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PERCID FISHES RELATED TO *POECILICHTHYS*
VARIATUS, WITH DESCRIPTIONS OF
THREE NEW FORMS

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IN 1931 J. Clark Salyer, II, secured for the University of Michigan Museum of Zoology two immature darters from the Big Niangua River, near Buffalo, Missouri. These were tentatively referred to *Poecilichthys variatus* by Hubbs and Trautman (1932: 33), but now, after having been carefully compared with more abundant material, seem to represent a distinct and hitherto unnamed form, herein called *P. tetrazonus*. Later, 1 young and 1 adult of the same species, from the Gasconade River system in Missouri, were found in the United States National Museum.

During the summer of 1938, in the course of field work leading to a general survey of Arkansas fishes, the junior author and Mrs. Black obtained in the White River system several specimens of another new darter closely related to *Poecilichthys variatus*. It differs from that species in several respects, and on available evidence appears to be specifically distinct. It is herein named *Poecilichthys euzonus euzonus*.

At the same time A. Hugh Denney, while collecting fishes in connection with a fish-management project of the United States Forest Service in southeastern Missouri, in another section of the White River system, seined several specimens of a very

similar darter, which we regard as subspecifically distinct from the Arkansas form. It is designated *Poecilichthys euzonus erizonus*.

Specimens which may be regarded as *Poecilichthys euzonus euzonus*, approaching *P. euzonus erizonus*, were located in the National Museum. They came from Black and Spring rivers at Black Rock and from the White River at Batesville, Arkansas. These darters, as well as 2 examples of *P. tetrazonus* mentioned above, were incorrectly referred by Meek to *Etheostoma uranidea* Jordan and Gilbert (in Gilbert, 1887: 48-49). The true *Imostoma uranidea* (Jordan and Gilbert), although often showing a color pattern much like that of *Poecilichthys variatus*, is a very different species. After comparing the types and other material, we regard *Etheostoma (Hadropterus) ouachitae* Jordan and Gilbert (in Gilbert, 1887: 49-50) as a synonym of *Imostoma uranidea*.

We are much indebted to Alexander Wetmore and Leonard P. Schultz for the privilege of examining and reporting on specimens in the United States National Museum.

The material of these 3 new forms, together with additional specimens of 3 related species already named, enables us to present this review of the *Poecilichthys variatus* group, in which we include:

1. *Poecilichthys osburni* Hubbs and Trautman, 1932
2. *Poecilichthys tetrazonus*, new species
3. *Poecilichthys variatus* (Kirtland, 1838)
4. *Poecilichthys euzonus*, new species
 - 4a. *Poecilichthys euzonus erizonus*, new subspecies
 - 4b. *Poecilichthys euzonus euzonus*, new subspecies
5. *Poecilichthys blennioides* (Gilbert and Swain, 1887)

The 5 species of the *Poecilichthys variatus* group, as here defined, may be recognized by the 4 conspicuous dark crossbars (5 in *P. osburni*), laid down over a pale and more or less uniform ground color above the lateral line. Other common characters—each shared, however, with some other species of the genus—are given as item 1a in the key.

It has just been discovered that 1 other species of *Poecilichthys* bears the 4 or 5 conspicuous oblique saddles characteristic of the *P. variatus* group. As Reeve M. Bailey has pointed out to us, the species described by Radcliffe and Welch (1913: 31-32, Pl. 18) as *Hadropterus sellaris* is not referable to *Hadropterus*, for it lacks all traces of the enlarged, spiny scales along the mid-ventral line, even between the pelvic fins where a very spiny plate is always evident in *Hadropterus* and other genera defined on this squamational character. *Poecilichthys sellaris*, known only from the two types collected in Swan Creek near Havre de Grace, Maryland, close to the head of Chesapeake Bay, may well bear no immediate relationship with the species of the Mississippi Valley having similar coloration. That the agreement in color pattern may have resulted from parallel evolution seems more plausible when we recall that very similar markings are developed in certain totally unrelated fishes of the riffles, for example in species of *Hypentelium* and *Cottus*. *P. sellaris* differs trenchantly from the species of the *P. variatus* group, including *P. blennioides*, in the V-shaped border of the gill-membranes and in the scaleless belly. The distinctive genital papilla of the adult male of *P. sellaris* is a subspherical process, preceded and partly covered by a complex flap consisting of a subtriangular shelf, on either side of which there is a large flat lobe turned under and back at the outer side to produce a small, thickened flap which is nearly hidden in ventral aspect. Other characters suggest relationship with *P. variatus*: (1) the saddles rival those of *P. blennioides* in boldness and are similarly set off by light borders; (2) the anal fin is almost as expansive as the second dorsal; (3) the pelvics are separated by an interspace about two-thirds as wide as the base of either fin.

Some doubt is involved in the reference of *Poecilichthys blennioides* to the *P. variatus* group. As indicated in the key, it is sharply set off from the 4 other species, which seem to constitute a well-circumscribed *Formenkreis*. No other characters than those of coloration seem to align *P. blennioides* definitively with this group.

Generic or subgeneric classification among the darters is extraordinarily difficult. The only respect in which this group of species provides an exception to the statement arises from the circumstance that *variatus* is the genotype of *Poecilichthys* Agassiz (1854: 304–6).¹ Consequently, *variatus* and its immediate relatives will remain in *Poecilichthys*, whether or not that genus is disrupted. We see no valid occasion for either the subgeneric or generic separation of any of the 4 other species here treated. Jordan and Evermann (1896: 1067) referred *Etheostoma variatum* to the subgenus *Poecilichthys* and *E. blennioides* to *Nanostoma*, but the criteria used by these authors to distinguish the 2 subgenera (“anal fin nearly as large as soft dorsal,” instead of much smaller; “spinous dorsal with about 13 spines,” rather than 9 to 12) fail completely, in the light of the data presented in this paper. Nor is there anything distinctive in the supplementary characters assigned to *Poecilichthys* (“head almost naked; fins very large; colors brilliant”). We therefore interpret *Nanostoma* as subgenerically synonymous with *Poecilichthys*. There is certainly no trace of justification for the generic separation of *Nanostoma* from *Poecilichthys*, as advised by Jordan (1916: 26) and as recently practiced by Jordan (1929: 163), and by Jordan, Evermann, and Clark (1930: 289).

The same authors—Jordan (1929: 157), Jordan, Evermann, and Clark (1930: 287)—and some others following their lead, have referred *Poecilichthys blennioides* to the genus *Ulocentra*. It is possible that this reference has a natural basis, since *blennioides* does strongly resemble the species of *Ulocentra*. It has, however, a definite though narrow frenum, and is therefore retained by us in *Poecilichthys*.

Since all 5 species under discussion seem referable to *Poecilichthys* in subgeneric as well as generic sense, there is no present reason for considering here whether *Poecilichthys* should be divided into subgenera or into genera. The consid-

¹ On the use of this name for all or part of the group called *Etheostoma* by Jordan and Evermann (1896: 1066–99), see Jordan (1916: 25) and Hubbs (1926: 63).

erable diversity in the species here treated, in the degree of union of the gill-membranes, lessens the taxonomic significance of this rather intangible character, which, with the equally tenuous character of the completeness of the lateral line, has been used in the primary division of the whole group.

In the species group as here established, the lateral-line system of the head (Hubbs and Cannon, 1935: 10-11, Pl. 2) is remarkably uniform. The lateral canal of the head gives off 5 pores, each of which, except the hindmost, opens at the end of a narrow tube directed, and commonly curved, downward and slightly backward. The supratemporal commissure is complete, with the median pore at the end of a short, backward-extending canal. The lateral pore on either side lies directly on the canal. In some individuals a small sense organ, superficially resembling a pore, is developed on either side of the supratemporal canal, between the lateral pore and the median line. The interorbital pores are present, as is the coronal, which terminates a backward-extending tube. The two nasals are widely separated, for the anterior one lies slightly in advance of the anterior nostril, whereas the posterior one is near the posterior nostril. The infraorbital canal is complete with 8 pores, but presents a peculiarity: although each of the 4 posterior pores lies at the end of a downward-projecting tube, the posteriormost or fourth of the anterior set is frequently, in some forms almost invariably, at the end of a short tube which extends upward to near the eye. In *P. blennioides* and *P. tetrazonus*, however, this pore typically opens out directly on the canal, or even at the end of ventral tubes (see descriptions of these species). There is some variation in this character, even on the two sides of an individual. The operculomandibular series comprises 10 pores, of which those on the opercle open at the end of short, downward-projecting tubes.

Due to the previous association of *P. blennioides* with the subgenus or genus *Nanostoma*, a check was made on the pores of the head in the various species referred to that group. *P. swannanoa* alone showed the upward-projecting fourth pore, and only as a variation from the more usual condition, in

which the pore lies below or on the canal. In *P. zonalis*, *P. zonalis arcansanus*, *P. lynceus* (= *P. elegans*), and *P. rupestris*, this pore opens on the lower side of the canal, as in most other darters, with a complete canal, which we have examined.

ANALYSIS OF THE SPECIES AND SUBSPECIES OF THE
POECILICHTHYS VARIATUS GROUP

1a (common characters).—Lateral line complete (occasionally with 1 or 2 pores missing). Gill-membranes more or less broadly connected. Form robust. Dorsal rays XI to XIV (X to XII in *P. tetrazonus*)—11 to 16; anal with 2 stiff spines and 8 to 11, commonly 9 or 10, soft rays. *Body above lateral line crossed by 4 conspicuous dark bars (5 in P. osburni), on a pale and more or less uniform ground color.*

2a.—Snout more or less produced (angle of muzzle 44° to 70°). Gill-membranes moderately to rather broadly connected, forming an angle of 50° to 90° . Scales 6 to 9—50 to 73—7 to 11 (5 or 6—47 to 54—7 or 8 in *P. tetrazonus*). Soft rays 12 to 15 in dorsal fin, 9 to 11 in anal, and 14 to 16 in pectoral. Least bony interorbital width 2.2 to 3.8 in eye. Least suborbital width 5.8 to 12.0 in head. Upper jaw 3.3 to 3.7 in head (3.5 to 4.0 in *P. euzonus erizonus*). Highest dorsal spine 2.2 to 2.8 in head; longest pectoral ray 0.8 to 1.2; length of pelvic fin 1.0 to 1.5. Dorsal saddles not set off by a light posterior border. Lateral blotches not fused into a zigzag line.

3a.—Five blackish saddles. Head 3.6 to 4.0. Eye 1.3 to 2.0 in snout, 4.4 to 5.6 in head. Snout 2.8 to 3.4. Least suborbital width 5.8 to 7.3.

4a.—Scales 7 to 9—59 to 69 (53 to 57 in a variant form)—8 to 11. Dorsal spines 11 to 14. Saddles and lateral markings fairly well developed in young, becoming obsolescent in adult females but intensified in breeding males; lateral blotches in adults forming 9 to 11 rather regular bars, almost encircling body posteriorly; 11 or 12 orange bars in breeding males. Body moderately compressed (width 1.5 in projection of depth). Least bony interorbital width 2.3 to 2.5 in eye. Vertical soft fins high (highest dorsal ray 1.4 to 1.7, and highest anal ray 1.7 to 1.8 in head). Interspace between pelvic fin and union of gill-membranes 1.2 to 1.4 in distance thence to tip of mandible. Breast scaleless (rarely with a few scales near pelvic fins); angle between supratemporal and lateral head canals and the opercle and cheeks

scales. *Upper Kanawha River system, Virginia and West Virginia:*

1. *P. osburni*

3b.—Four blackish saddles. Head 3.3 to 3.7. Eye 0.8 to 1.5 in snout, 3.7 to 4.7 in head. Snout 3.0 to 4.3. Least suborbital width 6.5 to 12.0 (usually more than 7.2).

4b.—Scales 5 or 6—47 to 51—7 or 8 (4 specimens known). Dorsal spines 10 to 12. Saddles and lateral markings moderately prominent; lateral blotches in adults forming about 10 rather regular bars on lower part of body, with weak extensions dorsally. Body moderately compressed (greatest width 1.4 to 1.7 in projection of depth). Least bony interorbital width 2.2 to 3.0 in eye. Vertical soft fins little elevated (highest dorsal ray 1.8 to 2.1, and highest anal ray 2.0 to 2.3, in head). Interspace between pelvic fin and union of gill-membranes 1.5 to 1.6 in distance thence to tip of mandible. Breast more or less scaled; angle between supratemporal and lateral head canals scaled or scaleless; opercle with 1 to 6 scales; cheeks with none. *Big Niangua and Gasconade River systems (Missouri River drainage basin), Missouri:*

2. *P. tetrazonus*

4c.—Scales 6 or 7—50 to 58—7 to 9. Dorsal spines 11 to 13, most frequently 13. Saddles and lateral bars very distinct in young, but becoming obscure in adults, particularly in breeding males; lateral blotches 9 to 11, not forming regular bars, those in the breeding males indistinct and not forming orange bars; the orange bars therefore few (5 or 6). Body more compressed (width 1.5 to 1.7 in projection of depth). Least interorbital width 2.5 to 2.7 in eye. Vertical soft fins high (highest dorsal ray 1.4 to 1.9, and highest anal ray 1.6 to 2.0, in head). Interspace between pelvic fin and union of gill-membranes 1.5 to 1.7 in distance thence to tip of mandible. Breast almost always scaleless, except near pelvic fins; angle between supratemporal and lateral head canals scaleless, or with 1 to 3 embedded scales; opercle ordinarily without scales, rarely with a few; cheeks always naked. *Ohio River drainage basin in New York, Pennsylvania, West Virginia, Ohio, Indiana, and Kentucky, exclusive of the Upper Kanawha, Wabash, Kentucky, and Tennessee River systems:*²

3. *P. variatus*

² A single record for the Cumberland River system, in Tennessee, has been doubted (Hubbs and Trautman, 1932: 33).

4d.—Scales 7 to 9—57 to 73—8 to 11 (6—54—9 in 1 specimen from Spring River with unusually large anterior scales). Dorsal spines 12 to 14, most frequently 13. Saddles and lateral markings very prominent in both sexes, at all ages and seasons. Body more terete (greatest width 1.2 to 1.5 in projection of depth). Least bony interorbital width 3.0 to 3.8 in eye (2.6 to 3.3 in young and half-grown specimens from Black Rock and Batesville, Arkansas). Vertical soft fins little elevated (highest dorsal ray 1.8 to 2.5, and highest anal ray 1.8 to 2.4, in head). Interspace between pelvic fin and union of gill-membranes 1.2 to 1.6 in distance thence to tip of mandible. Breast more or less completely scaled (with rare exceptions); angle between supratemporal and lateral head canals with a patch of ctenoid scales; cheeks with or without scales. *White River system in Missouri and Arkansas:*

4. *P. euzonus*

5a.—Cheeks with several ctenoid scales (wholly lacking in 1 of 18 specimens, and limited to 1 or 2 on each cheek in another); breast always well scaled, and the posterior scales usually somewhat ctenoid; opercle covered with ctenoid scales. Scales above lateral line 7, rarely 8. Lateral blotches 8 to 10, usually 8 or 9, less definitely connected with the saddles, more triangular, and becoming more disrupted with age; saddles in adult also less regular and straight-edged; light areas considerably tessellated with dark in adult; stippling of anterior lower surfaces restricted to the cheeks (usually leaving below the eye a clear patch transversed by a faint subocular bar) and to mottlings on the chin. Gill-membranes usually more broadly connected, forming an angle of 52° to 81° (typically 65° to 75° in adults). Snout more constricted and produced (angle of muzzle 40° to 50°), 3.0 to 3.5 in head. Eye smaller, 1.3 to 1.5 in snout, and 3.7 to 4.7, usually 4.0 to 4.5, in head. Highest dorsal ray 1.8 to 2.1 in head. Head 3.4 to 3.7, usually 3.5 to 3.6. *Current River (White River system), southeastern Missouri:*

4a. *P. euzonus erizonus*

5b.—Cheeks scaleless; breast scaleless anteriorly, with embedded scales posteriorly (wholly scaleless in 1 of 9 specimens); opercle not quite fully scaled. Scales above lateral line 8, rarely 9. Lateral blotches 5 to 8, usually 7 or 8, more definitely connected with the saddles, mostly squarish (somewhat triangular in young), and little disrupted with

age; saddles in adult also more regular and straight-edged; light areas scarcely tessellated with dark in adult; stippling of anterior lower surfaces densely extended over cheeks, throat, branchiostegal membranes, and fore part of breast (less developed in young, but always better developed at comparable sizes). Gill-membranes usually less broadly connected, forming an angle of 50° to 62° . Snout heavier and more declivous (angle of muzzle 44° to 57°), 3.3 to 4.0 in head. Eye larger, 0.9 to 1.2, usually 1.1 to 1.2, in snout, and 3.7 to 3.9 in head. Highest dorsal ray 2.0 to 2.3 in head. Head 3.0 to 3.4. *White River system, in typical form above Batesville, Arkansas:*

4b. *P. euzonus euzonus*

2b.—Snout more declivous (angle of muzzle 69° to 75°). Gill-membranes very broadly connected, forming an angle of 89° to 110° . Scales 4 or 5—42 to 45—6 or 7. Soft rays 11 to 13 in dorsal fin, 8 or 9 in anal, and 16 or 17 in pectoral. Least bony inter-orbital width 1.8 to 2.0 in eye. Least suborbital width 4.8 to 6.8 in head. Upper jaw 3.7 to 4.2 in head. Highest dorsal spine 1.9 to 2.0 in head; longest pectoral ray 0.7 to 0.8; length of pelvic fin 0.9 to 1.0. Dorsal saddles set off by a creamy white posterior border. Lateral blotches fused into a zigzag line.

3c.—Four green-black saddles. Head 3.6 to 4.0. Eye 1.2 to 1.8 in snout, 4.0 to 4.9 in head. Snout 2.7 to 3.4. *Tennessee River system, in Alabama and Tennessee:*

5. *P. blennioides*

EXPLANATION OF MEASUREMENTS AND COUNTS.—The measurements of the head include the opercular membrane. The eye (rather than the orbit) is measured between the margins of the cornea on the longest dimension. Scales above the lateral line are counted from the origin of the dorsal fin downward and backward to the lateral line, beginning with the one beside the first dorsal spine and ending with the scale row above the lateral line. Scales below the lateral line are enumerated diagonally upward and forward from beside the first anal spine to the lateral line, again excluding the lateral-line scale row, but including the very small row of scales often present next to the anal fin. The lateral-line count begins with the last scale which is in contact with the shoulder girdle and ends at the structural base of the caudal fin. The last ray of the

dorsal and anal fins is always counted as a divided ray—a criterion at times requiring careful examination.

1. *Poeciliichthys osburni* Hubbs and Trautman

Poeciliichthys osburni.—Hubbs and Trautman, 1932: 31–38, Figs. 1–2 (original description; records). Morgan, 1937: 150 (no air bladder).

This well-marked, isolated species shows direct relationship only with *P. variatus*. Its distinguishing characters are indicated in the original account, and as items 1*a*, 2*a*, 3*a*, and 4*a* of our key. The material in the University of Michigan Museum of Zoology has been examined. Some collections have been received since the type description was published. All are from the Kanawha (New) River system above Kanawha Falls. Series from the Kanawha system below these falls prove referable to *P. variatus*. Since certain errors in the original description have been discovered, we give here the counts and measurements of the holotype, and, in parentheses, of 6 adult paratypes.

Scales 8—64—9 (7 to 9—59 to 66—9 or 10). Dorsal rays XIII–13 (XII to XIII–13 to 15); anal rays, II, 9 (II, 9 or 10, usually 10); pectoral rays 15–15 (14 to 15, generally 15). Lateral markings 11 (9 to 11), not counting the blotch at the caudal base nor the continuation of the nuchal saddle. These markings form more definite bars than do those in other species. The posterior bars in the adult male almost encircle the body.

Depth 5.0 (4.8 to 5.4). Greatest width 1.5 (1.5) in projection of greatest depth. Head length 3.9 (3.6 to 3.9). Least suborbital width 6.5 (5.8 to 7.3) in head. Least interorbital width 2.3 (2.3 to 2.5) in eye. Eye 5.5 (4.8 to 5.6) in head; 1.8 (1.5 to 2.0) in snout. Snout 3.2 (2.8 to 3.4) in head. Upper jaw 3.6 (3.3 to 3.6). Angle of muzzle 55° (49° to 58°); of gill-membranes 61° (61° to 78°). Eye 2.7 (2.4 to 2.8) in distance from tip of mandible to union of gill-membranes; latter distance 1.8 (1.7 to 2.0) in head, and 1.2 (1.1 to 1.4) times interspace between union of membranes and insertion of pelvic fin. Highest dorsal spine 2.2 (2.2 to 2.5) in head,

2.5 (2.2 to 2.9) in first dorsal base, and 1.4 (1.4 to 1.5) in the highest dorsal soft ray, which enters the head 1.4 (1.4 to 1.7) times and the second dorsal base 1.1 (1.1 to 1.2) times. Length of caudal fin 1.5 (1.4 to 1.5) in head. Highest anal ray 1.7 (1.7 to 1.8) in head, and 1.2 (0.8 to 1.2) in the anal base, which enters the head 1.7 (1.5 to 2.3) times and the second dorsal base 1.3 (1.3 to 1.4) times. Longest pectoral ray 0.9 (0.8 to 1.0) in head; length of pelvic fin 1.2 (1.2 to 1.3). Interspace between pelvic fins 1.6 (1.4 to 1.7) in pelvic base.

In the original description a large-scaled variant of this form was mentioned. Three similar specimens, in the National Museum, were collected by Leonard P. Schultz and Earl D. Reid in Crooked Creek, 4 miles east of Galax, Virginia, July 13, 1938. They show the following characters: Scales 7—53—9 (1) or 10 (2); dorsal, XI (1) or XIII (2), 12 (1) or 13 (2); depth 5.1 to 5.6; eye 1.3 in snout, 4.4 to 5.2 in head; head 3.8 to 4.0; dorsal saddles 5; male with numerous light bars.

2. *Poecilichthys tetrazonus*, new species

(Pl. I, Fig. 1)

Etheostoma uranidea (misidentification).—Meek, 1891: 123 (Gasconade River at Arlington, and Little Piney River at Newburg, Missouri).

Poecilichthys variatus (misidentification).—Hubbs and Trautman, 1932: 33 (Missouri record only).

The holotype, University of Michigan Museum of Zoology No. 111330, is a half-grown specimen 33 mm. in standard length. It was seined in Big Niangua River, at mouth of Greasy Creek, 6 miles southeast of Buffalo, Dallas County, Missouri, by J. Clark Salyer, II, on August 28, 1931. One paratype, a young fish 22 mm. long, was taken with the holotype.

The two type specimens of this species were recorded by Hubbs and Trautman as *Poecilichthys variatus*, but on more detailed study appear to represent a distinct species. The two darters from the Gasconade River system of Missouri, referred by Meek to *Etheostoma uranidea*, seem to represent the same form. The contrasting characters of *P. variatus* and *P. tetra-*

zonus are given as items 4*b* and 4*c* in our key. When compared with the two subspecies of *P. euzonus*, *P. tetrazonus* is seen to differ sharply in the size of the scales and in numerous other characters, as stated in items 4*b* and 4*d* of the key. The available evidence indicates the full specific separation of *tetrazonus* from *variatus* and *euzonus*, but the relationships between these forms seem rather close. Further material may indicate subspecific intergradation.

In the following description the counts and measurements are given first for the holotype, followed, in parentheses, by determinations for (1) the paratype; (2) the young specimen, 28 mm. long, from Gasconade River; and (3) the adult, 57 mm. long, from Little Piney River.

Scales 5—51—7 (5—47—7; 6—52—8; 6—54—8). Breast with several ctenoid scales (with several cycloid scales in paratype; posterior half of breast well covered with ctenoid scales and anterior half with some embedded scales, in the 2 other specimens). Angle between supratemporal and lateral head canals with 1 large, ctenoid scale on one side but none on the other side (with none on either side in paratype; with several large ctenoid scales in the other specimens). Opercle of each side with 1 large ctenoid scale in the holotype (with a few ctenoid scales in the 3 others). Cheeks scaleless (in all specimens).

Dorsal rays XII—14 (X—14; XII—13; XII—13); anal rays II, 9 (II, 10; II, 9; II, 10); pectoral rays 15—15 (14—15; 14—?; 15—16). The dorsal fins are well separated.

The canals and pores of the head correspond with the description given on p. 5. The posteriormost of the anterior group of 4 infraorbital pores opens directly from the canal at its upper edge on one side and at its lower edge on the other side (at mid-line of canal on both sides; on lower edge of canal; at ends of short, downward-projecting tubes).

The body is shaped about as in specimens of like size of *P. variatus*; depth 5.3 (5.1; 4.6; 4.8). The body is moderately compressed; width 1.6 (1.4; 1.7; 1.7) in projection of depth.

The head is rather large, 3.3 (3.3; 3.7; 3.7) in standard length. Least suborbital width 9.6 (9.0; 10.0; 8.0) in head. Least interorbital width 3.0 (3.0; 2.5; 2.2) in eye. The eye is rather large: 4.2 (4.2; 4.5; 4.7) in head, 1.3 (1.0; 1.1; 1.5) in snout. The snout is rather short, 3.8 (4.2; 4.3; 3.6) in head, but rather pointed: angle of muzzle 55° (52° ; 51° ; 57°). Upper jaw 3.6 (3.5; 3.7; 3.6) in head. Angle of gill-membranes 66° (55° ; 74° ; 77°). Eye 2.4 (2.7; 2.5; 2.7) in distance from tip of mandible to union of gill-membranes; latter distance 1.6 (1.6; 1.6; 1.7) in head, and 1.6 (1.5; 1.4; 1.3) times interspace between union of gill-membranes and insertion of pelvic fin. Highest dorsal spine 2.7 (2.4; 2.3; 2.4) in head, 2.4 (2.0; 2.4; 2.8) in first dorsal base, and 1.3 (1.3; 1.3; 1.4) in the highest dorsal soft ray, which enters the head 2.1 (2.0; 1.8; 1.9) times and the second dorsal base 1.4 (1.4; 1.3; 1.4) times. Length of caudal fin 1.3 (— ; 1.5; 1.4) in head. Highest anal ray 2.3 (2.0; 2.0; 2.0) in head, and 1.0 (1.0; 1.0; 0.9) in the anal base, which enters the head 2.3 (2.0; 2.0; 1.8) times and the second dorsal base 1.4 (1.4; 1.3; 1.3) times. Longest pectoral ray 1.0 (0.9; 1.0; 1.0) in head; length of pelvic fin 1.4 (1.5; 1.2; 1.3). Interspace between pelvic fins 2.0 (1.5; 1.6; 1.5) in pelvic base.

The coloration of the holotype is as follows: The back is crossed by 4 regular dark saddles, about as in the related species. These crossbars are less blackened than in *P. euzonus*. As in *P. euzonus erizonus*, the anteriormost saddle is expanded backward to include the extreme front of the dorsal fin. This band splits at the pectoral insertion to form 2 narrow lines, 1 on either side of the fin (the anterior fork is under the gill-cover). The second and third saddles, descending from the rear of the spinous and soft dorsal fins, respectively, fail by 1 scale row to reach the lateral line. The fourth saddle, on the caudal peduncle, is continued to near the mid-ventral line. In addition there is a faint spot at the base of the caudal fin. There are about 9 lateral blotches (10 in the paratype). Of these the first 2 are rectangular, the others more or less triangular. The general ground color of the upper surfaces in alco-

hol is olivaceous tan, lighter than in *P. euzonus* because the melanophores on the scales are less dense. The bars radiating from the eye (1 downward and forward, 1 downward, and 1 backward) are short. The opercle and the angle of the preopercle are stippled, and there are melanophores near the radiating bars and at the tip of the chin. Otherwise, the lower sides of the head are nearly clear of pigment.

The young paratype, perhaps largely on account of its size, is unusually pale, resembling *Boleosoma*.

The Gasconade River specimen is colored much like the holotype, though the second and third bars show a tendency, with bilateral variation, to connect with lateral bars. The basal caudal spot is conspicuous. There are 10 lateral blotches, mostly squarish. The scale centers tend to be lighter, the crosshatching more conspicuous. A dusky blotch on the upper anterior sides represents a trace of the second saddle of *Poeciliichthys osburni*.

The single adult specimen (from Little Piney River) approaches *P. osburni* in that the lateral blotches, 9 on one side and 10 on the other, form rather definite bars on the lower sides, with weak extensions above the lateral line. There is no definite trace of the second saddle of *P. osburni*. The first saddle is truncated at the base of the first dorsal spine. There are faint connections between the second and third dark saddles and the lateral blotches below them. The basal caudal spot is inconspicuous. The cheeks and the lower side of the head are evenly and densely stippled.

The name *tetrazonus*, derived from *τετράς*, four, and *ζώνη*, zone, refers to the 4 prominent dark saddles characteristic of this and related species.

3. *Poeciliichthys variatus* (Kirtland)

(Pl. II, Fig. 1)

Etheostoma variata.—Kirtland, 1838: 168 and 192 (virtual *nomen nudum*; Mahoning River, Ohio; Cuyahoga River record probably based on *P. caeruleus*); 1841: 274-76, Pl. 2, Fig. 2 (original description; Mahoning River).

Etheostomata variatum.—Agassiz, 1850: 299 (type of genus *Poecilo-*

soma); 1854: 306 (type of *Poecilichthys*). Jordan and Eigenmann, 1885: 71 (skeleton). Woolman, 1892: 280, 286 (Kentucky records; characters). Boulenger, 1895: 81 (synonymy; description; Big Creek, Hyden, Kentucky). Jordan and Evermann, 1896: 1069-70 (description; range; synonymy).

Hadropterus variatus.—Putnam, 1863: 4 (synonymy). Jordan, 1885: 163-65 (rediscovery; synonymy; description).

Poecilichthys variatus.—Fowler, 1919: 70 (Pennsylvania records). Fowler and Carlson, 1927: 72 (color; Pennsylvania records). Jordan, 1929: 163 (description; range, Arkansas excepted). Jordan, Evermann, and Clark, 1930: 289 (range; synonymy). Hubbs and Trautman, 1932: 31-38, Fig. 1 (records and comparisons; Arkansas and Missouri records excepted). Morgan, 1937: 150 (no air bladder). Greeley, 1938: 72 (New York records). Fowler, 1938: 106 (Pennsylvania records).

Etheostoma notatum.—Agassiz, 1850: 299 (*nomen nudum*). Putnam, 1863: 4 (in synonymy of *H. variatus*).

?*Hadropterus tessellatus*.—Jordan, 1877: 7 (original description; synonymy excepted; Foxburg, Pennsylvania).

As Jordan (1885: 163) noted, the name *variatum* was transferred by himself and others for a time to *Poecilichthys caeruleus*. Vaillant (1873: 84-87) used the name *Boleosoma variatum*, and Jordan and Gilbert (1883: 503) that of *Alvordius variatus*, in describing species of *Hadropterus*.

This species, as here delimited, has been characterized by the authors cited in the synonymy. In our analysis of the species, it is compared in detail with the other forms of the group now recognized. Items *1a*, *2a*, *3b*, and *4c* of the key constitute a description. Additional characters are given below. The determinations were mostly made on 7 Ohio specimens 31 to 73 mm. in standard length.

Dorsal rays XI to XIII-12 to 16; anal rays II, 9 or 10, usually 9; pectoral rays 14 to 16, usually 15. Lateral markings 9 to 11.

Depth 4.6 to 5.4. Head length 3.5 to 3.7. Least suborbital width 8.0 to 9.5 in head. Eye 3.8 to 4.0 in head, 0.8 to 1.0 in snout. Snout 3.3 to 4.0 in head. Upper jaw 3.4 to 3.7. Angle of muzzle 55° to 70°; of gill-membranes 61° to 90°, increasing with age. Eye 2.2 to 2.5 in distance from tip of mandible to union of gill-membranes; latter distance 1.5 to 1.7 in head.

Highest dorsal spine 2.4 to 2.6 in head, 2.2 to 2.5 in first dorsal base, and 1.3 to 1.7 in highest dorsal soft ray, which enters the second dorsal base 1.0 to 1.4 times. Length of caudal fin 1.4 to 1.5. Highest anal ray 0.9 to 1.0, usually 1.0, in the anal base, which enters the head 1.6 to 2.0 times and the second dorsal base 1.3 to 1.4 times. Longest pectoral ray 0.8 to 0.9 in head; length of pelvic fin 1.1 to 1.3. Interspace between pelvic fins 1.5 to 2.0, usually 1.5, in pelvic base.

4. *Poecilichthys euzonus*, new species

This species is characterized by the very decided contrast between the dorsal saddles and the ground color; the smaller fins, as compared with those of *P. variatus* and *P. osburni*; and the more cylindrical body (the body form, especially in *P. euzonus erizonus*, approaches that of *Hadropterus*). The scales, about as in typical *P. osburni*, are somewhat smaller than in *variatus*. From *osburni*, the new species differs in the size of the fins, the general body shape, the number of bands, other features of coloration, and in various other characters. The squamation of the head and breast, too, separates this species distinctly from others of the group, though there is considerable difference in this respect between the 2 subspecies of *P. euzonus*. The details of the specific description are presented in the accounts of the 2 subspecies. Common specific characters are stated as items 1a, 2a, 3b, and 4d.

Poecilichthys euzonus, as here constituted, is a complex of 2 rather distinct subspecies, which are contrasted in items 5a and 5b of the key (p. 8). *P. e. euzonus* occurs in the White River system of Arkansas, above Batesville, and *P. e. erizonus* in the Current River of Missouri, which is also in the White River system.

Specimens from Spring River and Black River, at Black Rock, and from White River at Batesville, Arkansas, misidentified as *Etheostoma uranidea* by Meek (1894a: 268; and 1894b: 80), appear more like typical *P. euzonus*, but approach *erizonus* in distribution and in some characters. The Spring River specimens have been referred to *Poecilichthys variatus* by

Hubbs and Ortenburger (1929: 48) and by Hubbs and Trautman (1932: 33). It is possible that these fish should be interpreted as intergrades, but their small size and long preservation preclude a precise subspecific determination. In the Spring and White River series the breast is rather more scaled than in typical *euzonus*, but less so than in *erizonus*, and the cheeks bear no scales except for a few in 1 specimen from Spring River. The individual from Black River has the breast densely scaled and the cheeks about as well scaled as in *erizonus*. In general physiognomy all 3 lots are more like *euzonus* than *erizonus*. The saddles are more like those of *euzonus*; the lateral blotches, rather intermediate. In counts and measurements (Table I) the resemblances are diverse. As would be expected, the specimens from White River at Batesville seem somewhat closer to *euzonus* than do those from Black Rock.

4a. *Poecilichthys euzonus erizonus*, new subspecies

(Pl. I, Fig. 2)

The holotype, University of Michigan Museum of Zoology No. 124597, is an adult male 66 mm. in standard length. It was collected by A. Hugh Denney on August 10, 1938, in Current River, at "The Nook," T. 23 N., R. 2 E., Sec. 9, Ripley County, Missouri. The paratypes were all collected by Denney in Current River in Missouri: 5 with the holotype; 8 from near the Carter County Hunting and Fishing Club, T. 26 N., R. 1 E., Sec. 11 and 12, Carter County, July 25, 1938; 2 from the Doniphan Boat Landing, T. 23 N., R. 2 E., Sec. 27, Ripley County, July 26, 1938; 2 from the river just above the mouth of Pike Creek, T. 27 N., R. 1 W., Sec. 23, Carter County, August 18, 1938. The 18 available specimens of this form range in size from 34 to 70 mm.; 15 are 58 to 70 mm. long.

The diagnostic characters are given as items *1a*, *2a*, *3b*, *4d*, and *5a* in the key. Probably the most obvious difference between this subspecies and typical *euzonus* is the more extensive squamation of the breast and the scaled cheeks. The blotches on the side and the scale rows above the lateral line each aver-

TABLE I
 COUNTS AND MEASUREMENTS OF *POEILICHTHYS EUZONUS*
 Extreme counts and measurements, representing only 1 or 2 specimens, are indicated in parentheses for some of the items.

	<i>P. e. erizonus</i>			<i>P. e. euzonus</i> approaching <i>erizonus</i>			<i>P. e. euzonus</i>	
	Holotype	Paratypes	Black River	Spring River	White River	Paratypes	Holotype	
Number of specimens	1	17	1	12	8	8	1	
Standard length (in mm.)	66	34-70	30.5	28.5-38.5	36-45	28-49	60.5	
Scales above lateral line.....	7	7-8	7	(6)7-8	8-9	8(9)	8	
Scales in lateral line	67	62-68(73)	62	(54)60-66	57-65	63-67	65	
Scales below lateral line.....	9	9-11	9	(8)9-10	10-11	9-10	9	
Dorsal spines	13	(12)13(14)	13	(12)13	12-13	13(14)	13	
Dorsal soft rays	14	14-15	14	14(15)	13-14	(13)14	14	
Anal rays	10	(9)10-11	10	10(11)	9-11	(9)10	10	
Pectoral rays	16-16	(14)15-16	15-15	15-16	15-16	15-16	15-16	
Lateral blotches below lateral line	8	8-10	8	7-10	7-8(9)	5-8	6	
Depth in length	5.1	4.9-5.5(5.8)	4.7	(4.7)4.8-5.0	(5.0)5.1-5.3(5.6)	5.5-5.6(5.8)	5.2	
Greatest width in projection of depth	1.4	1.3-1.4(1.5)	1.5	1.5	(1.4)1.5	(1.2)1.3-1.4	1.3	
Head in length	3.6	3.4-3.7	3.5	3.2-3.4	3.3-3.6	(3.0)3.1	3.4	
Least suborbital width in head	7.2	(6.5)7.2-8.0(8.5)	9.3	(8.7)9.0-9.5(10.0)	10.0-12.0	(9.1)9.3-9.5(10.0)	8.8	
Least interorbital width in eye	3.0	3.0-3.5	3.2	(2.6)3.0-3.2(3.3)	2.6-2.7(2.8)	3.5-3.6(3.8)	3.5	

TABLE I—(Continued)

	<i>P. e. erizonus</i>		<i>P. e. euzonus</i> approaching <i>erizonus</i>			<i>P. e. euzonus</i>	
	Holotype	Paratypes	Black River	Spring River	White River	Paratypes	Holotype
Eye in head	4.5	(3.7)3.9– 4.5(4.7)	3.8	3.9–4.6(5.0)	4.3–4.6	3.7–3.9	3.9
Eye in snout	1.5	1.3–1.5	1.1	(1.0)1.2– 1.5(1.6)	1.1–1.3	(0.9)1.1–1.2	1.2
Snout in head	3.3	3.0–3.5	3.6	(3.1)3.3– 3.7(3.9)	(3.6)3.9–4.1	3.3–3.6(4.0)	3.6
Upper jaw in head	3.6	3.5–3.7(4.0)	3.5	3.5–3.6(3.7)	(3.5)3.6–3.7	3.4–3.6	3.5
Angle of muzzle	45°	40–50°	41°	(39)44–48 (55)°	(48)50–55°	44–57°	53°
Angle of gill-membranes	68°	(52)62–78 (81)°	52°	55–68°	62–67°	(50)53–62°	62°
Eye into distance from tip of mandible to union of gill-membranes	2.5	(2.1)2.3–2.5	2.3	(2.3)2.5– 2.7(2.8)	2.5–2.6	2.0–2.3(2.4)	2.1
Latter distance into head	1.7	(1.6)1.7–1.9	2.0	1.7–1.9	1.7–1.8	(1.7)1.8–2.0	2.0
Interspace between inser- tion of pelvic fin and union of gill-membranes in distance thence to tip of mandible	1.3	1.2–1.5	1.3	1.4–1.6	(1.2)1.3–1.5	1.3–1.4	1.3
Highest dorsal spine in head	2.6	2.4–2.6(2.8)	2.7	2.5–2.7(2.8)	2.4–2.7	2.3–2.6	2.7
Highest dorsal spine in first dorsal base	2.5	2.4–2.8	2.5	2.4–2.6(2.7)	2.2–2.5	(2.1)2.2–2.3	2.5

TABLE I—(Continued)

	<i>P. e. erizonus</i>		<i>P. e. euzonus</i> approaching <i>erizonus</i>			<i>P. e. euzonus</i>	
	Holotype	Paratypes	Black River	Spring River	White River	Paratypes	Holotype
Highest dorsal spine in highest dorsal ray	1.3	1.3-1.5	1.3	1.2-1.3	1.0-1.1	(1.1)1.3-1.4	1.4
Highest dorsal soft ray in head	2.0	1.8-2.1	2.2	2.1-2.2(2.5)	2.3-2.4	2.0-2.3	2.1
Highest dorsal soft ray in second dorsal base....	1.5	1.4-1.6	1.5	(1.2)1.3- 1.4(1.5)	1.6	1.3-1.5	1.4
Length of caudal fin in head	1.4	1.4-1.6	1.5	1.4-1.5	(1.4)1.5	1.5-1.7(1.8)	1.5
Highest anal ray in head	2.0	1.8-2.3	2.4	(2.1)2.2- 2.3(2.4)	1.9-2.3	(2.0)2.1-2.3	2.1
Highest anal ray in anal base	1.0	1.0-1.1(1.2)	1.0	(0.9)1.0	0.9-1.0	(0.9)1.0-1.1	1.1
Anal base in head	2.0	(1.5, 1.7) 1.8-2.1	2.4	(2.1)2.2- 2.4(2.6)	2.0-2.3	(1.9)2.1- 2.3(2.4)	2.0
Anal base in soft dorsal base	1.5	1.3-1.6	1.2	1.2-1.3(1.6)	1.4-1.5	1.2-1.4	1.3
Longest pectoral ray in head	0.85	0.9-1.0(1.2)	1.1	(1.0)1.1 (1.2)	1.1-1.2	1.1-1.2	1.1
Length of pelvic fin in head	1.0	1.1-1.2(1.4)	1.3	1.3-1.4	(1.3)1.4	1.2-1.4	1.2
Interspace between pelvic fins in pelvic base	1.5	1.4-1.6(1.9)	1.3	1.5-1.7(1.8)	1.3-1.6	(1.4)1.5	1.5

age about 1 fewer than in *euzonus*. In *erizonus* the eye averages smaller and the snout longer, so that the eye-snout ratio is quite distinct (1.3 to 1.5 in *erizonus*, 0.9 to 1.2 in *euzonus*). The fins, notably the pectoral, tend to be somewhat larger in *erizonus* than *euzonus*, though smaller than in *osburni* and *variatus*. Distinctions in coloration are evident, and there are several other minor differences. The 2 subspecies are compared as items 5a and 5b of the key, and in Table I.

The dorsal fins are separated in all the types.

In preserved specimens the ground color between the saddles of the back is olivaceous tan. Each scale of these regions is finely and closely speckled with black, except at the center, which is clear. Some scales, in irregular patches in the light areas, are much more densely speckled than others and produce a slightly tessellated effect. The back is crossed by the 4 strong fuscous bands characteristic of the *P. variatus* group. The margins of these dorsal saddles are not as sharply defined as in *P. e. euzonus*. The first saddle, extending over the posterior part of the nape, has its posterior margin somewhat extended backward along the sides of the first 1 or 2 spines of the dorsal fin. This mark extends solidly down to the insertion of the pectorals, where it divides, sending one line down behind the fin and another in front of the fin under the gill-cover. The second dorsal saddle begins at the back of the spinous dorsal and slopes more sharply forward than the first saddle. It widens at the lateral line and forks to form, below the lateral line, 2 less blackened lateral blotches, which are more distinctly separated from the dorsal saddles than in *euzonus*. The third saddle, located at the back of the soft dorsal, is quite similar, likewise giving off blotches below the lateral line. The fourth saddle, well back on the caudal peduncle, is not forked, but becomes markedly widened below the lateral line. There is a poorly defined dark spot on the peduncle near the base of the caudal fin.

The blotches below the lateral line, usually numbering 8, occasionally 9, in 1 fish 10, are all decidedly more triangular than in specimens of *euzonus* of similar size, never forming

squarish blocks or bars. With age this triangular pattern breaks down to produce a more irregular pattern, vaguely suggesting right triangles joined by their apices. The lateral markings are definitely more separated from the dorsal saddles than in *euzonus*, usually showing at most a slight connection.

The cheeks are lightly speckled with melanophores. The suborbital region ordinarily remains clear, except for a narrow rim below the eye and a narrow blackish bar extending downward from the middle of the eye. Otherwise the under side of the head and breast is usually immaculate at all ages, except for several black specks on the chin. Some adults show a tendency toward speckling on the under side of the head, but the degree of pigmentation characteristic of adult *euzonus* is never approached.

After 3 months in formalin the holotype and other breeding males retained some of the nuptial colors. A longitudinal band of yellow-orange extends along the lower side of the trunk, above and to slightly behind the depressed pelvic fin. Irregular red dots on the sides tend to be more or less centered, one on each pale area below the lateral line. Above the lateral line red dots begin behind the second blackish saddle, are arranged in groups of 3 or 4 before the third saddle, and become larger and more numerous toward the caudal fin. The light interspaces between the dark lateral blotches are tinted with lemon-orange. The spinous dorsal shows a basal stripe containing blocks of brown, then a clear streak followed by a band of black; then an orange-red submarginal stripe within the clear border. The basal half of the soft dorsal is colored like the caudal; the distal half is clear or nearly so. The caudal fin is marked by wavy vertical lines, alternately dusky and red; the red is intensified toward the base of the fin. The anal and pelvic fins are whitish. The pectoral, reddish orange on the base, is elsewhere marked by alternating blocks of red and dusky. The life colors correspond rather closely with those described for *P. variatus* and *P. osburni*, but the breeding males apparently do not become so intensely pigmented as in *variatus*, since a very strong contrast between the saddles and the ground color is retained.

The name *erizonus* is taken from the Greek: ἔρι, intensive prefix, and ζώνη, zone.

4b. *Poecilichthys euzonus euzonus*, new subspecies

(Pl. I, Fig. 3)

Etheostoma uranidea (presumed identification).—Meek, 1894a: 268 (record for White River at Oxford Bend, which is 9 miles northeast of Fayetteville, Washington County, Arkansas).

The holotype, University of Michigan Museum of Zoology No. 123548, is an adult male, 60.5 mm. in standard length. It was collected July 8, 1938, in Buffalo River, 4 miles southeast of St. Joe, Searcy County, Arkansas, by John D. and Ruby Y. Black. The 8 paratypes, all taken by the same collectors in the White River system of Arkansas, comprise 5 specimens collected with the holotype; 2 from King's River, 3 miles east of Alabam, at Denney Cave, Madison County, June 30, 1938; 1 from White River near Busch, Carroll County, July 8, 1938. The 9 types range in standard length from 28 to 60.5 mm.

The distinctive features of this form are mostly given in the key and in Table I.

The dorsal fins are separated in 7 specimens, united in 2.

The ground color of preserved specimens is a clear tan, apparently lacking the olivaceous tinge of *erizonus*. The side and back are finely and evenly speckled with fine black dots, except at the clear center of each scale. Since very few, usually none, of the scales on the back between the saddles are conspicuously darkened, the tessellated effect of *erizonus* is lacking. The saddles are all fuscous, possibly a little more brownish than in the other members of the group. The first saddle, crossing the nape just before the dorsal fin, is usually sharp-edged behind, extending just to the first dorsal spine, but in some specimens is extended backward as in *erizonus*, so that the saddle surrounds the first 2 spines. This saddle shows considerable variation, but its margins are sharper and straighter than in *erizonus*. The first saddle is continued down to the insertion of the pectoral fin where it divides into 2 rather narrow lines, one running down the side behind the

pectoral, the other extending along the fin base just under the edge of the gill-cover. The second dorsal saddle, extending downward and somewhat forward from the posterior part of the first dorsal base, splits at the lateral line to form an inverted Y. The resulting blotches on the sides below the lateral line are definitely block-shaped in the holotype and other adults, and are connected by at least a corner with a dorsal saddle. The similar third saddle, located at the back of the soft dorsal, shows no offset in the front margin, as the anterior of the 2 associated lateral blotches is continuous with the front half of this saddle. The fourth saddle, well back on the caudal peduncle, is undivided but expanded below the lateral line. There is also a poorly defined caudal spot. As in *erizonus*, the black speckling fades out rapidly below the lateral line. The sides below the blackish blotches are virtually immaculate.

The blotches along the sides are fewer than in any other species of the group, numbering 5 to 8, usually 7 or 8. In the adults they are clean-cut blocks, losing the more triangular shape which seems characteristic of the younger fish.

The sides and lower surfaces of the head, as well as the anterior half of the breast, are closely and finely speckled with black, particularly in the adults. In this respect the adults of *erizonus* and *euzonus* are surprisingly unlike, though immature individuals are not so distinct. The young of *euzonus* lack most of the speckling, but at comparable sizes are more pigmented than those of *erizonus*.

Almost nothing is known of the breeding colors of the male. However, the checkered pattern on the pectorals, caudal, and soft dorsal, and some color remaining on the spinous dorsal, indicate that the colors of the fins as a whole are similar to those of *erizonus*. As in that form, the pelvics and anal are apparently devoid of color.

The name *euzonus* is from $\epsilon\upsilon\bar{\nu}$, well or beautifully, and $\zeta\acute{\omicron}\nu\eta$, zone.

5. *Poecilichthys blennius* (Gilbert and Swain)

(Pl. II, Fig. 2)

Etheostoma (Rhothoea) blennius.—Gilbert and Swain, in: Gilbert, 1887: 55-56 (original description; near Florence, Alabama).

Etheostoma blennioides.—Jordan and Evermann, 1896: 1073 (description).

Ulocentra blennioides.—Jordan, 1929: 157 (description). Jordan, Evermann, and Clark, 1930: 287.

Poeciliichthys blennioides.—Kuhne, 1939: 92.

Etheostoma thalassinum (misidentification).—Boulenger, 1895: 83 (in part).

This very distinct species was well described by Gilbert and Swain. It is contrasted in our key with the other and more typical species referred to the *Poeciliichthys variatus* group. Its pertinence to the genus *Poeciliichthys* is discussed on p. 3.

Apparently the types are the only previously recorded specimens. Additional material has lately been collected by L. F. Miller, working under A. R. Cahn of the Tennessee Valley Authority: 1 adult 47 mm. long from Greene River, Duck River system, Wayne County, Tennessee, May 16, 1937; 1 small adult, 43.5 mm. long, from Brush Creek, Duck River system, Perry County, Tennessee, May 17, 1937; 1 adult male, 49 mm. long, from Bumpass Creek, Tennessee River system, Lauderdale County, Alabama, February 16, 1938; 13 half-grown, 25 to 27 mm. long, from Second Creek, Tennessee River system, Lauderdale County, Alabama, November 4, 1937.

The scales are relatively large. In the 3 adults and 6 young specimens the counts are: 4 or 5, usually 5—42 to 45—6 or 7. The head and breast are completely naked.

Dorsal rays XI to XIII—11 to 13. Anal rays II, 8 or 9. Pectoral rays 16 or 17, usually 16. The dorsals are well separated in all the specimens.

The lateral-line canals and pores of the head agree with the description for the group (p. 5), except that there is considerable variation in the posteriormost of the anterior set of 4 pores of the infraorbital series. In the Greene River specimen, the pore of one side opens by a short upward-projecting tube; on the other side, by a short downward tube. In all other examples examined, this pore opens into the canal, or just below it.

This is one of the most heavily set of all the darters. It is almost cylindrical, though relatively deep through the shoulders. The contours taper rapidly behind the spinous dorsal.

The abruptly declivous snout accentuates the appearance of robustness.

Considerable differences in proportionate measurements appear when the 2 adult specimens from the Duck River system are compared with the half-grown fish from nearer the type locality, in Alabama. Since the differences may reflect some local variation, as well as age changes, the measurements of the 2 lots are presented separately: those for the Duck River specimens first; those for the Alabama material in parentheses, and separately for the 1 adult and for 6 half-grown. Depth 4.4 to 4.7 (5.0; 4.7 to 5.0). Greatest width 1.3 (1.3; 1.4 to 1.5) in projection of greatest depth. Head length 3.9 to 4.0 (4.1; 3.6 to 3.8). Least suborbital width 5.3 to 5.5 (4.8; 6.0 to 6.7) in head. Least interorbital width 1.9 to 2.0 (1.9; 1.7 to 2.0) in eye. Eye 4.9 (4.6; 4.0 to 4.3) in head; 1.8 (1.6; 1.2 to 1.5) in snout. Snout 2.7 to 2.8 (2.9; 3.1 to 3.6) in head. Upper jaw 4.0 to 4.2 (3.7; 3.8 to 4.1). Angle of muzzle 72° to 73° (70°; 68° to 75°); of gill-membranes 97° to 98° (110°; 89° to 95°). Eye 2.7 (2.4; 2.3 to 2.6) in distance from tip of mandible to union of gill-membranes; latter distance 1.6 to 1.7 (1.9; 1.6 to 1.9) in head; and 1.3 to 1.4 (1.2; 1.4 to 1.6) times interspace between union of membranes and insertion of pelvic fin. Highest dorsal spine 1.9 to 2.0 (1.95; 2.0 to 2.2) in head, 2.2 to 2.3 (2.6; 2.0 to 2.1) in first dorsal base, and 1.2 to 1.3 (1.2; 1.2 to 1.3) in highest dorsal soft ray, which enters the head 1.6 to 1.8 (1.6; 1.7 to 1.8) times, and the second dorsal base 1.2 to 1.4 (1.3; 1.1 to 1.2) times. Length of caudal fin 1.3 (1.2; 1.3 to 1.4) in head. Highest anal ray 1.6 to 1.7 (1.7; 1.7 to 1.8) in head, and 0.8 (1.0; 0.7 to 0.8) in the anal base, which enters the head 1.8 to 2.2 (1.7; 2.1 to 2.4) times, and the second dorsal base 1.4 to 1.6 (1.3; 1.3 to 1.4) times. Longest pectoral ray 0.7 (0.8; 0.7) and length of pelvic fin 0.9 (1.0; 0.9) in head. Interspace between pelvic fins 1.1 to 1.2 (1.3; 1.4 to 1.5) in pelvic base.

The following color notes were made after the specimens had been in formalin about two weeks. In the adult from Greene River, the whole color tone was pinkish, owing to the light

brownish red spot on the center of each scale from the dorsal fins to the side of the belly. These spots became weak and tan colored on the lower sides of the caudal peduncle, but deeper and brighter under the pectorals. The lower sides, especially between and near the lateral blotches, were bright golden. The belly was white. The breast was bright silvery with strong mottlings of ivory before and behind the pectoral fins. The dark bars of the body were blackish green. The head was mottled with light and dark olive. The margin of the first dorsal fin was narrow and blood-red forward, still narrower and yellower posteriorly, but broad and red-brown near the end of the fin. There was a dusky reddish brown stripe on each interspinous membrane from the base well toward the tip, and a somewhat similar, but less reddish mark on each membrane of the second dorsal. The greenish caudal rays were very indefinitely banded with dusky. The anal and pelvic rays were mostly yellow, becoming a little orange forward and outward. The pectoral fin was mostly yellowish on the rays, but the median part of the fin was banded with pink and green.

The specimen from Brush Creek was brighter, although the red spots on the scales were fainter (hardly evident on the white underparts). The blackish green oblique saddles were abruptly set off on the posterior edge by bright cream, as in the other specimen, and there was a tannish semicircle on the nape in front of the first saddle. The red border on the spinous dorsal was developed only anteriorly. The dorsal spines and soft rays were individually barred with deep green and amber, and the membranes were only slightly blotched. The greenish caudal was barred with darker and lighter. The pectoral showed 2 pink crescents near the base, and bars of yellowish and greenish outward. The pelvic fin was definitely dappled with pink.

The adult male from Bumpass Creek was described as richly though not brilliantly colored. The light areas covering most of the sides and back were enriched by a strong rosy wash, mostly concentrated toward the centers of the scales. The dorsal spines were set off in translucent streaks, between which

the membranes were deep red-brown. The first dorsal became pinkish brown just within a fine, pale edge. The second dorsal was mostly red-brown on the membranes, becoming sooty outward and pale brown along the rays. The caudal and pectoral fins were dusky green and yellowish; the pelvic, dusky with a cream edge; the anal, pale.

In the small specimens from Alabama the light areas were a rich tan. The base of the pectoral was marked with a conspicuous watery orange crescent.

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PLATE I

FIG. 1. Holotype of *Poecilichthys tetrazonus*, a half-grown specimen 33 mm. in standard length, from Big Niangua River, Missouri.

FIG. 2. Holotype of *Poecilichthys euzonus erizonus*, an adult male 66 mm. in standard length, from Current River, Missouri.

FIG. 3. Holotype of *Poecilichthys euzonus euzonus*, an adult male 60.5 mm. in standard length, from Buffalo River, Arkansas.

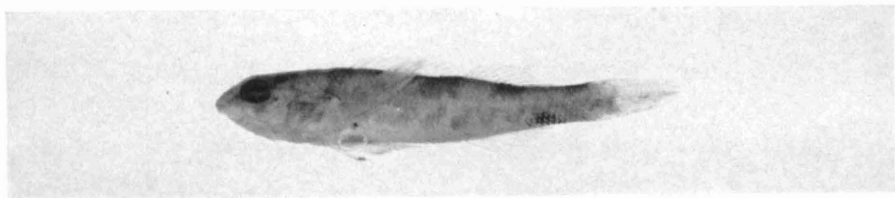


FIG. 1

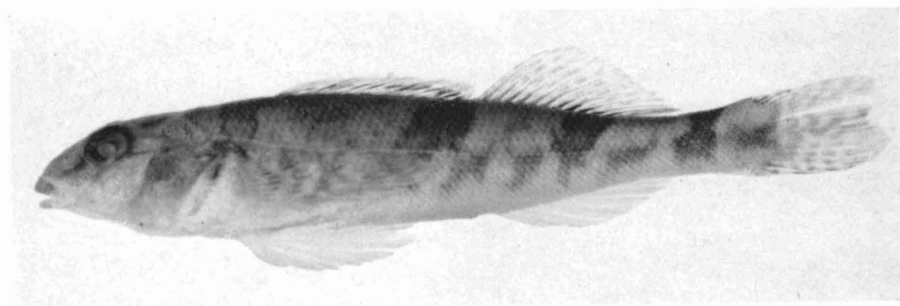


FIG. 2

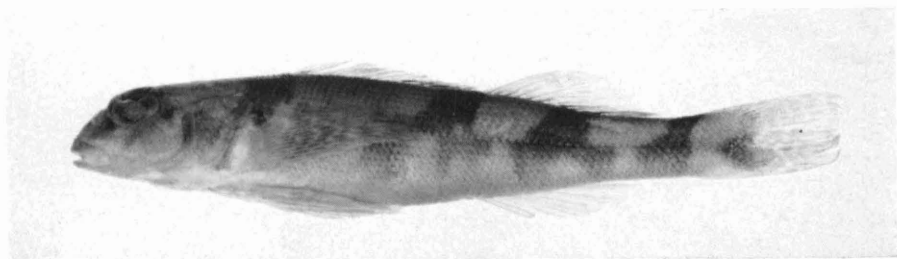


FIG. 3

Photographs by F. W. Ouradnik.

Carl L. Hubbs and John D. Black

PLATE II

FIG. 1. Breeding male of *Pocilichthys variatus*, 73 mm. in standard length, from Columbiana County, Ohio.

FIG. 2. Adult of *Pocilichthys blennius*, 43.5 mm. in standard length, from Brush Creek, Duck River system, Tennessee.

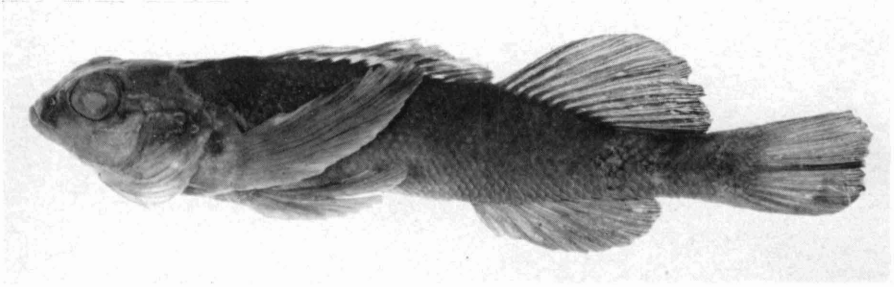


FIG. 1

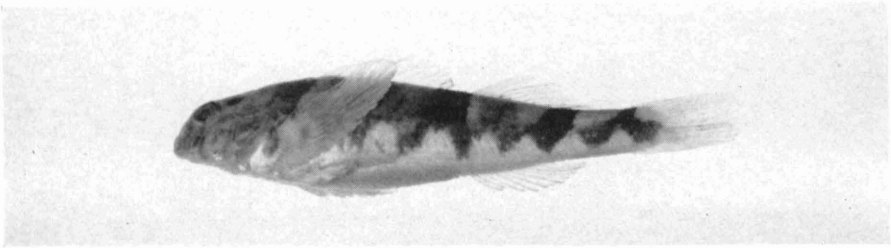


FIG. 2

Photographs by F. W. Ouradnik.

