

ETHEOSTOMA ETNIERI, A NEW PERCID FISH FROM THE CANEY
FORK (CUMBERLAND) RIVER SYSTEM, TENNESSEE, WITH
A REDESCRIPTION OF THE SUBGENUS *ULOCENTRA*

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ABSTRACT

The subgenus *Ulocentra* is diagnosed and redescribed. *Etheostoma etnieri*, a new darter of the subgenus *Ulocentra* (Percidae, Etheostomatini), is described from the Caney Fork (Cumberland) River system in Tennessee and is compared with the nominal *E. atripinne*, *E. duryi* and *E. simotermum*. This brightly colored, sexually dichromatic darter is more closely allied to *E. duryi* than any other nominal *Ulocentra*. *Etheostoma etnieri* differs from *E. duryi* mainly in modal number of caudal peduncle scales and pigmentation of the body and fins and from Cumberland River basin *E. atripinne* in having fewer dorsal saddles, usually a poorly developed premaxillary frenum and in pigmentation of the body and fins. *Etheostoma etnieri* also has fewer lateral-line scales compared to *E. atripinne* from the Caney Fork River system. Range, relationship, size, fish associates and ecological data are presented.

Etheostoma etnieri represents one of three previously undescribed darters endemic to the Caney Fork River system of the Cumberland River basin (Bouchard 1973) and is one of seven presently recognized undescribed forms of snubnose darters within the state of Tennessee. In addition to *E. etnieri*, the Caney Fork River fauna includes a second member of the subgenus *Ulocentra* presently referable to *E. atripinne*. The subgenus is unique among darters, containing more undescribed than nominal species. The extreme morphological and meristic similarity between members of the subgenus has contributed to much

of this taxonomic uncertainty. All four nominal species of *Ulocentra* occur within Tennessee waters.

Subgenus *Ulocentra* Jordan 1878:223
Snubnose Darters

Diagnosis—Group of closely related, medium sized, sexually dichromatic darters closely allied to subgenus *Etheostoma*, sharing with that group complete lateral-line and cephalic canal system, broadly connected gill membranes, expansive pectoral fins, declivous snout, distinct dorsal blotches or saddles, breeding males brightly colored, often with reds and usually greens. Phylogenetically more advanced subgenus *Ulocentra* generally differing from members of *Etheostoma* (*sensu stricto*) in following ways: breeding males lacking nuptial tubercles; branchiostegal rays 5 (6 in *E. coosae*); lateral line usually slightly arched anteriorly; snout steeply declivous (slightly produced in *E. coosae* and *E. duryi*; see Figs. 5c,f); dorsal blotches or saddles typically 8 or 9 (rarely 7, 10 or 11); palatine teeth always absent; pelvic and anal fins melanistic in breeding males; spinous portion of dorsal fin often with red ocellus in first interradial membrane.

Description—Body slightly compressed; snout steeply declivous, less so in *E. coosae* and *E. duryi* (Figs. 5c,f); mouth subterminal, horizontal; frenum variable,

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absent to well developed. Eye breaking dorsal contour of head in lateral view; nape distinctly humped, often decurving sharply to occiput. Caudal fin slightly emarginate; branchiostegal membranes broadly connected, rays 5-5, in *E. coosae* 6-6; pectoral fin typically longer than head; eye length greater than snout. Lateral line complete, slightly arched anteriorly; scales moderate in size (37-62 in lateral line); vertebrae 37-40. Dorsal fin spines IX-XIII; dorsal fin soft rays 10-13; anal fin spines II, first largest; anal fin soft rays 6-9; branched caudal fin rays 13-17; pectoral fin rays 12-15. Supratemporal canal complete with 3 pores; lateral canal complete with 5 pores; single coronal pore; postorbital, interorbital, posterior nasal and anterior nasal pores present; preoperculo-mandibular canal complete with 7-9 pores; infraorbital canal with 7-10. Nape, temporal areas, opercles, prepectoral region and belly covered with exposed scales. Breast naked or covered with exposed or embedded scales on posterior half (scales may extend from prepectoral regions along caudal margin of branchiostegal membranes mesiad, but not forming complete line of scales). Cheeks covered with embedded and/or exposed scales. Nuptial tubercles absent. Genital papilla sexually dimorphic, long subcylindrical tube in breeding females; much shorter and narrower, subconical to subcylindrical structure in breeding males. Dark subocular and preorbital bars, latter passing beneath anterior naris and may reach upper lip. Three or four small caudal spots, ventral member may be lacking, middle one(s) may be coalesced with lateral blotch. Lateral blotches 7-11, rounded or vertically elongate, may be discontinuous or fused into irregular lateral band. Dorsal blotches or saddles usually 8 or 9 (range 7-11 due to irregularities in distribution of dorsal pigments).

These medium sized darters inhabit riffles and runs of low to moderate turbulence. Preferring small to medium sized streams, their habitats range from springs to large rivers where they are less common and usually found near the

margins. In areas draining well indurated rocks of Mesozoic or Paleozoic age, they are most often collected over gravel riffles with or without scattered rocks; runs may be gravel and/or sandy. Coastal Plain species predominantly occur over gravel and/or sandy riffles and runs. The subgenus is widely distributed over the southeastern United States in the Mississippi, Mobile Bay and some Gulf Coastal drainages. In the Mississippi drainage, members of the subgenus are known from the Kentucky River system downstream to the Yazoo River system. They are notably absent from the Mississippi Alluvial Plain and west of the Mississippi River. They occur in all major tributaries of the Mobile Bay drainage (*i.e.* Coosa, Tallapoosa, Black Warrior and Tombigbee River systems) and Gulf Coastal drainages east of Mobile Bay to the Choctawhatchee River system.

Etymology—*oulos* (Gr. = complete) in combination with *kentron* (Gr. = spine) in reference to the two well developed anal fin spines "the chief character separating the genus from *Boleosoma*" (Jordan and Evermann 1896:1047).

Type-species—*Etheostoma atripinne* [as *Ulocentra atripinnis* (Jordan 1878: 223)]. *Type-species*, by monotypy (see Jordan 1919:395).

List of species—*Etheostoma atripinne* (as *Arlina atripinnis* Jordan 1877:10). *Etymology*: *ater* (L. = black) in combination with *pinna* (L. = fin) in reference to the black pelvic and anal fins of breeding males, common in the subgenus.

Etheostoma coosae (as *Poecilichthys coosae* Fowler 1945:356). *Etymology*: "Named for the Coosa River" (Fowler 1945:358), from which basin the types were collected in Cherokee County, Alabama.

Etheostoma duryi Henshall 1889:32. *Etymology*: patronym in honor of its collector, Mr. Charles Dury.

Etheostoma etnieri new species, described herein.

Etheostoma simoterum (as *Hyostoma simoterum* Cope 1868:215). *Etymology*: *simos* (Gr. = snub-nose) and *ter* (Gr. =

suffix, signifying agent) in reference to the contour of the snout, common in the subgenus.

KEY TO SPECIES

- 1a Premaxillary frenum moderately to well developed, anterior margin of snout bound to upper lip by mesial fleshy bridge.....2
- 1b Premaxillary frenum poorly developed or lacking, anterior margin of snout free and often partially overhanging upper lip.....4
- 2a (1a) First two dorsal saddles anterior to spinous portion of dorsal fin (Fig. 2c).....*atripinne**
Tennessee River system in Tennessee and Alabama upstream to Cumberland Plateau.
- 2b Only one dorsal saddle anterior to spinous portion of dorsal fin (Fig. 1c).....3
- 3a (2b) Breast usually with scales on posterior half; alternating broken pale and solid dark lines above lateral line.....*etnieri*
That portion of Eastern Highland Rim drained by Caney Fork (Cumberland) River system.
- 3b Breast usually without scales on posterior half, lacking alternating broken pale and solid dark lines above lateral line.....*simoterum**
Tennessee River system in Virginia, Tennessee and Alabama downstream to Sequatchie Valley.
- 4a (1b) Branchiostegal rays 6; spinous portion of dorsal fin with complete, bright red band in breeding males.....*coosae*
Coosa River system in Tennessee, Georgia and Alabama above the Fall Line.
- 4b Branchiostegal rays 5; spinous portion of dorsal fin with bright red limited to ocellus in first inter-radial membrane.....5
- 5a (4b) Breast usually with scales on posterior half; alternating broken pale and solid dark lines above lateral line; caudal peduncle scales usually 18 or 19.....*etnieri*

That portion of Eastern Highland Rim drained by Caney Fork (Cumberland) River system.

- 5b Breast usually without scales on posterior half; lacking alternating broken pale and solid dark lines above lateral line; caudal peduncle scales usually 17 or fewer.....*duryi*
Tennessee River system in Tennessee and Alabama.

*See *RELATIONSHIPS* for discussion of *E. atripinne* and *E. simoterum*.

Etheostoma etnieri, new species
Cherry Darter

The description is based on 362 specimens collected from the Caney Fork (Cumberland) River system, Tennessee. Counts and measurements are those outlined in Hubbs and Lagler (1958) except for diagonal scale counts (Raney and Suttkus 1964). Head length was measured from the tip of the snout to the end of the opercular spine. A vernier caliper was used in making measurements to the nearest 0.1 mm. Measurements are expressed in thousandths of standard length unless otherwise indicated. The description of cephalic canals follows Hubbs and Cannon (1935) except the term preoperculomandibular has replaced operculomandibular. Vertebral counts were made from radiographs of 30 specimens following Bailey and Gosline (1955). Means for meristic and morphometric data are indicated in parenthesis. Most of the locality data in the *Material* section were derived from Tennessee General Highway County Maps, 1967 editions, for the following counties: Putnam, Van Buren, Warren and White. Specimen references as follows: AU-Auburn University, CU-Cornell University, TU-Tulane University, USNM-National Museum of Natural History, UT-University of Tennessee Ichthyology Collection. Parenthetic enclosures indicate the number of specimens in the numbered lot.

Material. — Holotype. — TU 83147, an adult male, 60.4 mm in standard length, collected 18 March 1972 at Cherry Creek, tributary to Calfkiller River [Caney Fork (Cumberland) River

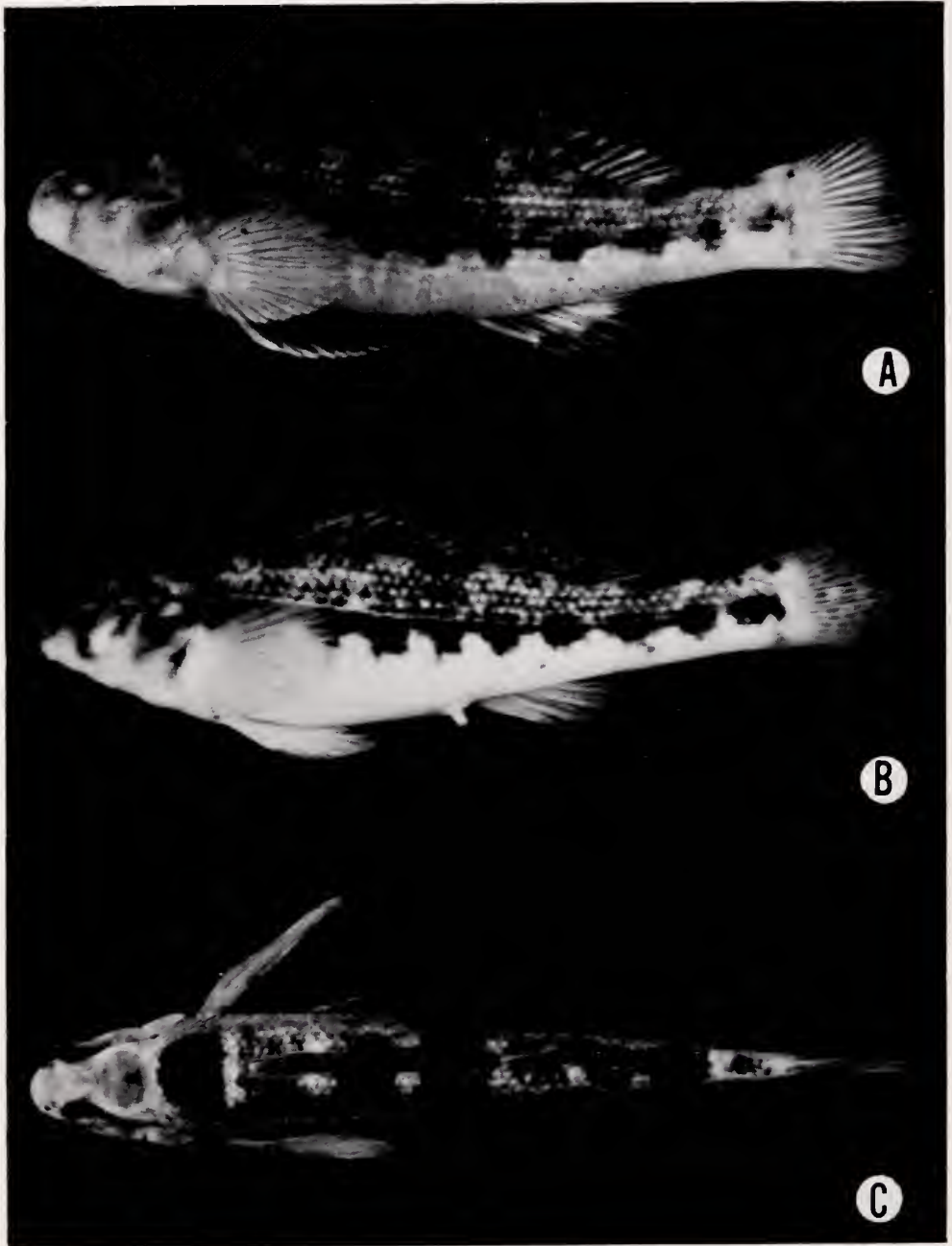


Figure 1. *Etheostoma (Ulocentra) etnieri*, sp. nov. a (top) Lateral view of holotype, adult male, S.L. 60.4 mm (TU 83147). b (middle) Lateral view of allotype, adult female, S.L. 47.8 mm (TU 83148). c (bottom) Dorsal view of a paratype, adult male, S.L. 55.8 mm (TU 83149).



Figure 2. *Etheostoma (Ulocentra) atripinne* from the Caney Fork River system, Tennessee (RWB 9-2469-3). a (top) Lateral view of adult male, S.L. 57.3 mm. b (middle) Lateral view of adult female, S.L. 50.2 mm. c (bottom) Dorsal view of adult male S.L. 57.3 mm.

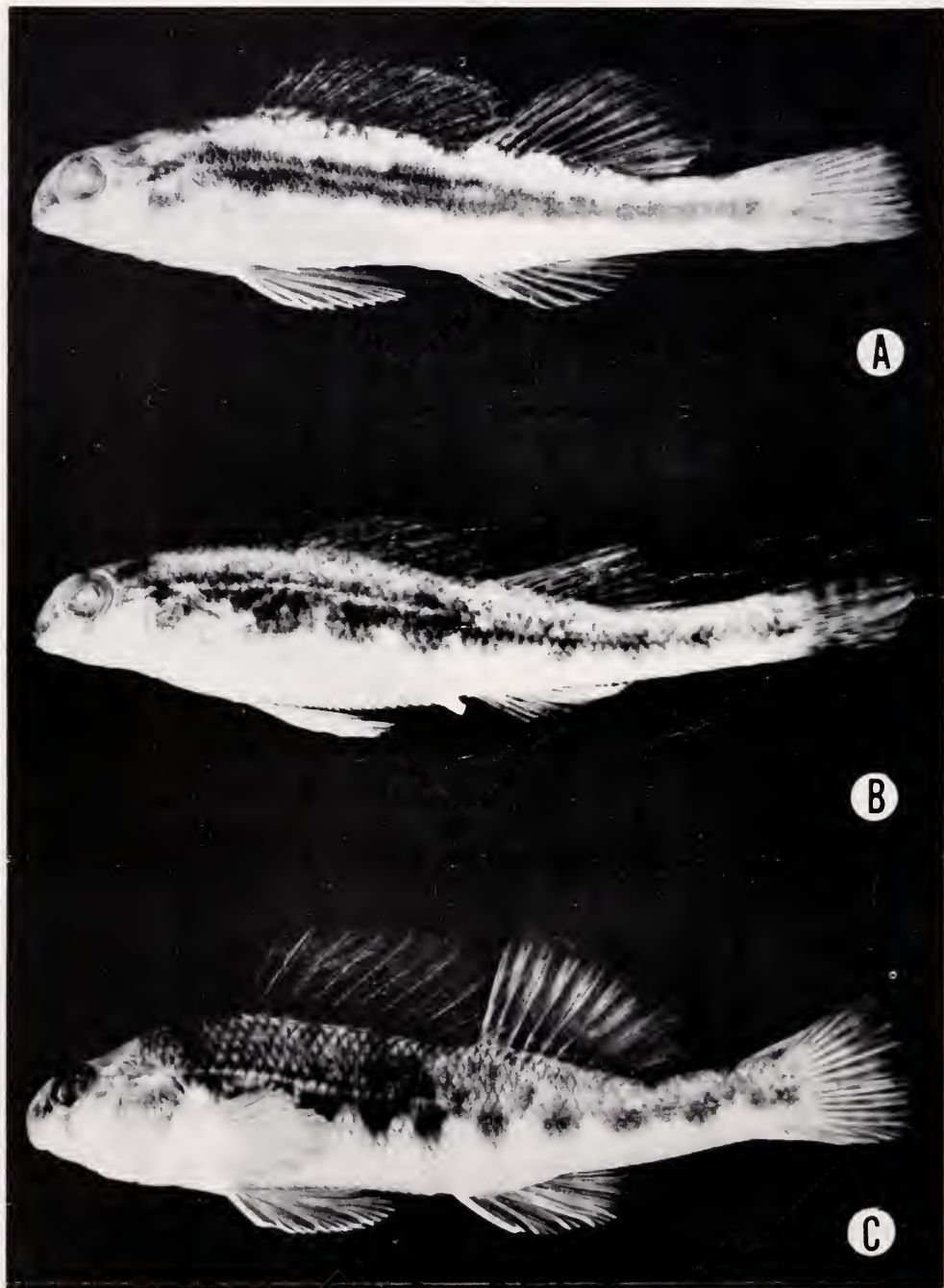


Figure 3. *Etheostoma (Ulocentra) duryi* from the Tennessee River system, Tennessee. a (top) Lateral view of adult male, S.L. 47.0 mm (UT 91.581). b (middle) Lateral view of adult female, S.L. 41.1 mm (UT 91.581). c (bottom) Lateral view of adult male, S.L. 50.8 mm (UT 91.628).

system], at Tennessee State Highway 84 (near Yankeetown Community), 5.3 miles northeast of intersection of U.S. Highway 70 and Tennessee State Highway 84 in Sparta, White County, Tennessee, by R.W. Bouchard, J.D. Way, F.L. Oakberg and B.E. Oakberg.

Allotype.—TU 83148, an adult female 47.8 mm SL, taken with the holotype.

Paratopotypes.—UT 91.211 (14), 5 October 1968; (22), 8 July 1969; USNM 214172 (56), 9 October 1971; TU 83149 (11), 18 March 1972; UT 91.677 (14), 6 June 1972.

Paratypes.—PUTNAM COUNTY, Calfkiller River along Tenn. St. Hwy. 84, SW of Monterey, lat. 35° 18-20' N, long. 85° 01-07' W, 6 June 1972, UT 91.672 (9). VAN BUREN COUNTY, Cane Creek, 5.4 mi. E Spencer at Tenn. St. Hwy. 30, lat. 35° 44-45' N, long. 85° 23-24' W, 16 July 1964, (1), TU 33451; Cane Creek at County Road 4251, lat. 35° 48-49' N, long. 85° 25-26' W, 8 July 1969, (3), Cane Creek at County Road 4251, 6 June 1972, (9), UT 91.676. WARREN COUNTY, Barren Fork River (Collins River basin) at Tenn. St. Hwy. 55 in McMinnville, lat. 35° 40-41' N, long. 85° 46-47' W, 25 August 1967, (5), UT 91.109; Collins River, 5.7 miles SW of McMinnville on Tenn. St. Hwy. 8, lat. 35° 37-38' N, long. 85° 41-42' W, 17 July 1964, (5), TU 33479; Barren Fork River at Tenn. St. Hwy. 55, lat. 35° 40-41' N, long. 85° 46-47' W, 3 May 1972, (1), UT 91.645; Charles Creek (Collins River basin) at Tenn. St. Hwy. 56, lat. 35° 43-44' N, long. 85° 47' W, 4 February 1967, (1), UT 91.48; Charles Creek at Tenn. St. Hwy. 56, 3 October 1971, (39), CU 53474; Hills Dry Creek (Collins River basin) at County Road 4398, SE McMinnville, lat. 35° 34-35' N, long. 85° 40-41' W, 3 October 1971, (11); unnamed spring trib. to West Fork Hickory Creek (Collins River basin) at County Road 4258, 0.4 mi. SE West Fork Hickory Creek, lat. 35° 34-35' N, long. 85° 53' W, 26 November 1972, (1). WARREN-VAN BUREN COUNTY LINE, Rocky River, 15 mi. E McMinnville at Tenn. St. Hwy. 30, lat. 35° 44-45' N, long. 85° 35-36' W, 11 April 1963, (2), TU 30316; Rocky River at Tenn. St. Hwy. 30, 9 July 1969, (18), Rocky River at Tenn. St. Hwy. 30, 3 October 1971, (19). WHITE COUNTY, Calfkiller River at U.S. Hwy. 70, Sparta, lat. 35° 55-56' N, long. 85° 28-29' W, 15 June 1968, (11), AU 3234; Town Creek (Calfkiller River basin) at U.S. Hwy. 70, W Sparta, lat. 35° 56-57' N, long. 85° 29-30' W, 15 June 1968, (3), AU 3218; Wildcat Creek at County Road 4396, NE Sparta, lat. 35° 56-57' N, long. 85° 25-26' W, 8 September 1969, (22), Wildcat Creek at County Road 4396, NE Sparta, 7 October 1972, (81) TU 83150.

The following material was used for comparison with the new species: *Etheostoma atripinne* from a number of localities in Tennessee, *E. duryi* from Alabama and Tennessee, *E. coosae* from Tennessee, *E. simoterum* from several localities in Tennessee.

Diagnosis.—Darter of medium length

(see section on *Size*); upper lip usually not bound to snout by frenum; posterior half of breast typically with embedded scales. Dorsal saddles usually 8; numbers 5 and 6 may be fused forming 7 saddles; number 2 may be broken producing 9 saddles. Saddles 1 (completely anterior to insertion of spinous portion of dorsal fin), 4 (caudal end of spinous portion of dorsal fin) and 7 (caudal of soft-rayed portion of dorsal fin) darkest. Males typically with broken bands of dark red pigment above and below lateral line, forming two jagged lateral stripes three scale rows above and one scale row below lateral line, ventral stripe less distinct. Females usually with jagged lateral stripe of dark red pigment on two scale rows above lateral line, usually present on row below lateral line. Alternating broken pale and solid dark horizontal lines along sides; ventral stripes may be less distinct in some males or lacking in females. Anal fin with basal red band; caudal fin with central red blotch. Gular area and anterior portion of branchiostegal membranes with orange erythrophores. Bases of pelvic fin membranes 2-5 with erythrophores forming red streaks.

Description.—Snout steeply declivous; premaxillary frenum variable, lacking to moderately developed; nape distinctly humped, usually decurving sharply to occiput. Branchiostegal membranes broadly connected, rays 5-5; pectoral fin (237) typically longer than head (223); eye length (58) greater than snout (43). Lateral line complete, slightly arched anteriorly; scales moderate in size (45-57 in lateral line); scale rows around caudal peduncle usually 19 (range 17-22); transverse scale rows usually 13 (range 13-15) from anal fin origin, usually 12 (range 11-13) from origin of soft-rayed dorsal fin portion; scale rows above lateral line typically 5 or 6. Vertebrae 38 or 39; dorsal fin usually with XI (range IX-XIII) spines, and 11 (range 10-12) soft rays; anal fin spines II, first largest; anal soft rays typically 7 (range 6-8); branched caudal fin rays usually 15 (range 13-15); pectoral fin rays 14 or 15. Supratemporal canal complete with 6 pores; postorbital,

interorbital, posterior nasal and anterior nasal pores present; single coronal pore; infraorbital canal complete with usually 8 (range 7-10) pores; preoperculo-mandibular canal pores usually 9 (range 7-9). pores usually 9 (range 7-9).

Breast naked anterior half, squamation variable caudally, embedded, rarely lacking. Cheeks completely scaled in both sexes, exposed on upper half, embedded lower or completely exposed in males; exposed on upper, embedded lower or completely embedded in females. Dorsal saddles 4-9 scale rows in length. Lateral blotches 3-6 scale rows in width. Nuptial tubercles absent. Genital papilla sexually dimorphic, long, subcylindrical tube in breeding females (Fig. 1b); blunt, much shorter and narrower, varying from subconical to subcylindrical in breeding males. Dark subocular and preorbital bars, latter passing beneath anterior nares but not reaching premaxillae. Three small caudal spots, ventral member may be

lacking, middle may be coalesced with lateral blotch. Lateral blotches 8 or 9 (range 7-10), rounded, may be discontinuous or connected by narrow band below lateral line. Dorsal saddles usually 8, numbers 5 and 6 may be fused, forming 7 saddles, number 2 may be broken, producing 9 saddles. Saddles 1 (completely anterior to insertion of spinous dorsal fin portion), 4 (caudal end of spinous portion of dorsal fin) and 7 (caudal of soft-rayed portion of dorsal fin) darkest. General body outlines as indicated in Figs. 1a-c. General body proportions indicated in Table 1.

Coloration, Holotype, Male.—Breeding males more brilliantly colored and melanistic than females or non-breeding males. Following data taken from holotype, breeding male, immediately after preservation on 18 March 1973. Scattered melanophores on lips with concentration on middle portion of upper lip. Melanophores concentrated on occiput, temporal region, opercles, snout and on eye above pupil. Throat and branchiostegal membranes with distinct, evenly scattered, discrete melanophores. Gular area and anterior portion of branchiostegal membranes with orange coloration. Lower branchiostegal rays and membranes with melanophores concentrated proximally. Head and breast green; pupil green-yellow; iris black. Exposed surface of scales with melanophores concentrated marginally with few, if any, over central portion; however, melanophores in underlying epidermis appearing through central portion of translucent scales. Alternating broken pale and solid dark lines; five pale and six dark horizontal lines above lateral line, four and five below. Lateral line mostly depigmented anteriorly. Three vertical spots on caudal peduncle, middle one coalesced with last lateral blotch.

Dorsum with 8 quadrate blotches or saddles, numbers 1, 4 and 7 darkest; first saddle located cephalad to first dorsal spine; second located at insertion of spinous dorsal fin portion; third at middle of spinous portion of dorsal fin; fourth at dorsal fin portion; third at middle of spinous portion of dorsal fin; fourth at

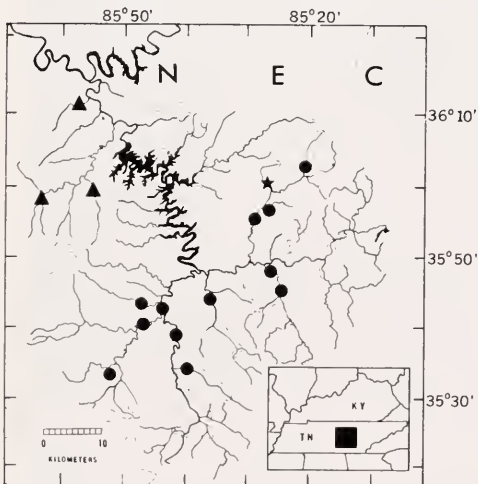


Figure 4. Distribution of collections of *Etheostoma (Ulocentra) etnieri* (circles) and *E. (U.) atripinne* (triangles) in the Caney Fork River system, Tennessee. Star symbol indicates type-locality for *Etheostoma etnieri*. N: Nashville Basin. E: Eastern Highland Rim. C: Cumberland Plateau.

termination of spinous dorsal fin portion; fifth just behind insertion of soft-rayed portion of dorsal fin; sixth at middle of soft-rayed dorsal fin portion; seventh immediately caudad to soft-rayed portion of dorsal fin; eighth broken by lightly pigmented area and extending onto procurent caudal fin rays. Nine rounded lateral blotches, numbers 1 and 4 connecting dorsal saddles 1 and 4 respectively; first blotch located caudo-ventrad to first dorsal saddle; second beneath insertion of spinous portion of dorsal fin; third under middle of spinous

dorsal fin portion; fifth at insertion of soft-rayed portion of dorsal fin; sixth under middle of soft-rayed dorsal fin portion; seventh under termination of soft-rayed portion of dorsal fin; eighth on caudal peduncle caudad to soft-rayed portion of dorsal fin; ninth on caudal peduncle between procurent caudal fin rays. Sides with dark red pigmented areas forming wide jagged line, 3 scale rows above and two scale rows below lateral line, ventral stripe less distinct. Ventral and ventrolateral areas bright red to brick red in breeding males (fading to orange or orange-yellow in non-breeding specimens). Genital papilla white, immediate surrounding area gray. Spinous portion of dorsal fin with numerous discrete melanophores over spines and interradial membranes; submarginal band occupying last 5 (range 4-6) interradial membranes, consisting of proximal area of melanophores and distal area of erythrophores in last 3 interradial membranes. All interradial membranes with several large concentrations of melanophores of varying intensities. First interradial membrane with red ocellus in lower half adhering to first dorsal spine. Ocellus with black margin on area contiguous with interradial membrane. Coloration of membranes of soft-rayed portion of dorsal fin as follows: (1) basal black band of concentrated melanophores from proximal one-eighth of first interradial membrane, sloping posteriorly to proximal one-sixteenth of fifth interradial membrane; (2) narrow dusky band of scattered melanophores extending from first interradial membrane and forming basal band from sixth interradial membrane to eleventh, band occupying one-eighth of first interradial membrane decreasing in size caudally; (3) second black band of concentrated melanophores extending from first to fourth interradial membranes, occupying one-eighth of first interradial membrane decreasing slightly in width posteriorly; (4) second dusky band occupying first 3 interradial membranes, decreasing from width of one-eighth of first membrane to one-sixteenth of third; (5) red band of erythrophores beginning in second inter-

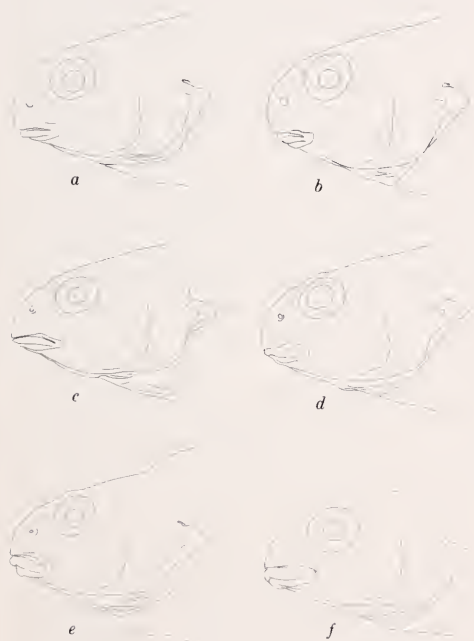


Figure 5. Snout profiles in five species of *Etheostoma* (subgenus *Ulocentra*) a. *Etheostoma simoterum*, adult male, S.L. 46.4 mm (UT 91.333). b. *Etheostoma atripinne*, adult male, S.L. 45.5 mm (UT 91.150). c. *Etheostoma coosae*, adult male, S.L. 52.5 mm (UT 91.147). d. *Etheostoma etnieri*, adult male, S.L. 52.6 mm (USNM 214172). e. *Etheostoma duryi*, adult male, S.L. 46.2 mm (UT 91.628). f. *Etheostoma duryi*, adult male, S.L. 35.6 mm (UT 91.841).

radial membrane widening and increasing in intensity caudally, occupying most of caudal half of fin and most outstanding aspect thereof; (6) submarginal band of concentrated melanophores forming black band from second to eleventh interradial membranes. Remaining portion of fin consisting of mixed erythrophores and melanophores. Procurrent caudal fin rays green; caudal fin with large melanophores on soft rays, interradial membranes mostly with scattered melanophores at proximal one-third and distal one-fourth, latter forming faint dark margin. Caudal fin with erythrophores located in central interradial membranes, brightest at midline, becoming lighter dorsad and ventrad. Membranes outside last branched ray lacking chromatophores. Prepectoral region with evenly scattered discrete to small stellate melanophores. Pectoral fin base with scattered discrete melanophores. Pectoral rays with concentrations of melanophores, inconsistent in membranes and generally few in dorsal members increasing in number ventrad, mostly proximad. Distal portion of ventral six pectoral rays lacking pigment, forming depigmented lower margin of fin. Pelvic fin base with scattered distinct melanophores, rays and interradial membranes covered with melanophores, especially discrete on membranes. First pelvic ray pale with increasing ray pigmentation distally. Distal portion of ventral four pelvic rays lacking pigment, forming depigmented lower margin of fin. Pelvic fin interradial membranes 2-5 with small amounts of red pigmentation on proximal half. Anal fin with numerous discrete melanophores over spines and interradial membranes. First anal spine with light red coloration. Anal fin membranes listed in sequence from anterior margin colored as follows: (1) anterior and distal portions with red erythrophores, membrane covered with melanophores, most concentrated distally; (2) scattered melanophores and faint red pigmentation in middle of membrane extending to distal margin; (3) gray proximal third, red middle third and black distal third; (4-9) membranes with

decreasing width of proximal melanophore band, increasing width and brightness of red erythrophore band and increasing width of distal melanophore band.

Coloration, Allotype, Female.—Females much more somber in contrast to brilliantly colored males. Dominant colors brown and black contrasting sharply with white venter. Some red, orange or yellow on fins, sides and venter. Following data taken from allotype immediately after preservation. Dark suborbital bar, slightly wider than holotype, originating in line with middle of eye and extending ventrad below level of lower jaw, widening distally. Preorbital bar more intensely contrasting with lighter snout, originating in line with center of eye extending anteroventrad below anterior naris but not reaching premaxilla. Lips white with fewer melanophores than holotype. Head with melanophore concentrations greatest on occiput, temporal areas, opercles, snout, caudal half of cheek and eye above pupil. Throat immaculate, branchiostegal rays and membranes with several melanophores proximally. Body scales with melanophores mostly marginally. Lateral line mostly depigmented antierad. Dorsum with 8 quadrate saddles, numbers 1, 4 and 7 darkest. Position of saddles as in holotype except saddle number 8 entire and more intense. Nine rounded lateral blotches in same general position as holotype but lateral blotches 1 and 4 merge less discernibly with dorsal saddles 1 and 4 respectively. Along sides dark red, jagged, lateral stripe, 2 scale rows wide above lateral line, dorsal row of color extending onto base of caudal fin. Most female paratypes possessing one scale row of red pigment below lateral line. Alternating broken white and solid dark horizontal lines along sides, ventral members may be less distinct or lacking in some females. Ventral and ventrolateral areas mostly without pigment, although scattered melanophores and yellow to orange pigment present, including base of caudal fin. Genital papilla white with scattered melanophores in immediate area caudally and on

either side. Some melanophores on body at base of anal fin. Breast with several scattered stellate melanophores. Spiny and soft dorsal fin portions generally with alternating bands of melanophores on spines. Concentrations of melanophores present on membranes in various areas, mostly on bases of membranes in spinous dorsal fin portion. Red ocellus present on first interradial membrane of spiny portion of dorsal fin as on male, except smaller. Last 4 interradial membranes of soft-rayed portion of dorsal fin with erythrophores incompletely bordered by melanophores. Several erythrophores mixed with melanophores in ray preceding above four. Red band in many specimens slightly more extensive, covering up to six interradial membranes with occasional scattered melanophores. Procurrent caudal fin rays with varying concentrations of melanophores. Caudal fin with alternating vertical bands of melanophores lining rays and on rays of proximal bands; membranes generally immaculate with scattered melanophores proximally. In some specimens erythrophores present in caudal membranes, especially medially. Prepectoral region with blotches. Pectoral fin base immaculate; fin colorless, several scattered melanophores lining rays. Anal fin with scattered melanophores on rays, first spine with several melanophores, second immaculate.

Disposition of types.—The holotype (male) and the allotype (female) are deposited at Tulane University (TU 83147 and TU 83148) as are 11 paratopotypes and 89 paratypes. Additional paratypes are deposited in the following museums: 29 paratypes, University of Alabama Ichthyology Collection; 35 paratypes, Auburn University; 39 paratypes, Cornell University; 22 paratypes, University of Florida Museum; 22 paratopotypes and 18 paratypes, University of Michigan Museum of Zoology; 56 paratopotypes, National Museum of Natural History; 28 paratopotypes and 11 paratypes, University of Tennessee Ichthyology Collection. The x-rays are deposited at Tulane University (TU 1491-1494).

Size.—The largest male has a standard length of 63.7 mm, the largest female 54.7 mm. Both specimens were collected from Charles Creek at Tennessee State Highway 56, Warren County, Tennessee, on 3 October 1971.

Range.—This species is known only from the Caney Fork (Cumberland) River system (Fig. 4). It appears to be limited to streams flowing over the Mississippian limestones of the Eastern Highland Rim. Streams flowing over the sandstone, siltstone and shale deposits of the topographically higher Cumberland Plateau lack members of the subgenus *Ulocentra* in the Caney Fork River system. In general, it appears that those acid to neutral waters flowing over the predominantly sandstone and shale deposits of the Cumberland Plateau and Cumberland Mountains provinces have less diversity and biomass in fishes, decapod crustaceans and molluscs than streams flowing over Ordovician to Mississippian limestone deposits of neighboring geomorphic provinces (Bouchard, in press). Streams draining the Ordovician limestones of the topographically lower Nashville Basin contain the nominal *Ulocentra*, *E. atripinne*.

Fish associates.—The following list of species follows Bailey *et al.* (1970). Collected with *E. etnieri* at one or more localities were the following: *Lampetra aepyptera*, *Dorosoma cepedianum*, *Salmo gairdneri*, *Camptostoma anomalum*, *Clinostomus funduloides*, *Hybopsis amblops*, *H. dissimilis*, *Notropis ardens*, *N. chrysocephalus*, *N. galacturus*, *N. heterolepis*, *N. leuciodus*, *N. rubellus*, *N. spilopterus*, *N. telescopus*, *N. sp.* (cf. *spectrunculus*), *Phoxinus erythrogaster*, *Pimephales notatus*, *Rhinichthys atratulus*, *Semotilus atromaculatus*, *Hypentelium nigricans*, *Noturus flavus*, *Fundulus catenatus*, *Ambloplites rupestris*, *Lepomis cyanellus*, *L. gulosus*, *L. L. macrochirus*, *Micropterus dolomieu*, *Etheostoma blennioides*, *E. flabellare*, *E. luteovinctum*, *E. maculatum*, *E. squamiceps*, *E. sp.* (cf. *stigmaeum*), *E. virgatum*, *Percina caprodes*, *Cottus caroliniae*.

Table 1
Measurements of *Etheostoma etnieri* Expressed as Thousandths
of Standard Length.

Locality	Cherry Creek Holotype	Cherry Creek Allotype	Cherry Creek Paratopotypes	Charles Creek Paratypes	Rocky River Paratypes
Number of Specimens	1	1	10	10	10
Standard length (mm)	60.4	47.8	43.9-60.4 (51.4)	43.6-63.7 (52.5)	44.2-52.0 (48.4)
Body depth at dorsal origin	215	207	196-222 (212)	201-227 (209)	185-206 (195)
Caudal peduncle depth	113	100	96-113 (105)	102-117 (107)	97-104 (101)
Body width	147	*	135-149 (142)	140-159 (147)	123-142 (134)
Caudal peduncle length	288	305	288-323 (305)	289-329 (309)	279-319 (300)
Longest dorsal spine	169	121	113-169 (145)	119-157 (134)	117-151 (132)
Longest dorsal soft ray	152	123	123-172 (148)	130-170 (146)	138-162 (149)
Caudal fin length	187	180	170-194 (184)	168-190 (181)	174-196 (186)
First anal spine	109	88	83-109 (93)	82-106 (97)	96-116 (106)
Longest anal ray	132	134	132-153 (139)	120-144 (130)	130-160 (140)
Longest pectoral ray	245	230	230-259 (241)	216-239 (226)	235-254 (245)
Pelvic fin length	214	224	197-236 (219)	189-222 (210)	222-244 (232)
Width of interpelvic space	81	69	68-81 (74)	71-78 (74)	73-79 (76)
Head length	224	215	215-233 (224)	182-255 (221)	214-232 (222)
Head depth (at occiput)	174	165	157-181 (168)	152-166 (156)	137-152 (146)
Head width	157	153	144-159 (151)	135-152 (145)	131-141 (135)
Snout length	51	44	42-51 (45)	28-55 (42)	40-51 (43)
Orbit length	60	61	56-63 (58)	49-62 (55)	56-60 (57)
Fleshy interorbital width	45	46	45-52 (48)	43-52 (48)	43-52 (49)
Upper jaw length	66	56	52-67 (59)	45-60 (56)	49-58 (54)
Lower jaw to junction of gill membranes	142	128	128-146 (140)	128-147 (140)	133-145 (139)
Pelvic insertion to junction of gill membranes	144	126	114-147 (132)	125-141 (134)	127-140 (135)

*Ovigerous

Table 3
Number of dorsal spines and soft rays in four species of *Etheostoma*
(subgenus *Ulocentra*); values for holotype in boldface.

Species and River System	Dorsal Spines						X	Dorsal Soft Rays						N	$\bar{X}$
	9	10	11	12	N			10	11	12	13				
<i>etnieri</i>															
Cumberland R.															
Caney Fork R.					10	11.0		10				10	11.0		
Cherry Ck.					10	10.6		1	9			10	10.9		
Charles Ck.	1	3	5	1	10	10.9		1	6	3		10	11.2		
Rocky R.		2	7	1	10	10.9		1	6	3		10	11.2		
Totals	1	5	22	2	30	10.8		2	25	3		30	11.0		
<i>atripinne</i>															
Cumberland R.					10	11.4						10	11.2		
Caney Fork R.			6	4	10	11.4			8	2		10	11.2		
Harpeth R.			4	6	10	11.6		3	7			10	10.7		
Tennessee R.															
Duck R.		2	4	4	10	11.2		1	7	2		10	11.1		
Shoal Ck.			5	5	10	11.5			7	3		10	11.3		
Flint R.			8	2	10	11.2			6	4		10	11.4		
Totals		2	27	21	50	11.4		4	35	11		50	11.1		
<i>simoterum</i>															
Tennessee R.															
Hiwassee R.		3	7		10	10.7		1	7	2		10	11.1		
French Broad R.		2	8		10	10.8		3	5	2		10	10.9		
Totals		5	15		20	10.8		4	12	4		20	11.0		
<i>duryi</i>															
Tennessee R.															
Beaverdam Ck.		1	5	4	10	11.3			3	6	1	10	11.8		
Duck R.		3	5	2	10	10.9			4	5	1	10	11.7		
Totals		4	10	6	20	11.1			7	11	2	20	11.8		

Table 4
Number of anal and branched caudal rays in four species of *Etheostoma*
(subgenus *Ulocentra*); value for holotype in boldface.

Species and River System	Anal Rays			Branched Caudal Rays										$\bar{X}$	
	6	7	8	N	X	13	14	15	16	17	N	X			
<i>etnieri</i>															
Cumberland R.															
Caney Fork R.		8	2	10	7.2		2	8			10			14.8	
Cherry Ck.	1	9		10	6.9						10			14.8	
Charles Ck.	1	8	1	10	7.0	1		9			10			14.9	
Rocky R.				30	7.0	1	3	26			30			14.8	
Totals	2	25	3												
<i>atripinne</i>															
Cumberland R.															
Caney Fork R.	2	8		10	6.8		1	8	1		10			15.0	
Harpeth R.	1	9		10	6.9		3	7			10			14.7	
Tennessee R.															
Duck R.	1	9		10	6.9		2	7	1		10			14.9	
Shoal Ck.	2	8		10	6.8		3	6	1		10			14.8	
Flint R.	1	8	1	10	7.0	1	2	7			10			14.7	
Totals	7	42	1	50	6.9	1	11	35	3		50			14.8	
<i>simotermum</i>															
Tennessee R.															
Hiwassee R.	1	8	1	10	7.0		2	4	4		10			14.2	
French Broad R.	2	7	1	10	6.9	2	6	2			10			14.0	
Totals	3	15	2	20	7.0	4	10	6			20			14.1	
<i>duryi</i>															
Tennessee R.															
Beaverdam Ck.		9	1	10	7.1	2	4	3	--	1	10			14.4	
Duck R.	4	6		10	6.6		5	5			10			14.5	
Totals	4	15	1	20	6.9	2	9	8	--	1	20			14.5	

Table 6
Number of vertebrae and number of dorsal saddles anterior to spinous portion of dorsal fin in four species of *Etheostoma* (subgenus *Ulocentra*); values for holotype in boldface.

Species and River System	Vertebrae				N	$\bar{X}$	Saddles Anterior to Dorsal Fin						
	37	38	39	40			1	%	1-2	%	2	%	N
<i>etnieri</i>													
Cumberland R.													
Caney Fork R.							119	100					119
Cherry Ck.	2	8			10	38.8	40	100					40
Charles Ck.	4	6			10	38.6	37	100					37
Rocky R.	6	4			10	38.3							
Totals	12	18			30	38.6	196						196
<i>atripinne</i>													
Cumberland R.													
Caney Fork R.							2	5	6	15	32	80	40
Harpeth R.							6	20	3	10	21	70	30
Stones R.*	4	17	3		24	39.0							
Tennessee R.													
Duck R.							2	8	4	16	19	76	25
Shoal Ck.							1	6	7	44	8	50	16
Flint R.							5	42	7	58		12	12
Totals	4	17	3		24	39.0	16		27	80		123	
<i>simoterum</i>													
Tennessee R.													
Hiwassee R.							11	28	23	58	6	15	40
French Broad R.							65	65	24	24	11	11	100
Clinch R.*	5	14	3		22	38.9							
Holston R.*	4	30	5		39	39.0							
Totals	9	44	8		61	39.0	76		47	17		140	
<i>duryi</i>													
Tennessee R.													
Beaverdam Ck.							22	100					22
Duck R.							32	100					32
Dry Ck.*	5	6	7		18	38.1							
Totals	5	6	7		18	38.1	54						54

*data from Bailey and Gosline (1955)

*data from Bailey and Gosline (1955)

Table 7
Diagonal scale counts in four species of *Etheostoma* (subgenus *Ulocentra*); value for holotype in boldface.

Species and River system	11	13	14	15	16	17	18	19	N	$\bar{X}$
<i>etnieri</i>										
Cumberland R.										
Caney Fork R.		4	5	1					10	13.6
Cherry Ck.		8	1	1					10	13.3
Charles Ck.		4	5	1					10	13.7
Rocky R.		16	11	3					30	13.5
Totals										
<i>atripinne</i>										
Cumberland R.										
Caney Fork R.			4	1	1	4	4	1	10	17.5
Harpeth R.					5				10	15.1
Tennessee R.										
Duck R.				2	5	3			10	16.1
Shoal Ck.			2	6	2				10	15.0
Flint R.		1	6	3					10	14.2
Totals		1	12	12	13	7	4		50	15.6
<i>simotermum</i>										
Tennessee R.										
Hiwassee R.	2	1	6	1					10	13.6
French Broad R.			5	2	3				10	14.8
Totals	2	1	11	3	3				20	14.2
<i>duryi</i>										
Tennessee R.										
Beaverdam Ck.	1	4	3						10	12.7
Duck R.		4	6						10	13.6
Totals	1	4	9						20	13.2

Table 8
Caudal peduncle scale counts in four species of *Etheostoma*
(subgenus *Ulocentra*): value for holotype in boldface.

Species and River system	15	16	17	18	19	20	21	22	23	24	N	$\bar{x}$
<i>etnieri</i>												
Cumberland R.												
Caney Fork R.			3	9	12	4	2				30	18.8
Cherry Ck.			1	2	7						10	18.6
Charles Ck.			1	1	5	2	--	1			10	19.2
Rocky R.			5	12	24	6	2	1			50	18.8
Totals												
<i>atripinne</i>												
Cumberland R.												
Caney Fork R.							5	--	4	1	10	22.1
Harpeth R.											10	20.4
Tennessee R.							3	1				
Duck R.					1	5	4	4			10	21.2
Shoal Ck.					3	6	1				10	19.8
Flint R.				3	4	3					10	19.0
Totals				3	8	16	13	5	4	1	50	20.5
<i>simoterum</i>												
Tennessee R.												
Hiwassee R.			2	3	2	3					10	18.6
French Broad R.			2	3	3	2					10	18.5
Totals			4	6	5	5					20	18.6
<i>duryi</i>												
Tennessee R.												
Beaverdam Ck.	3	1	6								10	16.3
Duck R.	1	2	7								10	16.6
Indian Ck.	3	4	7	2	4						20	17.0
Totals	7	7	20	2	4						40	16.7

Ecology.—*Etheostoma etnieri* has been collected in a wide range of habitats from springs and small creeks to large rivers. The species has a definite preference for smaller to medium sized streams or creeks and is usually collected in riffles and runs of moderate to low turbulence, especially over a gravel substrate. In larger streams and rivers the species is typically found along the margins. At the type-locality the stream consists of alternating pools and riffles. Covering much of the bottom are large limestone slabs, bedrock, gravel, rubble and a shallow covering of silt in the pools. Cherry Creek varies from approximately 5 to 10 m wide. At the type locality most specimens of *E. etnieri* were collected in riffles or runs over a gravel substrate with scattered rocks of moderate size. The dominant riffle inhabitant in Cherry Creek is *E. blennioides* while *Rhinichthys atratulus* and *Notropis telescopus* are the most common fishes in the pools.

Relationships.—Of the nominal members of the subgenus *Ulocentra*, *E. etnieri* has its closest affinities with *E. duryi*. As is typical with the subgenus *Ulocentra*, most differences between species are exhibited in coloration and pigmentation.

Major similarities between *E. etnieri* and *E. duryi* which indicate close kinship are as follows: the spinous portion of the dorsal fin may possess a red ocellus on the first interradial membrane, a dark mottled pattern and a single marginal or submarginal band in breeding males (confined to the last 4 to 6 interradial membranes in *E. etnieri*); the venter is brightly colored; a basal red band is present on the posterior portion of the anal fin in breeding males (not present in all populations of *E. duryi*); the premaxillary frenum is lacking (occasional specimens of *E. etnieri* have a moderately developed premaxillary frenum); a band of dark red pigment occurs dorsad to the lateral blotches; development of green in breeding males is limited primarily to the head and procurent caudal fin rays (*E. etnieri* also develops green on the breast).

Etheostoma etnieri differs from *E.*

duryi in the following respects: the breast is usually scaled on the posterior half (usually naked in *E. duryi*); a submarginal band is present on the spinous portion of the dorsal fin in breeding males and confined to the last 4 to 6 interradial membranes (complete marginal band on *E. duryi*); the breast is gray in adult nonbreeding males and green in breeding males (orange in breeding males and yellow to orange in nonbreeding males of *E. duryi*); there is a large red blotch on the central portion of the caudal fin in breeding males (no red on caudal fin of *E. duryi*); a jagged band of broken, dark red pigment occurs along the length of the dorsolateral area (limited to the posterior half of the body and less well developed in *E. duryi*); the lateral blotches are little fused (often fused in adult male *E. duryi*, Fig. 3a); the lateral line is more depigmented; orange pigment is present in breeding males on the branchiostegal membranes and gular area; breeding males exhibit red coloration on the pelvic fins; caudal peduncle scale counts are usually 18 or more (typically fewer than 18 in *E. duryi*—see Table 12).

Streams flowing over Ordovician limestones in the lower Caney Fork River system contain a species of snubnosed darter presently referable to *E. atripinne*. The major differences between *E. etnieri* and Cumberland River system *E. atripinne* are in the development of the premaxillary frenum, pigmentation and coloration. The frenum of *E. etnieri* is usually lacking or poorly developed (occasional individuals do have a moderately developed frenum). The pigmentation of *E. etnieri* is different from any population of *E. atripinne* in the Cumberland system. The dorsal saddle or blotch before the spinous portion of the dorsal fin is divided in *E. atripinne* (Fig. 2c) yielding 9 saddles, as opposed to 8 in *E. etnieri* (Fig. 1c). The usually 8 or 9 well separated lateral blotches of *E. atripinne* (Figs. 2a, b) are strikingly dissimilar to those of *E. etnieri* which usually has 8 slightly contiguous blotches (Figs. 1a, b). Differences in coloration of breeding individuals distinguish *E. etnieri*.

Table 9
Diagonal scale counts in four species of *Etheostoma* (subgenus *Ulocentra*); value for holotype in boldface.

Species and River system	Scales Above Lateral Line					N	$\bar{X}$
	4	5	6	7	8		
<i>etnieri</i>							
Cumberland R.							
Caney Fork R.							
Cherry Ck.	1	20	9			30	5.3
Charles Ck.		9	1			10	5.1
Rocky R.		8	2			10	5.2
Totals	1	37	12			50	5.2
<i>atripinne</i>							
Cumberland R.							
Caney Fork R.		1	4	3	2	10	6.6
Harpeth R.			9	1		10	6.1
Tennessee R.							
Duck R.		4	5	1		10	5.7
Shoal Ck.		4	6			10	5.6
Flint R.		10				10	5.0
Totals		19	24	5	2	50	5.8
<i>simoterum</i>							
Tennessee R.							
Hiwassee R.	1	9				10	4.9
French Broad R.		6	4			10	5.4
Totals	1	15	4			20	5.2
<i>duryi</i>							
Tennessee R.							
Beaverdam Ck.	9	1				10	4.1
Duck R.	3	7				10	4.7
Indian Ck.	11	9				20	4.5
Totals	23	17				40	4.4

Table 11
A comparison of two subgenera of *Etheostoma*

	<i>Ulocentra</i>	<i>Etheostoma</i>
Nuptial tubercles on breeding males	None	Often present (see Collette 1965)
Branchiostegal rays	5 (6 in <i>E. coosae</i>)	6 (5 in some populations of <i>E. zonale</i>)
Lateral line	Usually slightly arched anteriad	Straight anteriad
Snout Profile	Usually steeply declivous	Declivous
Number of dorsal saddles or blotches	Usually 8 or 9	Usually 4-7
Palatine teeth	None	Often present (see Richards 1966)
Melanism on pelvic and anal fins of breeding males	Pelvic and anal fins black	Scattered melanophores on anal and pelvic fins
Red ocellus on spinous portion of dorsal fin	Often present	Absent

Table 12
A comparison of three species of *Etheostoma* (subgenus *Ulocentra*)

	<i>etnieri</i>	<i>duryi</i>	<i>atripinne</i>
	Caney Fork River system, Tennessee	Tennessee River system, Tennessee, Alabama	Cumberland River system, Tennessee, Kentucky
Breast squamation	Usually scaled posterior half	Breast usually naked	Breast usually naked
Band on spinous portion of dorsal fin, breeding males	Submarginal band confined to posterior 4-6 membranes	Complete marginal band	Complete marginal band
Breast coloration, breeding males	Green	Orange	Orange
Caudal fin coloration	Red blotch	No obvious bright colors	No obvious bright colors
Dorsolateral coloration	Jagged, dark red band along length of entire body	Jagged, dark red band reduced and confined to posterior half of body	Bright red spots
Lateral pattern	Alternating solid dark and broken pale lines	No alternating dark and pale lines	No alternating dark and pale lines
Pigmentation of lateral line	Depigmented anteriad	Moderately depigmented anteriad	Moderately depigmented anteriad
Premaxillary frenum	Usually lacking	Lacking	Moderately to well developed
Number of saddles or blotches anterior to spinous portion of dorsal fin (Table 6)	Always one	Always one	Usually two, slightly to moderately conjoined or separate
Anal fin coloration, breeding males	Red blotch	Red blotch may be present	No obvious bright colors
Development of green breeding color in males	Present on head, breast and procurent caudal fin rays	Present on head and procurent caudal fin rays	Usually present on head, body and procurent caudal fin rays
Coloration of gular area and branchiostegal membranes	Orange and green in breeding males	Green only in breeding males	Green only in breeding males
Coloration of pelvic fin membranes, breeding males	Red	No bright colors	No bright colors
Caudal peduncle scales	Mode 18 or 19	Mode 17	Mode 20 or more

ri from Cumberland River system *E. atripinne* in the following ways. In *E. etnieri* a series of broken pale and solid dark lines are evident above the lateral line. This character can usually be seen even in non-breeding males, but may be less evident in some females. *Etheostoma etnieri* has a broken, jagged, lateral stripe of dark red pigment above the lateral line. The development of this stripe varies in females and non-breeding males. *Etheostoma atripinne* possesses distinct bright red spots mostly above the lateral line. Bright red areas in the soft-rayed portion of the dorsal fin, anal and caudal fins are distinctive in *E. etnieri*, while *E. atripinne* has a bright red margination on the spiny dorsal fin portion as well as red spots on the membranes. Both species possess a red ocellus margined with melanophores on the first membrane of the spinous portion of the dorsal fin. Green coloration usually is limited to the head, breast and procurrent caudal fin rays in *E. etnieri* as opposed to more extensive green coloration in *E. atripinne*. A comparison of *E. etnieri* with Caney Fork River system *E. atripinne* shows the former to exhibit fewer lateral-line scales (45-57) than the latter (54-61) (see Table 2) as well as lower diagonal and caudal peduncle scale counts (see Tables 7-10).

Present taxonomic research with species of the subgenus indicates a cline between *E. simoterum* and *E. atripinne* in, most notably, scale counts and numbers of saddles or blotches anterior to the spinous portion of the dorsal fin (Tables 2, 6-10). Since the purpose of this paper is to expedite the recognition of *E. etnieri*, no attempt will be made to prove or disprove the hypothesis that *atripinne* is conspecific with *simoterum*, and consequently the other Caney Fork River system *Ulocentra* has been referred to as *E. atripinne*. The hypothesis is simply noted here so that subsequent researchers may take it into consideration. Hopefully the description of *E. etnieri* will inspire further study of this poorly known group of handsome darters.

Etymology.—This darter is named in

honor of David A. Etnier, University of Tennessee, Knoxville, in recognition of his contributions to our knowledge of ichthyology and efforts to preserve Tennessee's rich and diverse aquatic fauna. The vernacular name, cherry darter, is in reference to the type-locality and to the striking red color of breeding males.

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