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PAREXOGLOSSUM LAURAE, A NEW CYPRINID FISH FROM THE UPPER KANAWHA RIVER SYSTEM

BY CARL L. HUBBS

ONE of the American cyprinid fishes, *Exoglossum maxillingua* (Le Sueur) is so peculiar that it has been set apart as a distinct tribe, Cochlobori, by Cope (1869: 354), or as a distinct subfamily, Exoglossinae, by Jordan and Gilbert (1883: 146) and subsequent authors. But the discovery of the new genus described in this paper renders *Exoglossum* less unique, connects it with other American cyprinids, and makes unnecessary the special subfamily which has been erected for it. In this connection it may be pointed out that modifications of the jaw bones and lips are frequent within different groups of cyprinid fishes, especially those of Asia. Furthermore the peculiar structure of the dentary bones in *Exoglossum* has been exaggerated in the descriptions by Cope (1869: 354 and 359), Jordan and Gilbert (1883: 160), Jordan and Evermann (1896: 327), and other authors: the dentary bones, unlike the fleshy mandibles, are not united for their entire length as stated, but only along their anterior third; posteriorly the branches are distinctly separated, and retain a long median separation even after the intervening connecting tissue has been removed and the rami forced together posteriorly (see Figure 1).

The new species described in this paper has been recorded several times from the Kanawha River system in Virginia and West Virginia, under the name of *Exoglossum maxillingua*. The first of these records is that of Cope (1868: 241), who in his paper "On the distribution of fresh-water fishes in the Allegheny region of southwestern Virginia" merely listed the species for the Kanawha system in the comparative distribution table, without giving his actual records. These were supplied by Fowler (1923: 12, and 1924: 416), as Walker's and Sinking creeks and Kanawha River [Kanawha Creek]. Jordan (1889: 140) added Reed Creek, Virginia, and Fowler (1923: 12) reported the species also from Brush Creek, Virginia.

These Kanawha records of *Exoglossum maxillingua* were, I assume, all based on the hitherto unnamed genus and species, the description of which is the object of the present paper. Cope's specimens have been restudied, but those reported from the Kanawha system by Jordan and by Fowler have not been located for reëxamination. I have, however, collected the new species in Reed Creek, Virginia, from which Jordan obtained his specimens, and in three localities in the Kanawha drainage basin in West Virginia, and have consistently failed to find any specimens of the true *Exoglossum* in the same system. I therefore am led to conclude that *Exoglossum maxillingua* is exclusively represented in the Kanawha River system by the new form, which is now named *Parexoglossum laurae*.

This new cyprinid has been recorded under another erroneous identification from the Kanawha system. One of the specimens from the Bluestone River at Abbs Valley, recorded as *Phenacobius teretulus* by Goldsborough and Clark (1908: 35) proves on recent examination to represent *Parexoglossum laurae*, which has little in common with the true *Phenacobius teretulus* Cope (1867a: 96, and 1868: 228, pl. 22, fig. 1).[1]

[1] One of the cotypes of *Phenacobius teretulus* Cope, from Eggleston Springs, Virginia, has characters indicating that the species is a true *Phenacobius*, but distinct from *P. mirabilis*. It has the breast incom-

Parexoglossum laurae is the fourth known cyprinid characteristic of the fauna of the Kanawha River above its falls. The others are *Phenacobius teretulus,* just mentioned; *Notropis kanawha* Jordan and Jenkins (in Jordan 1889a: 354, pl. 44, fig. 5, and Jordan, 1889b: 140, pl. 14, fig. 5), and *Notropis scabriceps* (*Photogenis scabriceps* Cope, 1867b: 166, and 1868: 229, pl. 22, fig. 5). In a separate paper, Hubbs and Trautman are adding a darter to the list of fishes restricted to the upper Kanawha, the fauna of which furthermore appears distinctive in the absence of certain species which would be expected from general geographical position to occur, and in the distributional relations of other forms. The discovery of this new cyprinid in the Kanawha River system above the falls is therefore in line with other distributional facts.

There is no evidence to indicate that *Parexoglossum laurae* occurs outside of the upper Kanawha River system above the falls. It is represented by a closely allied form, however, in a restricted area in western Ohio. That form is being described in a companion paper, by Milton B. Trautman, as a second species of *Parexoglossum,* and has once been recorded under the manuscript name (without description) of "*Exoglossops laurae* Hubbs" (Osburn, Wickliff, and Trautman, 1930: 173).

These two species of *Parexoglossum* do not exclusively represent *Exoglossum maxillingua* west of the Allegheny divide, for that species itself has, on the basis of recent collections, been found to inhabit certain of the streams in the basin of the upper Allegheny River in Pennsylvania (Fowler, 1919: 62, and Fowler and Carlson, 1927: 70). These authors also recorded the eastern species from the Genesee River system of the Lake Ontario basin, from which it probably reached the Allegheny system,—by stream capture along with

pletely scaled (almost fully scaled in type of *Sarcidium scopifer* Cope); the mouth larger, reaching almost to eye; eye larger and inserted more posteriorly, a little behind instead of a little before middle of head length; head slenderer; caudal spot fainter and more diffuse.

several other fishes. Otherwise *Exoglossum* is confined to the Atlantic streams from the St. Lawrence to the Roanoke. Whether it occurs in the headwaters of the Ohio as a relict or as the result of recent stream capture can not be surely asserted. That *Exoglossum maxillingua* had its origin in the West is, however, indicated not only by the general relations of the Atlantic coast stream fauna, but also by the occurrence, now being made known, of two related and distinctly more primitive forms in the Ohio basin.

I wish to thank Mr. Milton B. Trautman for assistance in the preparation of this paper, and Miss Grace Eager for the masterly care she took in preparing the illustration of the species.

Parexoglossum, new genus

Exoglossops Hubbs, in Osburn, Wickliff, and Trautman, 1930: 173 (*nomen nudum;* preoccupied).

This genus is obviously related to *Exoglossum,* with which it agrees in having the mandibular rami united on the midline distally and closely approximated and parallel elsewhere; the flesh obsolescent on the mandible distally; the premaxillaries nonprotractile; the shoulder girdle produced over the gills; the pharyngeal arch and teeth similar. It also agrees in many details of form, proportions, scale number, fin position and ray number, texture, color, and habitat. It is doubtless these features of resemblance, the superficial ones included, which have led authors to identify the specimens of *Parexoglossum,* hitherto reported, as *Exoglossum maxillingua.* Any one knowing both genera in life could hardly hesitate to regard them as closely related.

Parexoglossum differs from *Exoglossum* in having barbels (occasionally lacking on one or even on both sides in *P. laurae,* as in many other American minnows with barbels); in lacking the fleshy lobes at the mandibular bases; in having the lower lip approaching a normal structure, nonlobular, and extended along the sides of the mandible; in having the posterior portion of the dentary bones less swollen, and in having a different scale structure—radii wholly absent on lateral

fields, posterior field rhombic instead of lobular, and lines separating lateral and posterior fields angulated instead of rectilinear across the scale (see Plate I).

Clearly *Parexoglossum* is ancestral to *Exoglossum,* for in all of these features by which it is distinguished from that genus, it is surely the more primitive. From what division of the American cyprinids *Parexoglossum* may have itself arisen is less certain. It appears perhaps to have most in common with *Margariscus,* with which it agrees in having a weak barbel pendant from the lower edge of the premaxillary well in advance of its end, and in numerous details of form, fins, coloration, scale structure, etc. It differs from all other North American cyprinids as well as *Margariscus* in the technical characters by which it is allied with *Exoglossum.*

Description of the genus.—Dorsal and anal fins short, with 8 and 7 principal rays respectively; dorsal fin inserted a little behind the pelvic origin, which is near middle of body length; pelvic rays constantly 8; principal caudal rays 19. Body moderately slender but thick; belly broadly rounded in cross section; head as wide as deep, and squarish in outlines. Lateral line almost straight except for anterior rise; developing rather late in life. Scales of moderate size, in about 50 cross rows, completely covering breast. Focus of scale (see Plate I) about four times as far from apex as base; apical and lateral fields together forming a semi-oval (forming four sides of a hexagon in *Exoglossum*); basal field a vertically elongated rhomb rather than a lobe; lines separating the two lateral fields from the posterior field not so sharply marked as in *Exoglossum,* and forming an angle at scale center, rather than a straight vertical line; ridges everywhere developed, rather irregular in places, fairly well spaced on apical field, where rounded across midline, denser on lateral fields and much crowded on basal field. Shoulder girdle produced forward as a slightly bilobed shelf, and incurved, so as to conceal thoroughly the lower pharyngeals. The pharyngeals are rather small, and are without shoulder along the tooth-bearing section, where the arch is slender but turgid, especially about

the base of the single, weak inner tooth; the teeth of the outer row, 4 on each side, are rather strong, well-hooked and with only a bare trace of grinding concavity. Gill opening nearly vertical; first gill slit much restricted; gill rakers about 2 + 3, of which only the pair at angle are more than rudiments. Muzzle heavy. Barbel usually developed as a slender, rounded thread, pendant from lower edge of premaxillary well in advance of end. Premaxillaries nonprotractile, bound to forehead by a frenum; slightly inferior. Upper lip thick, almost pendant. Lower lip very thick at angle, but not forming a basal lobe, gradually narrowing and fusing with the mandible anteriorly, so as to leave the broad, blunt end of chin lipless. Two halves of mandible as seen externally in contact on midline, with a swollen, fleshy basal portion which grades into the fleshless tip of the mandible. The bony mandibular rami are **L**-shaped, with an outer or posterior arm rising deeply

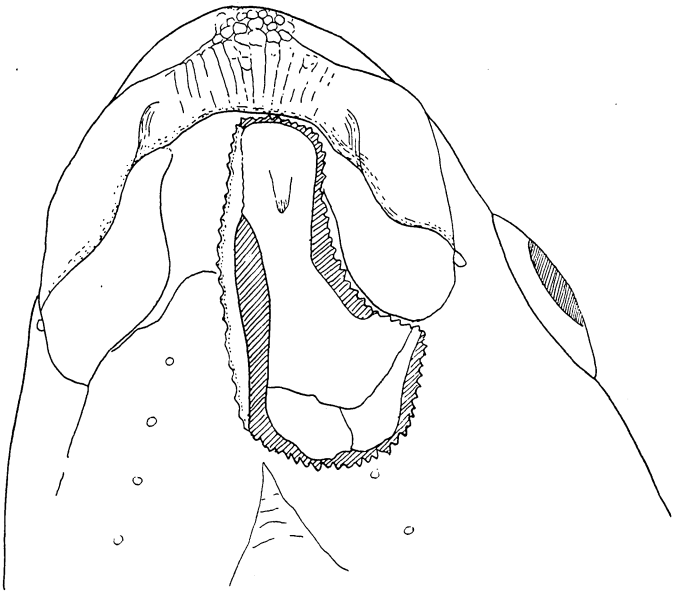

FIG. 1. Semi-diagrammatic view of lower surface of head in *Parexoglossum laurae*. The left side is shown as partly dissected to reveal the structure of the lower jaw bones. Drawn by the author.

into the fleshy lower part of the head, so as to make a sharp angle with the median or anterior arm, which is flat horizontally and moderately swollen posteriorly; the inner edges of the two mandibular rami are parallel throughout, but are actually united only on the anterior third (as also in *Exoglossum*); the space between the rami is about one-fourth as wide as the pupil anteriorly, so that it can not be closed by forcing the posterior ends of the rami together (see Figure 1). Mandibular tip sharply included, but not so deeply incurved as in *Exoglossum*. Skin of muzzle broken up by irregular sensory papillae; upper lip with very weak plicae transverse to the gape. Isolated scales darkened. Nuptial tubercles absent so far as known. Intestine short, with a simple **S**-loop. Peritoneum bright silvery, with melanophores few and scattered.

Type species.—*Parexoglossum laurae,* new species.

Parexoglossum laurae, new species

Plate I

Holotype.—A half grown specimen 55.5 mm. long to caudal, collected by Carl L. and Laura C. Hubbs on September 10, 1928, in Second Creek, tributary to Greenbrier River, south of Ronceverte, West Virginia; Cat. No. 92413, Museum of Zoology.

Numerous paratypes are also designated, all like the type from the basin of the Kanawha River above the falls. These are listed below:

Sinking Creek, Virginia: 53 specimens 32 to 137 mm. long, collected by E. D. Cope; Cat. Nos. 1615–1668, Academy of Natural Sciences of Philadelphia.

Walker's Creek, Virginia: 2 specimens 66 and 98 mm. long, collected by E. D. Cope; Cat. Nos. 1377 and 1378, Academy of Natural Sciences of Philadelphia.

Kanawha Creek, Wythe County, Virginia: 7 specimens 40 to 60 mm. to caudal, collected by E. D. Cope; Cat. Nos. 1383 to 1389, Academy of Natural Sciences of Philadelphia.

TABLE OF COUNTS AND MEASUREMENTS OF THE TYPES OF *Parexoglossum laurae*

Museum	Academy of Natural Sciences of Philadelphia											
Locality	Sinking Creek, Virginia								Walker's Cr., Va.		Kanawha Cr., Va.	
Length to C.	137	122	109	106	105	95	89	57	98	66	60	40
Pectoral rays:												
left	17	16	17	16	—	—	—	—	17	17	16	—
right	17	16	17	15	—	—	—	—	15	17	17	—
Scales:												
above lat. l.	8	8	8	9	8	8	10	9	8	9	9	—
lateral line	49	50	49	50	50	51	53	52	47	48	53	—
below lat. l.	6	6	6	6	6	6	6	6	5	5	6	—
Length head	4.0	4.0	3.65	4.0	4.0	3.75	3.5	3.6	4.0	3.5	4.1	4.0
Depth body	4.1	4.0	4.2	—	—	4.3	—	4.7	4.0	4.4	4.3	—
Width in depth	—	—	—	—	—	—	—	—	—	—	—	—
Depth caudal peduncle:												
in length, c. p.	2.0	1.8	1.75	1.8	1.8	1.8	1.6	1.6	1.6	1.7	1.8	2.0
in head	2.2	2.0	2.25	2.1	1.8	2.2	2.3	2.0	2.2	2.1	2.2	2.0
Length eye	4.8	5.3	5.5	4.7	4.4	5.0	5.4	4.0	5.0	4.3	4.0	4.0
Interorbital	2.65	2.6	2.9	3.0	2.75	3.3	3.6	3.2	3.3	3.6	3.35	3.2
Snout	2.8	3.0	3.0	3.1	2.8	3.2	2.5	2.8	2.7	3.0	3.2	3.6
Suborbital	3.9	4.3	4.2	4.3	3.9	4.8	5.6	5.5	4.0	4.6	5.3	6.0
Upper jaw	3.0	3.2	3.35	3.0	3.2	3.35	2.65	3.0	3.5	3.6	3.4	3.7
Depressed D.:												
in D. to occiput	1.45	—	1.6	1.65	1.65	1.6	1.3	1.4	1.5	1.55	1.45	1.5
in D. to snout tip	—	—	—	—	—	—	—	—	—	—	—	—
in head	1.1	—	1.3	1.25	1.1	1.15	1.2	1.15	1.1	1.1	—	—
Depressed A.	—	—	1.45	1.45	—	1.4	1.35	1.3	1.35	1.35	1.25	—
Length pectoral	1.35	1.3	1.5	—	1.35	1.35	1.35	1.3	1.3	1.4	1.3	—
Length pelvic	—	1.5	1.7	1.7	1.6	1.65	1.6	1.6	1.5	1.7	1.55	1.5

TABLE OF COUNTS AND MEASUREMENTS OF THE TYPES OF *Parexoglossum laurae* (con.)

Museum	U. S. N. M.	Museum of Zoology, University of Michigan							
Locality	Bluestone R., W. Va.	Trib. Greenbrier R., W. Va.			Second Cr., W. Va.		Camp Cr., W. Va.		Reed Cr., Virginia
Length to C.	small adult	65	35	34	55[1]	48	65	42	84
Pectoral rays:									
left	—	—	—	—	16	—	—	—	—
right	—	17	17	17	16	17	17	17	17
Scales:									
above lat. l.	—	9	9	9	9	9	9	9	10
lateral line	48	49	48	48	48	49	50	49	48
below lat. l.	—	7	6	6	6½	6	6	6	6
Length head	3.4	3.9	3.9	3.9	3.8	4.0	3.7	3.9	3.85
Depth body	—	4.4	4.4	4.5	4.2	4.5	4.55	4.9	4.1
Width in depth	—	1.65	1.65	1.6	1.6	1.6	1.6	1.6	1.65
Depth caudal peduncle:									
in length, c. p.	—	2.0	2.0	1.9	1.9	1.9	2.0	1.85	1.75
in head	—	2.03	2.02	2.05	2.05	2.01	2.02	2.01	2.03
Length eye	—	3.8	3.4	3.4	3.6	3.8	4.2	3.2	4.55
Interorbital	—	3.3	2.7	2.9	3.5	3.2	3.1	3.6	3.15
Snout	—	2.8	3.2	3.0	2.9	2.9	2.8	3.2	2.6
Suborbital	—	5.0	5.6	5.3	4.55	5.4	5.1	5.1	4.2
Upper jaw	—	3.0	3.4	3.2	3.2	3.3	3.1	3.2	3.2
Depressed D.:									
in D. to occiput	—	1.45	1.45	1.4	1.4	1.5	1.5	1.45	1.45
in D. to snout tip	—	2.4	2.5	2.4	2.35	2.15	2.5	2.4	2.5
in head	—	1.1	1.15	1.25	1.2	1.15	1.2	1.2	1.1
Depressed A.	—	1.35	1.3	1.25	1.3	1.3	1.3	1.4	1.3
Length pectoral	—	1.4	1.5	1.55	1.3	1.55	1.35	1.4	1.3
Length pelvic	—	1.6	1.65	1.7	1.6	1.6	1.6	1.65	1.55

[1] Holotype.

Bluestone River at Abbs Valley, West Virginia: 1 small adult, collected by Bureau of Fisheries; Cat. No. 58781, United States National Museum.

Tributary of Greenbrier River, White Sulphur Springs, West Virginia: 3 specimens, 34, 35, and 65 mm. long, collected by Carl L. and Laura C. Hubbs on September 10, 1928; Cat. No. 92665, Museum of Zoology.

Second Creek, West Virginia (taken with holotype): 1 specimen 48 mm. to caudal; Cat. No. 92666, Museum of Zoology.

Camp Creek, at Camp Creek, Mercer County, West Virginia: 2 specimens, 42 and 65 mm., collected by Carl L. and Laura C. Hubbs on September 11, 1928; Cat. No. 92667, Museum of Zoology.

Reed Creek, Wythe County, Virginia, below Max Meadows, elevation 1950 feet: 1 specimen 84 mm. to caudal, collected by Carl L. Hubbs and E. P. Creaser on May 17, 1931; Cat. No. 92668, Museum of Zoology.

The specific characters of *Parexoglossum laurae* are for the most part sufficiently well indicated in the figures, in the generic, description, and in the table of counts and measurements. All that need be added here is further details regarding the mouth structure, life color notes, and a habitat description.

The mouth is very peculiar (see Figure 1), though of course not so extreme as in *Exoglossum*. The outer border of the whole mouth forms four sides of a hexagon: the outer lateral borders of the mouth are strictly parallel, and are connected with the anterolateral edges, of equal length, by a sharp curve. On the inner side of this sharp curve, the face of the lip is considerably flexed. The upper lip is very thick, especially posteriorly where it resembles a hound's dewlap. The inner edges of the lower lip are almost parallel, converging but very slightly forward. The lipless edge of the mandible forms a truncated curve more than half as wide as the orbit. The dentary bones are subspatulate toward their tip, narrower opposite the anterior part of the fissure between the rami than farther forward.

The underlying color tone in life is translucent waxy olive or waxy brown, with a surface sheen on the scales of metallic lavender-purple. The fins are somewhat amber. The caudal in some is dusky red.

The skin in life has the same slimy feel that *Exoglossum* has.

Ecology.—As to the habitat of this species, I can only describe the situations where we have encountered it.

The tributary of Greenbrier River at White Sulphur Springs (south edge of town and 2 miles below) was 10 to 30 feet wide, very clear and without vegetation, had a stony bottom with some gravel, a moderate temperature, and long riffles broken by pools as deep as 3 feet.

Second Creek south of Ronceverte was a moderately clear mountain stream 15 to 75 feet wide, without vegetation, had a stony and bouldery bottom with some sand in the pools, a moderate temperature, and shallow riffles separated by pools as deep as 5 feet.

Camp Creek at Camp Creek was a rather warm, moderately clear mountain stream, 15 to 50 feet wide, almost without vegetation, having a bottom of solid rock with boulders and mud, and riffles interspersed with pools as deep as 3 feet.

Reed Creek where fished was a rather warm and somewhat silty (recently high) stream, 30 to 40 feet wide, almost without vegetation, floored almost entirely with stones, and had a moderate to very swift current as deep as 2 feet, without pools in the area fished.

I name this species for my wife Laura, who has helped collect all the specimens I have obtained, and has been a helpful companion on many other scientific adventures.

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PLATE I

Scales of *Parexoglossum* and related genera, all taken near middle of body just above lateral line, and all traced on ground glass of projecting apparatus. Drawn by the author.

FIG. 1. (Left). Scale of *Margariscus margarita margarita,* from a specimen 80 mm. long to caudal, collected in Chittenango Creek, Madison County, New York.

FIG. 2. (Center). Scale of *Parexoglossum laurae,* from the 84 mm. paratype collected in Reed Creek, Virginia.

FIG. 3. (Right). Scale of *Exoglossum maxillingua,* from a specimen 76 mm. long to caudal, collected in Honeoye Creek, New York.

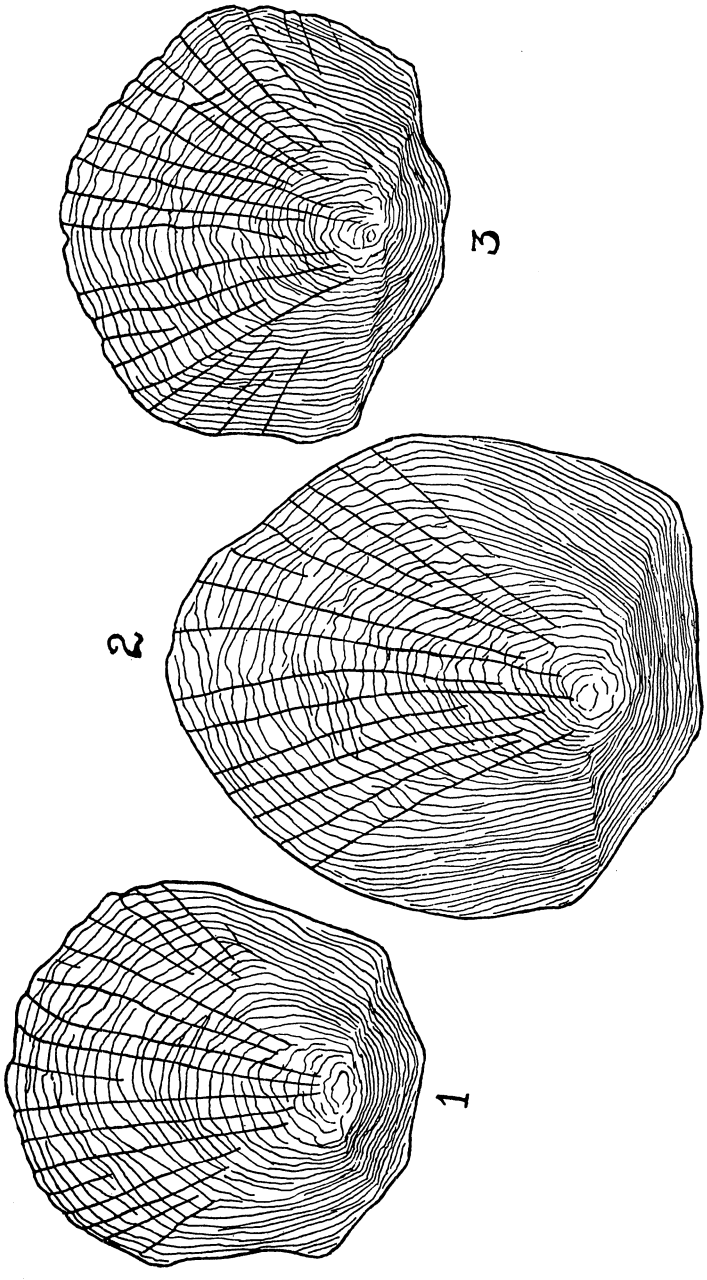
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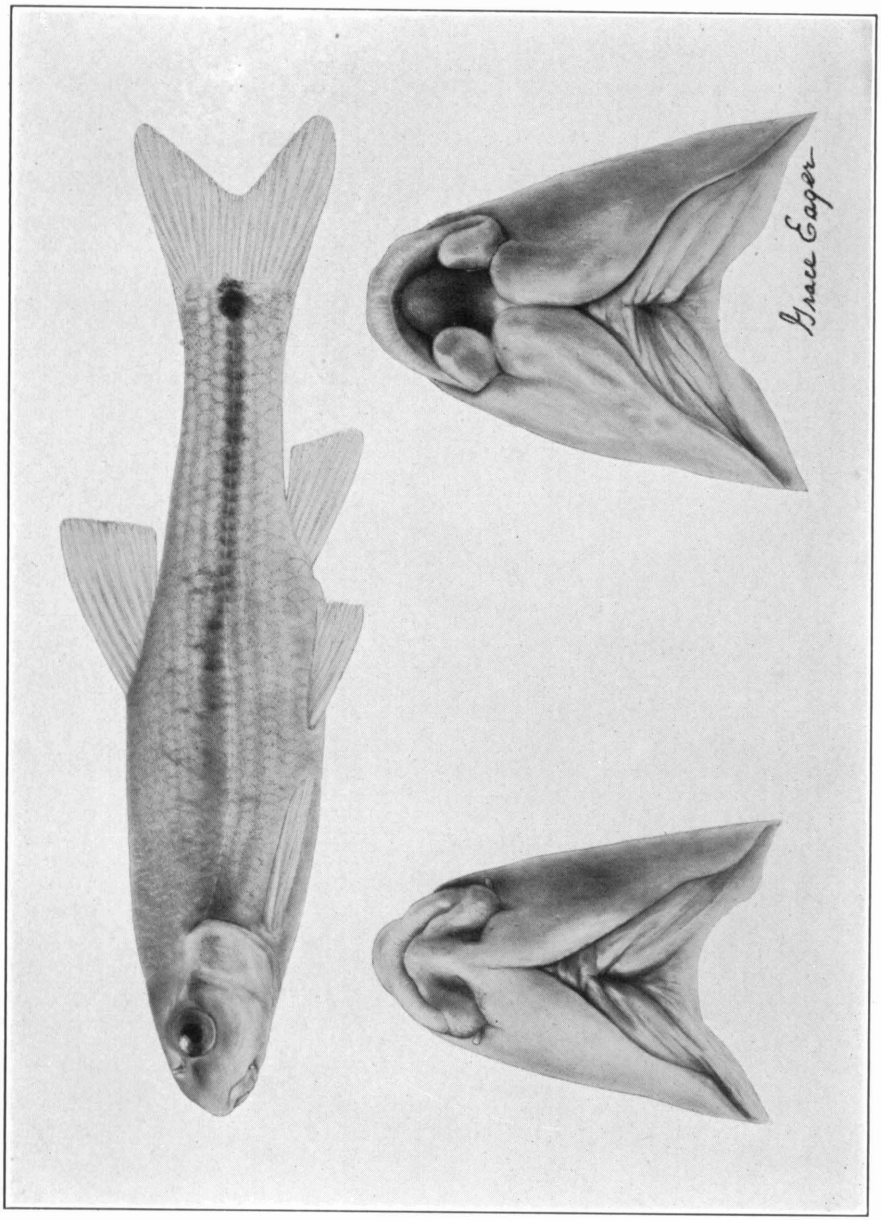
PLATE II

Parexoglossum and *Exoglossum*

FIG. 1. Holotype of *Parexoglossum laurae.*

FIG. 2. (Lower left). Lower side of head of holotype.

FIG. 3. (Lower right). Lower side of head of specimen of *Exoglossum maxillingua* of same length.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