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POECILICHTHYS KANAWHAE, A NEW DARTER
FROM THE UPPER NEW RIVER SYSTEM IN
NORTH CAROLINA AND VIRGINIA*

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ON a recent collecting trip in North Carolina, Ernest A. Lachner, L. James Kezer, and the author were so fortunate as to take numerous specimens of a new percid fish of the genus *Poecilichthys*. This new darter is closely related to both *P. variatus* and *P. osburni*. It is named *Poecilichthys kanawhae* for the Kanawha River system, of which the New River is a main tributary.

The 45 available specimens of the new species have all been taken in the New River drainage of North Carolina and Virginia, where it is largely limited to riffles. It appears to prefer large streams, although a few specimens were taken in a small tributary within 100 feet of the New River. Thus another interesting species is added to the distinctive fauna of the Kanawha River system above the Kanawha Falls, and it is to be considered a relict form. Discussions of the fish fauna of this region have been published by Hubbs (1931), Hubbs and Trautman (1932), and Hubbs and Raney (1939). Since little is known of the distribution of the fishes in the head-

* The trip to North Carolina upon which this new species was found was made possible through a grant from the Faculty Research Committee of Cornell University.

waters of the New River (see Breder and Breder, 1923), lists of the species collected at 9 localities are included in Table I. Several species not hitherto recorded from North Carolina were found.

The holotype (U.M.M.Z.¹ No. 131837), an adult male 71.5 mm. in standard length, and 20 paratypes, which include several adult males and females as well as many juveniles, were taken in the North Fork of the New River at Crumpler, Ashe County, North Carolina, on April 1, 1940. Here the river, averaging close to 300 feet in width, consists of long, deep pools with occasional long riffles. These darters were collected in a moderately fast riffle in water from 6 to 18 inches in depth over a bottom of small rubble and gravel. A few were taken by overturning large rocks, but most were obtained by holding a 10-foot seine stationary and scuffing the area of gravel and rubble on the upstream side. The adult females were swollen with eggs, an indication that the breeding season was near. The adult males were in brilliant nuptial dress. In and above this riffle, 14 other species, including 3 species of darters, were taken. The fishes which were collected at this and at the other localities are listed in Table I.

Two paratypes, both small males, were collected in the North Fork of the New River, 1 mile north-northeast of Warrensville, Ashe County, North Carolina, on April 1, 1940. Both specimens were captured in a riffle over a rubble bottom.

Five paratypes, 2 adult males in breeding color and 3 juveniles, were taken in the North Fork of the New River, 1 mile north-northeast of Creston, Ashe County, North Carolina, on the same day. The specimens were taken in a rather swift riffle 70 feet wide and 2 feet deep at the deepest point, over a gravel bottom.

Seven paratypes—3 adult males, 2 females with eggs, and 2 juveniles—were collected in the South Fork of the New River at Index, Ashe County, North Carolina, on April 2, 1940. Four were seined in a wide riffle in the main channel, and 3 specimens, including a large, adult male, were taken in the mouth of a small tributary within 100 feet of the river.

¹ University of Michigan Museum of Zoology.

TABLE I

DISTRIBUTION OF THE FISHES COLLECTED IN THE NEW RIVER DRAINAGE, ASHE AND WATAUGA COUNTIES, NORTH CAROLINA, APRIL 1-2, 1940. THE PRESENCE OF A SPECIES IS INDICATED BY AN X
 Those species found in the same riffle habitat as *Poecilichthys kanawhae* are followed by an asterisk

Species	North Fork New River				South Fork New River				
	At Crumpler	1 mi. NNE. of Warrens-ville	1 mi. NNE. of Creston	At Index	1 mi. SW. of Fleet-wood	1 mi. NE. of Blowing Rock	Trib. 1.5 mi. NE. of Bald-win	Trib. at Todd	Trib. 6 mi. NE. of Boone
<i>Salvelinus f. fontinalis</i> .....	.....	.....	.....	.....	.....	X	X	.....	.....
<i>Salmo gairdneri irideus</i>	X	X	.....	.....	.....	X	X	X	X
<i>Catostomus c. commersonni</i>	X	X	X	X	X	.....	.....	X	.....
<i>Hypentelium nigricans</i> *	X	X	X	.....	.....	.....	.....	X	.....
<i>Nocomis micropogon</i> *	X	X	.....	.....	.....	X	X	.....	X
<i>Rhinichthys atratulus obtusus</i> *	X	X	X	X	.....	.....	.....	.....	X
<i>Rhinichthys cataractae</i>* .....	.....	X	X	.....	.....	.....	.....	.....	X
<i>Notropis scabriceps</i> .....	.....	X	X	.....	.....	.....	.....	.....	.....
<i>Notropis spilopterus</i>	X	X	X	.....	.....	.....	.....	.....	X
<i>Notropis photogenis</i> *	X	X	X	X	X	.....	.....	.....	.....
<i>Notropis rubellus</i> *	X	X	X	X	.....	.....	.....	.....	.....
<i>Phenacobius teretulus</i> *	X	X	X	X	.....	.....	.....	.....	.....
<i>Pareucoglossum taurae</i>* .....	.....	X	X	.....	.....	.....	.....	.....	.....
<i>Hyborthynchus notatus</i>	X	X	X	X	.....	.....	.....	.....	.....
<i>Campostoma anomalum</i> *	X	X	X	X	.....	.....	.....	.....	.....
<i>Hadropterus maculatus</i> *	X	X	X	X	.....	.....	.....	.....	.....
<i>Poecilichthys kanawhae</i>	X	X	X	X	X	X	X	X	X
<i>Catnotus f. flabellaris</i> *	X	X	X	X	X	X	X	X	X
<i>Etheostoma b. biennioides</i> *	X	X	X	X	X	X	X	X	X
<i>Cottus bairdii</i>* .....	.....	.....	.....	X	.....	.....	.....	.....	.....

Five paratypes, all juveniles, were obtained in the South Fork of the New River, 1 mile southwest of Fleetwood, Ashe County, North Carolina. All were found in a long, wide riffle in water less than 1 foot deep, for the most part, over rubble bottom.

The holotype and numerous paratypes have been deposited in the University of Michigan Museum of Zoology. The other paratypes listed above are in the Cornell University Museum.

Two paratypes (U.M.M.Z. No. 95371), both juveniles, were captured in Big Reed Island Creek, Carroll County, Virginia, on May 17, 1931, by Carl L. Hubbs and Edwin P. Creaser. Hubbs and Trautman (1932: 37) recognized that these were different from typical *Poecilichthys osburni*, but since they had only 2 small specimens they described them as large-scaled variants. In their recent revision of the *Poecilichthys variatus* group, Hubbs and Black (1940: 11) also mentioned these as variants of *P. osburni*.

Three paratypes (U.S.N.M.² No. 107679), including an adult male and two females, were obtained in Crooked Creek 4 miles east of Galax, Carroll County, Virginia, on July 13, 1938, by Leonard P. Schultz and Earl D. Reid. Some characters of these specimens were listed by Hubbs and Black (1940: 11), who considered them also as large-scaled variants of *Poecilichthys osburni*.

Dr. Carl L. Hubbs has kindly examined all the specimens of *Poecilichthys kanawhae* mentioned above and is in agreement with the diagnosis presented here. He has also loaned me specimens of *kanawhae* and *osburni* from the collection of the University of Michigan Museum of Zoology and has made available to me scale and fin counts of the specimens of *osburni* in the University of Michigan collection. In addition, he has examined the manuscript critically and has made a number of suggestions for its improvement. Dr. Leonard P. Schultz, Curator of Fishes in the United States National Museum, has loaned me 3 specimens of *kanawhae*, designated above as paratypes, and several series of *variatus* from Virginia, which were

² United States National Museum.

TABLE II
 NUMBER OF SCALE ROWS AND FIN RAYS IN THREE SPECIES OF *Poeciliichthys*

	Lateral-line Scale Rows (to End of Hypural)																					Mean		
	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68		69	70
<i>P. kanawhae</i> *	1	2	5	2	3	10	9	7	4	2	53.2	
<i>P. variatus</i> †	1	2	3	7	7	8	8	2	3	1	6	4	52.6	
<i>P. osburni</i> ‡	3	3	4	9	4	7	6	4	0	1	0	1	63.1
	Scales Above Lateral Line					Scales Below Lateral Line						Anal Rays												
	6	7	8	9	Mean	7	8	9	10	11	Mean	8	9	10	11	Mean								
<i>P. kanawhae</i>	14	30	1	.....	6.7	8	34	3	.....	.....	7.9	14	31	.....	.....	8.7			
<i>P. variatus</i>	20	22	.....	.....	6.5	1	20	21	.....	.....	8.5	2	22	18	.....	9.4			
<i>P. osburni</i> .....	.....	3	27	12	8.2	.....	.....	10	23	9	10.0	1	20	20	1	9.5					
	Dorsal Spines						Dorsal Soft Rays						Dorsal Spines + Soft Rays											
	10	11	12	13	14	Mean	12	13	14	15	16	Mean	22	23	24	25	26	27	28	Mean				
<i>P. kanawhae</i>	1	14	28	2	12.7	18	22	5	12.7	1	2	23	17	2	25.4				
<i>P. variatus</i>	24	18	12.4	5	25	12	13.2	3	15	20	4	25.6				
<i>P. osburni</i>	1	1	21	19	12.4	2	17	20	2	1	13.6	1	1	6	26	5	3	26.0				

* Types: see Table IV for localities.

† Specimens from Pennsylvania, West Virginia, and Virginia.

‡ Specimens from the upper Kanawha River system in West Virginia and Virginia.

used in making comparisons. The measurements and counts included in this paper were obtained in the manner described by Hubbs and Black (1940: 9).

Poecilichthys kanawhae, new species

(Pl. I)

Although this darter is related to both *P. variatus* and *P. osburni*, it appears to be closer to *variatus* in many characters. Both *kanawhae* and *variatus* are rather robust and heavy-shouldered species as compared to the more terete *osburni*. The squamation (Table II) is almost identical: there are from 48 to 57 lateral-line scale rows, with a mean of 53 in each, whereas in *osburni* there are from 59 to 70, with a mean of 63. Furthermore, both may be separated from *osburni* by the other scale counts as may be seen in Table II. In addition to differences in body shape and in squamation, *osburni* is more darkly banded, especially anteriorly. This character is especially striking in adult males at the height of the breeding season (see Hubbs and Trautman 1932: 35, Fig. 2). In *kanawhae* and *variatus* the dark, vertical bands are pronounced on the posterior half of the body. There are usually 6, and they become entirely invisible in some adult males of *variatus* which, as portrayed in Hubbs and Black (1940, Pl. 2), may appear very dark. The breeding colors are in general almost identical in *kanawhae* and *variatus*. However, in the large, adult, male *kanawhae* near the breeding season, there are usually 10 vertical red-orange bars along the side. In this respect *kanawhae* resembles *osburni* rather than *variatus*, since in the latter the red-orange bars are fewer (5 or 6) and are limited to the posterior half of the body. Whereas *kanawhae* and *variatus* correspond in the several above-mentioned characters, such as general body shape, number of scale rows, and general coloration, *kanawhae* differs from *variatus* in the characters given in Table III.

In several respects *kanawhae* and *osburni* are closer to each other than to *variatus*. Each has 5 dark saddles (6 in 65 per cent of the specimens of *kanawhae*) on the back, whereas *varia-*

tus has only 4. The coloration along the sides is similar, in that the transverse red-orange bars occur along the anterior half of the body (in *variatus* these bars are limited to the posterior half). Both have a large yellowish mark on the cheek

TABLE III

A COMPARISON OF SOME CHARACTERS OF *Poecilichthys kanawhae*
AND *Poecilichthys variatus*

	<i>P. kanawhae</i>	<i>P. variatus</i>
Black saddles on back	5 or 6	4
Vertical red-orange bars on sides in breeding males ...	10	5 or 6
Eye	Smaller; greatest diameter less than snout (about equal to snout in a few cases); eye in snout. 1.1-1.4	Larger; greatest diameter equal to or greater than snout; eye in snout 0.8-1.0
Snout	Snub-nosed; angle of muzzle 70° to 90°	Snout somewhat produced; angle of muzzle 55° to 70°
Gill-membranes	More broadly joined; angle, 100° to 128°; few or no pigment flecks in adult ♂	Less broadly joined; angle, 61° to 90°; heavily dotted with pigment flecks in adult ♂
Head	Shorter; in standard length, 3.8 to 4.1 in adults; narrower behind eyes	Longer; in standard length, 3.4 to 3.7 in adults; broader behind eyes
Light mark on cheek	Large and well defined in adult ♂	Small and ill-defined in adult ♂
Breast	Scaleless (at times with several embedded scales)	Scaled (naked in a few individuals)

and little or no pigment on the gill-membranes, and, furthermore, the breast is scaleless (occasionally with a few embedded scales). In *variatus* the breast is almost always well scaled.

The structural evidence, considered in the light of the known distributional facts, indicates that *kanawhae* and *osburni* have evolved from the *variatus* type as they were left isolated in the upper Kanawha River system above the great Falls of the Kanawha River in West Virginia. As far as is now known,

kanawhae is limited to the extreme headwaters of the New River in North Carolina and some of its tributaries in Carroll County, Virginia. In Carroll County *osburni* also has been taken in Reed Creek. This stream enters the New River almost opposite the mouth of Big Reed Island Creek, where Hubbs and Trautman (1932: 37, and Fig. 1) collected *kanawhae*. The 2 species have not been taken together, however—at least, up to the present. Lower in the Kanawha River system (but still above the Falls) *osburni* has been taken in a number of localities. No *variatus* has been taken above the Falls in the Kanawha River. The distribution of *variatus*, as given recently by Hubbs and Black (1940: 7), includes the “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.”

Hubbs and Black (1940: 9), in their recent revision of the group, have included a key to the darters related to *P. variatus*. *P. kanawhae* could be included, in part, under item *2b* of their key, since the snout is more declivous (angle to muzzle from 70° to 90°) and the gill-membranes are broadly joined. However, as may be seen by an examination of Tables II and IV, *kanawhae* does not agree with *blennioides* in all other characters given in *2b*. Under *3c* in the key, the presence of 6 (often 5) dark saddles in *kanawhae* distinguishes it trenchantly from *P. blennioides*, which has 4. Furthermore, the dark dorsal saddles in *blennioides* are set off by a creamy white posterior border, not seen in *kanawhae*.

The counts and measurements of the types included in Tables II, III, and IV, the photograph of an adult male in Plate I, and the comparisons with related forms have portrayed most of the characteristics of *kanawhae*.

In the adult, the form of the body is rather robust and the snout is very blunt. In the holotype, the angle of the muzzle, especially when the anterior half of the snout is considered, is close to 90° , but the snout is more produced in smaller specimens. The snout, viewed from the side, is somewhat rounded. The dorsal contour of the body, beginning at the top of the

TABLE IV
MEASUREMENTS AND COUNTS OF THE TYPES OF *Poeciliichthys kanawhae*

	North Fork, New River, at Crum- pier, N.C.		North Fork, New River, near Cros- ton, N.C.		North Fork, New River, near Warrens- ville, N.C.		South Fork, New River, near Fleet- wood, N.C.		South Fork, New River, near Big Reed Island Creek, Va.		Crooked Creek, near Galax, Va.	
	U.M.M.Z.* No. 131837	C.U.M.† No. 7663 and U.M.M.Z. No. 131838	U.M.M.Z. No. 7830 and U.M.M.Z. No. 131834	C.U.M. No. 7830 and U.M.M.Z. No. 131834	U.M.M.Z. No. 7678 and U.M.M.Z. No. 131836	C.U.M. No. 7688 and U.M.M.Z. No. 131835	C.U.M. No. 7693 and U.M.M.Z. No. 131835	C.U.M. No. 7693 and U.M.M.Z. No. 131835	U.M.M.Z. No. 95371	U.S.N.M.‡ No. 107679	Paratypes	Paratypes
Number of specimens	1	20	5	5	2	7	5	5	2	3	Paratypes	Paratypes
Standard length (in mm.)	71.5	38.5-60	35-70	35-70	48-52.5	44-60	39-44	39-44	30-44	46.5-58.5	30-44	46.5-58.5
Scales above lateral line	7	6-8	6-7	6-7	6-7	6-7	6-7	6-7	6-7	6-7	6-7	6-7
Scales in lateral line	55	49-56	50-56	50-56	51-55	48-56	53-57	53-57	54-57	53	54-57	53
Scales below lateral line	8	7-9	7-8	7-8	8	7-8	8	8	8	8	8	8
Dorsal spines	12	12-13	12-14	12-14	12-13	12-14	12-13	12-13	11-12	13	11-12	13
Dorsal soft rays	12	12-14	12-14	12-14	12-13	12-14	12-14	12-14	12-13	12-13	12-13	12-13
Anal rays	8	8-9	8-9	8-9	9	8-9	8-9	8-9	8-9	9	8-9	9
Pectoral rays	16-16	15-16	15-16	15-16	15-16	15-16	15-16	15-16	15-16	16-16	15-16	16-16
Depth in length	4.8	4.1-5.7	4.8-5.8	4.8-5.8	5.5-5.7	4.3-5.5	5.4-6	5.4-6	5.1-6.2	5-5.3	5.1-6.2	5-5.3
Greatest width in projec- tion of depth	1.5	1.2-1.6	1.3-1.4	1.3-1.4	1.2-1.4	1.2-1.4	1.3-1.5	1.3-1.5	1.3-1.4	1.3-1.4	1.3-1.4	1.3-1.4
Head in length	3.9	3.6-3.9	3.9	3.9	4.1	3.8-4	3.7-3.9	3.7-3.9	3.6-3.7	3.7-4	3.6-3.7	3.7-4
Least interorbital width in eye	2.4	2.4-3.4	2.2-3	2.2-3	2.7	2.7-3.3	2.4-2.9	2.4-2.9	2.3-2.5	2.1-3.2	2.3-2.5	2.1-3.2
Eye in head	4	3.7-4.3	3.85-4.2	3.85-4.2	3.9-4.1	3.6-4.1	3.9-4.2	3.9-4.2	4	3.9-4	3.9-4.2	3.9-4

* U.M.M.Z. = University of Michigan Museum of Zoology.
 † C.U.M. = Cornell University Museum.
 ‡ U.S.N.M. = United States National Museum.

TABLE IV—(Cont.)

	North Fork, New River, at Crumpler, N.C.		North Fork, New River, near Creston, N.C.		North Fork, New River, near Warrensville, N.C.		South Fork, New River, near Fleetwood, N.C.		Big Reed Island Creek, Va.		Crooked Creek, near Galax, Va.	
	U.M.M.Z.* No. 131837	C.U.M.† No. 7663 and U.M.M.Z. No. 131838	U.M.M.Z. No. 7830 and U.M.M.Z. No. 131834	Paratypes	U.M.M.Z. No. 7678	Paratypes	U.M.M.Z. No. 7693 and U.M.M.Z. No. 131835	Paratypes	U.M.M.Z. No. 95371	Paratypes	U.S.N.M.† No. 107679	Paratypes
	Holotype	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	
Eye in snout	1.4	1.1-1.4	1.2-1.4	1.3	1.2-1.3	1.3-1.4	1.2-1.3	1.2-1.3	1.2-1.3	1.2-1.3	1.2-1.3	
Snout in head	2.9	2.9-3.4	2.7-3.4	3	3-3.2	2.8-3.2	3-3.4	3-3.4	3-3.4	3-3.3	3-3.3	
Upper jaw in head	3.1	3.0-3.5	3.1-3.5	3.1-3.3	3-3.4	3.1-3.2	3.1-3.2	3.1-3.2	3.1-3.2	3.3-3.4	3.3-3.4	
Angle of muzzle	88	72-86	70-85	79-80	76-90	70-76	70-75	70-75	70-75	73-81	73-81	
Angle of gill-membranes	125	109-126	100-123	110-114	106-128	102-115	100-112	100-112	100-112	103-116	103-116	
Eye into distance from tip of mandible to union of gill-membranes	2.5	2.1-2.7	2.25-2.5	2.3-2.5	2.1-2.4	2.1-2.6	2.6-2.7	2.6-2.7	2.6-2.7	2.3-2.5	2.3-2.5	
Latter distance into head	1.6	1.6-1.85	1.7	1.6-1.8	1.6-1.7	1.6-1.8	1.5	1.5	1.5	1.6-1.7	1.6-1.7	
Interspace between insertion of pelvic fin and union of gill-membranes, in distance thence to tip of mandible	1.4	1.2-1.5	1.1-1.5	1.6-1.9	1.1-1.6	1.1-1.5	1.5	1.5	1.5	1.3-1.6	1.3-1.6	
Highest dorsal spine in head	2.2	2.0-2.7	2.1-2.4	1.25-1.6	2-2.6	2.2-2.6	2.1-2.8	2.1-2.8	2.1-2.8	2.4-2.6	2.4-2.6	
Highest dorsal spine in first dorsal base	2.7	2.3-3.4	2.6-3.0	2.8	2.4-3.3	2.5-3.1	2.2-3.2	2.2-3.2	2.2-3.2	2.7-3.2	2.7-3.2	

TABLE IV—(Concl.)

	North Fork, New River, at Crumpler, N.C.		North Fork, New River, near Creston, N.C.		North Fork, New River, near Warrensville, N.C.		South Fork, New River, at Index, N.C.		South Fork, New River, near Fleetwood, N.C.		Big Reed Island Creek, Va.		Crooked Creek, near Galax, Va.	
	U.M.M.Z.* No. 131837	C.U.M.† No. 7663 and U.M.M.Z. No. 131838	U.M.M.Z. No. 7830 and U.M.M.Z. No. 131834	C.U.M. No. 7678 and U.M.M.Z. No. 131836	C.U.M. No. 7688 and U.M.M.Z. No. 131835	C.U.M. No. 7693 and U.M.M.Z. No. 131835	U.M.M.Z. No. 95371	U.S.N.M.‡ No. 107679						
	Holotype	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	Paratypes	
Highest dorsal spine in highest dorsal ray	1.6	1.3-1.7	1.3-1.8	1.4-1.7	1.4-1.7	1.4-1.7	1.3-1.5	1.2-1.7	1.3-1.6					
Highest dorsal soft ray in head	1.4	1.4-1.8	1.3-1.7	1.4-1.6	1.3-1.7	1.3-1.7	1.6-1.8	1.6-2	1.5-1.9					
Highest dorsal soft ray in second dorsal base ..	1	0.9-1.4	1-1.3	1.2-1.3	1-1.2	1-1.2	1.1-1.5	1-1.1	1.2-1.4					
Length of caudal fin in head	1.25	1.2-1.3	1.2-1.3	1.2	1.2-1.3	1.2-1.3	1.3-1.4	1.2	1.3					
Highest anal ray in head ..	1.7	1.5-1.9	1.6	1.6	1.5-1.7	1.5-1.7	1.6-1.8	1.7-1.8	1.6-1.7					
Highest anal ray in anal base	1	0.7-1.0	0.9-1.0	0.9	0.8-1.0	0.8-1.0	0.8-0.9	0.9	0.8-0.9					
Anal base in head	1.7	1.6-2.3	1.6-1.8	1.7-1.8	1.6-2.1	1.6-2.1	1.8-2.2	2	1.7-2					
Anal base in soft dorsal base	1.3	1.1-1.8	1.3-1.4	1.4	1.2-1.5	1.2-1.5	1.3-1.6	1-1.3	1.3-1.5					
Longest pectoral ray in head	0.9	0.8-0.9	0.8-0.9	0.8	0.8-0.9	0.8-0.9	0.8-0.9	0.8-0.9	0.9					
Length of pelvic fin in head	1.3	1.2-1.4	1.2-1.3	1.2	1.2-1.3	1.2-1.3	1.2-1.3	1.2-1.3	1.2-1.3					
Interspace between pelvic fins in pelvic base	1.4	1.1-1.8	1.2-1.5	1.35-1.5	1.1-1.5	1.1-1.5	1.3-1.5	1.3	1.2-1.6					

head, is slightly inclined upward to just beyond the origin of the first dorsal. The slope of the back is somewhat rounded beneath the first dorsal, but gradually declines posteriorly to the end of the second dorsal base, where it levels off. The ventral margin of the body is nearly horizontal anteriorly, but curves upward sharply at the origin of the anal and levels off again just behind the base of the anal. The caudal peduncle is rather stout.

Yearlings and small juveniles about 30 to 40 mm. in standard length are more elongate and have a body shape very much like that of *Etheostoma blennioides blennioides*.

The genital papilla (see Hubbs and Cannon, 1935: 11) of adult females is much better developed than that of adult males (in the type series, collected near the breeding season). In the female it is an unpigmented, subconical structure, somewhat flattened on the dorsal side and lying rather closely against the first spine of the anal fin. In adult females it is more than half as long as the first anal spine. In the adult male it is more flaplike and is much flattened, especially on its dorsal side. It has numerous, small, dark spots, which are more concentrated near the base, and is rather short, averaging about $\frac{1}{4}$ as long as the first anal spine. The females are less brightly colored and differ in pattern, especially along the posterior side of the body, as is pointed out below.

In breeding or near-breeding adults the anal rays are heavily edged with tissue on either side. Nonbreeding adults and small specimens do not have this thickened tissue.

The spine on the posterior edge of the opercle is rather blunt. In *P. variatus* it is much longer and sharper. In the holotype the cheeks, opercle, breast, and angle between the supratemporal and lateral head canals are scaleless. In a small number of the paratypes there are a few embedded scales on the breast but the cheeks and opercle are scaleless.

The lateral-line system of the head is similar to that of the other fishes related to the *P. variatus* group discussed in detail by Hubbs and Black (1940: 5). The terminology here used is that employed by Hubbs and Cannon (1935: 10-11, Pl. II).

The lateral canal gives off 5 pores. The supratemporal commissure is complete; the median pore opens at the end of a tube which extends posteriorly a short distance. On either side is a lateral pore which opens directly over the canal. The coronal pore lies about on a line with the posterior border of the eye, whereas in *P. variatus* it is well in advance of the same line. The 2 anterior nasal pores are mesad and slightly in advance of the anterior nostrils; the 2 posterior nasal pores lie mesad and usually slightly in advance of the posterior nostrils. The infraorbital canal has 8 pores in some specimens, but the next to the last pore of one or both sides is lacking in several others; the holotype has such a pore on the right side only. The anterior series of 4 pores is rather strongly set off from the posterior group of 4, which open at the end of downward or backward extending tubes. The posteriormost pore of the anterior series presents an appearance very different from that of *P. variatus* or *P. osburni*, in which this pore lies at the end of an upward extending tube which reaches nearly to the eye. In *kanawhae* the tube is short; it extends upward only slightly in certain specimens, but downward for a short distance in others; in still other examples the pore opens on the canal. On the right side of the holotype the tube extends upward for a short distance and the pore opens upward. On the left side, however, the pore is lacking. In this character *kanawhae* appears to resemble *P. blennius* and *P. tetrazonus*. There are 10 pores in the operculomandibular series.

The holotype is a brilliantly colored male. The dorsal background of olivaceous brown is crossed by 6 prominent dark saddles, which are sharply set off from the adjacent olivaceous-brown scales. The first bar is located just in front of the first dorsal, the second is slightly in front of the middle of the first dorsal. It is the least pronounced of all the saddles and does not reach as far down on the sides as the others. The third saddle is at the posterior fifth of the first dorsal; the fourth is at the middle of the second dorsal; the fifth is immediately behind the second dorsal; the sixth crosses the caudal peduncle

near the base of the caudal fin. In about $\frac{1}{3}$ of the specimens the fifth and sixth are fused and thus form but 1 saddle. All the saddles except the second, which crosses the middle of the dorsal fin, extend below the lateral line on the side. The posterior sides have 6 prominent, transverse green bars with red-orange bars between. These more or less complete transverse red-orange bars (10, in all) are also found on the anterior sides. The bar just behind the pectoral base is more pronounced than are the 3 immediately posterior to it. These bars are not as well developed in younger males and are not found in females. Anteriorly, the lower sides are of a red-orange that merges into yellow above. The belly is pearl white. In the holotype, as in other males which are near the breeding season, the scales on the belly and lower sides are tipped with pearl white. The gill-membrane is red-orange, and the branchiostegals are yellow. The top of the head is dark; the snout is dusky with a yellow tinge. The opercle is dusky, and the cheeks have a large orange-yellow blotch. A dusky green, vertical band extends downward from the eye to the gill-membrane and is bordered in front by a yellow band. The chin is yellow-orange. An oval orange spot extends from the ventral end of the pectoral base to the anterior part of the pelvic base.

The first dorsal is strongly banded. At the base on the membrane is a row of greenish-yellow spots. This is bordered outwardly by a clear band, which in turn is bordered by a broad, green band. Next to the green band is another clear band and beyond that a bright orange-red band bordered on the extreme edge of the fin by a narrow clear area. The second dorsal is more somber, as the rays are relatively clear. The membrane near the base is dusky green with orange spots. Two-thirds of the distance from the base the membrane is orange, bordered on the outer edge by a clear area, and at the extreme edge of the fin is a narrow dusky-green band. The caudal fin has a green bar at its base, and the remainder of the fin is edged by a narrow green band. The main part of the caudal fin is slightly dusky, with four narrow, vertical, wavy

red bands. The anal fin is dark green at the base and fades to pearl white at the edge, and has a few scattered orange spots on the membranes. The pelvic fins are green at the base and pearl-white at the edge, with a tinge of red-orange just inside the pearl edging. The pectorals are dusky at the base, greenish-yellow in the center, and clear on their outer borders. Four rows of wavy red spots parallel the posterior edge of the fin.

Adult females have the 6 (occasionally 5) dark saddles across the back, but the dark transverse bars on the posterior sides are not strongly developed. The general effect is rather that of a scattered mottling with an irregular or zigzag ventral border. The most anterior dark bar is better developed, extending downward from the first dorsal saddle behind the pectoral fins. They lack the bright orange and reds which are prominent on the body of the male. The pelvic and anal fins are white; there are a few dark spots on the anal fin. Both dorsals, the caudal, and the pectorals are dark-spotted. These spots appear in from 2 to 3 vertical rows on the caudal fin. There are also red-orange spots in the second dorsal, caudal, and pectoral fins, and those in the latter 2 fins are arranged more or less in rows. There is a row of faint, dusky spots near the base of the first dorsal, and a row of red-orange spots near the edge.

The yearlings are banded somewhat like *Etheostoma blennioides blennioides*. There are usually 10 irregular dark bars along the side. With the exception of the anal and pelvics the fins are dark-spotted, somewhat as in the female.

SUPPLEMENTARY RECORDS.—On April 4, 1941, many additional specimens of *Poecilichthys kanawhae* were collected in southwestern Virginia in the tributaries of the New River. It was found in Carroll County in Little Reed Island Creek, 1 mile northwest of Hillsville; Crooked Creek, 1 mile southwest of Woodlawn; Snake Creek, 7 miles southeast of Hillsville; Big Reed Island Creek, 5.5 miles northeast of Hillsville. Specimens were also collected in Chestnut Creek, 1 mile south of Galax, Grayson County, and in the West Fork of Little River,

5.5 miles northeast of Willis, Floyd County. It was the most common darter in the riffles. No specimens of *P. osburni* were taken in the same streams.

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PLATE I

Paratype of *Poecilichthys kanawhae*, an adult male in breeding dress, 70 mm. in standard length, from North Folk of New River, near Creston, Ashe County, North Carolina.

POECILICHTHYS KANAWHAE

PLATE I



