Mississippi Acad. Sci. 19: 128-134.

Robins, C. R., R. M. Bailey, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott. 1991. Common and scientific names of fishes from the United States and Canada (5th ed.). Amer. Fish. Soc. Spec. Publ. 20: 1-183.

Simons, A. M. 1992. Phylogenetic relationships of the *Boleosoma* species group (Percidae: *Etheostoma*). *In* R. L. Mayden (ed.), Systematics, Historical Ecology, and North American Freshwater Fishes (pp. 268-292). Stanford Univ. Press.

Smith-Vaniz, W. F. 1968. Freshwater Fishes of Alabama. Auburn Univ. Agric. Experiment Sta. (211 pp.).

Suttkus, R. D. and R. M. Bailey. 1993. *Etheostoma colorosum* and *E. bellator*, two new darters, subgenus *Ulocentra*, from southeastern United States. Tulane Stud. Zool. Bot. 29: 1-28.

Suttkus, R. D. and H. T. Boschung. 1990. *Notropis ammophilus*, a new cyprinid fish from southeastern United States. Tulane Stud. Zool. Bot. 27: 49-63.

Suttkus, R. D. and D. A. Etnier. 1991. *Etheostoma tallapoosae* and *E. brevirostrum*, two new darters, subgenus *Ulocentra*, from the Alabama River drainage. Tulane Stud. Zool. Bot. 28: 1-24.