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A NEW SPECIES OF PYGMY CHARACOID FISH FROM THE RIO NEGRO AND RIO AMAZONAS, SOUTH AMERICA (TELEOSTEI: CHARACIDAE)

Stanley W. Weitzman and Robert H. Kanazawa

Specimens of the new fish described below, *Klausewitzia aphanes*, were first discovered during early May of 1975 among about 400 live specimens of the cardinal tetra, *Cheirodon axelrodi* Schultz, newly imported from Manaus, Brazil. We maintained 16 specimens of *K. aphanes* alive for about 6 months and were unable to grow them to a size larger than 16.5 mm in standard length (SL). Two are still alive at the time of writing, September 1976, and have grown no larger than 16 mm SL. Unfortunately we were unable to trace the precise locality where these specimens were caught but since specimens of *C. axelrodi* are collected for the aquarium trade from the Rio Negro near Tapurucuara, Amazonas, Brazil, we thought it possible that these specimens might be from that or a nearby locality. During December 1975 the senior author examined the fish collections at the Museu de Zoologia da Universidade de São Paulo (MZUSP) obtained from the Rio Negro, Brazil by Dr. P. Vanzolini for the Expedicão Permanente da Amazonia (EPA) and found 10 specimens of this tiny fish with specific locality information (see type data below). Dr. Vanzolini's patience in separating and preserving even the smallest of fishes has enabled us to describe this new fish.

In life *K. aphanes* swims much like species of the North American centrarchid genus of pygmy sunfishes, *Elassoma*,[1] ordinarily swimming slowly from place to place and remaining suspended between movements, or darting from place to place when responding to gross environmental disturbance and again remaining suspended in the water between movements. *K. aphanes* frequently remains among plants in aquaria where they are inconspicuous because of their color, size, and movements.

K. aphanes belongs to the characid subfamily Characidiinae. See Weitzman and Kanazawa (1976) for a brief discussion of the taxonomic status of this subfamily.

We wish to thank Dr. Paulo Vanzolini, Director of the Museu de Zoologia da Universidade de São Paulo and Drs. Heraldo Britski and Naercio Menezes, of the same institution for their hospitality while examining the collections in their care and for their generosity in allowing us to describe this new fish. The Expedicão Permanente da Amazonia (EPA) is maintained and financially supported by the Fundacão de Amparo a Pesquisa de Estado de São Paulo and we wish to thank that organization for its support of systematic biology. Further assistance in sorting and examining

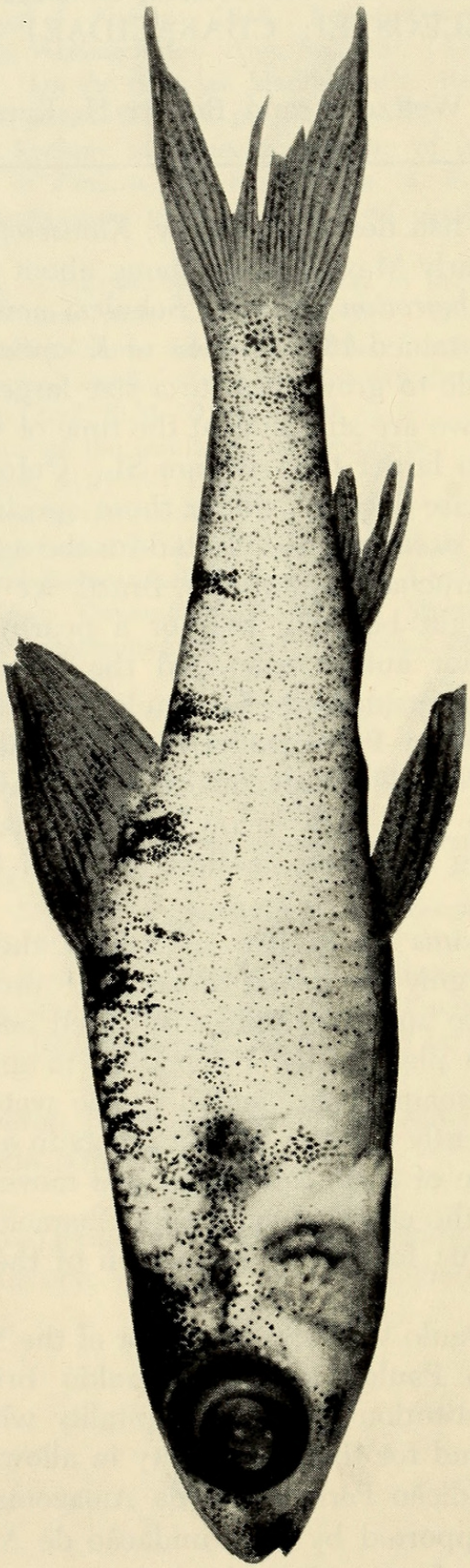

Fig. 1. *Klausewitzia aphanes*, new species, MZUSP 12978, male, 13.0 mm SL; holotype, Brazil, State of Amazonas, Rio Negro, São João, near Tapurucuara, from an igarapé on terra firma, October 23, 1972.

specimens in the collections of the Museu de Zoologia de São Paulo was provided by Marilyn Weitzman, William L. Fink, and Sara H. Fink. Funds for examination of the collections at the Museu were provided by the Smithsonian Amazonian Ecosystem Research Program under the direction of Clifford Evans, Smithsonian Institution. Sara Fink prepared Figs. 4–6. We also wish to thank Merrill Cohen of The Aquarium, Inc., Elkridge, Maryland, for letting us examine his stocks of imported fishes and allowing us to remove specimens of the new fish described here and others that we found of interest.

Klausewitzia aphanes, new species
Figs. 1–6, Table 1

Holotype.—MZUSP 12978, male, SL 13.0 mm; Brazil, State of Amazonas, Rio Negro, São João, near Tapurucuara, from an igarapé on terra firma, P. Vanzolini, E.P.A., 23 October 1972.

Paratypes.—MZUSP 12979–12981, 3, SL 11.0–12.5 mm, with same data as holotype except collected 27 October 1972; USNM 213780 (formerly MZUSP 12982 and 12983), 2, SL 12.0–12.5 mm, with same data as MZUSP 12979; USNM 213781 (formerly MZUSP 12984), 1, SL 12.5 mm, Brazil, State of Amazonas, Rio Negro, Paricatuba, from a lake separate from the river, P. Vanzolini, E.P.A., 11 November 1972.

The following specimens are not types: MZUSP 7800, 1, SL 12.5 and MZUSP 12976, 1, SL 13.0 mm; Brazil, State of Amazonas, an igarpé of the Lago José-Acu at Parintins, Heraldo Britski, E.P.A., 11–12 December 1967; USNM 213782 (formerly MZUSP 12977), 1, SL 12.5 mm, same data as MZUSP 7800; USNM 213783, 14, SL 13.5–16.5 mm, aquarium specimens without certain locality but imported as incidentals with cardinal tetras, *Cheirodon axelrodi*, shipped to United States from Manaus, Brazil and probably collected during early 1975 from area of Rio Negro possibly near Tomar or Tapurucuara where cardinal tetras are commonly obtained for the aquarium trade.

Diagnosis.—Teeth on jaws all conical, entire ventral border of maxillary lined with a single row of 9 to 17 teeth. Premaxillary with a single row of 8–10 teeth (see Fig. 4), dentary with an outer row of 7–8 and an inner row of 11–13 teeth (see Figs. 5 and 6). Lateral line incomplete with 4 to 5 scales. Adult length apparently no longer than about 16.5 mm SL.

In description below, first number in brackets [] is for holotype, followed by range of paratypes in parentheses. All measurements are expressed as a percentage of standard length. Two alizarin preparations are of aquarium specimens, USNM 213783. See Table 1 for morphometrics.

Description.—Body short, relatively compressed, greatest depth at dorsal fin origin. Predorsal profile convex to head, then gently convex on head to

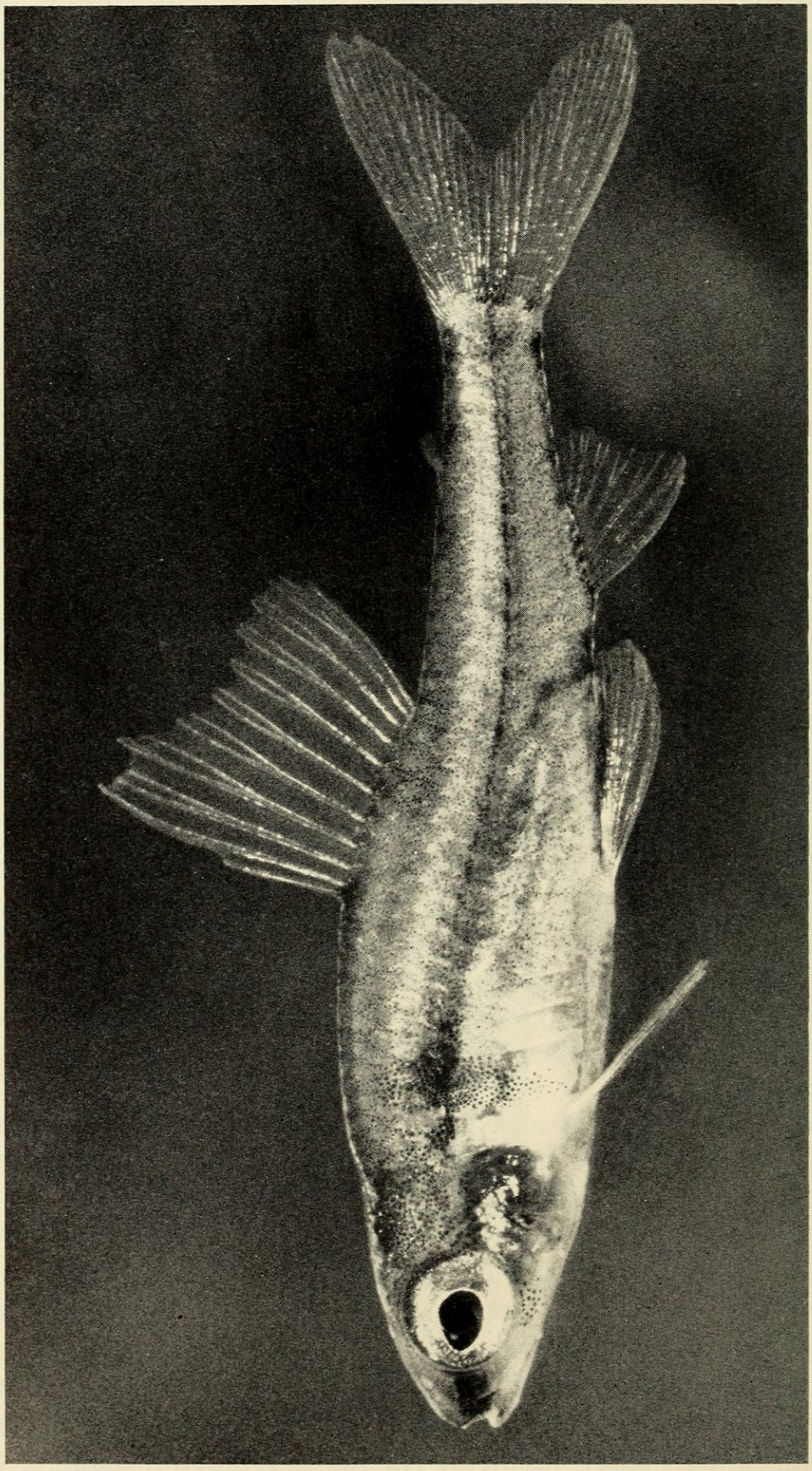

Fig. 2. *Klausewitzia aphanes*, new species, USNM 213783, male, 13.5 mm SL; live specimen, locality unknown but see text.

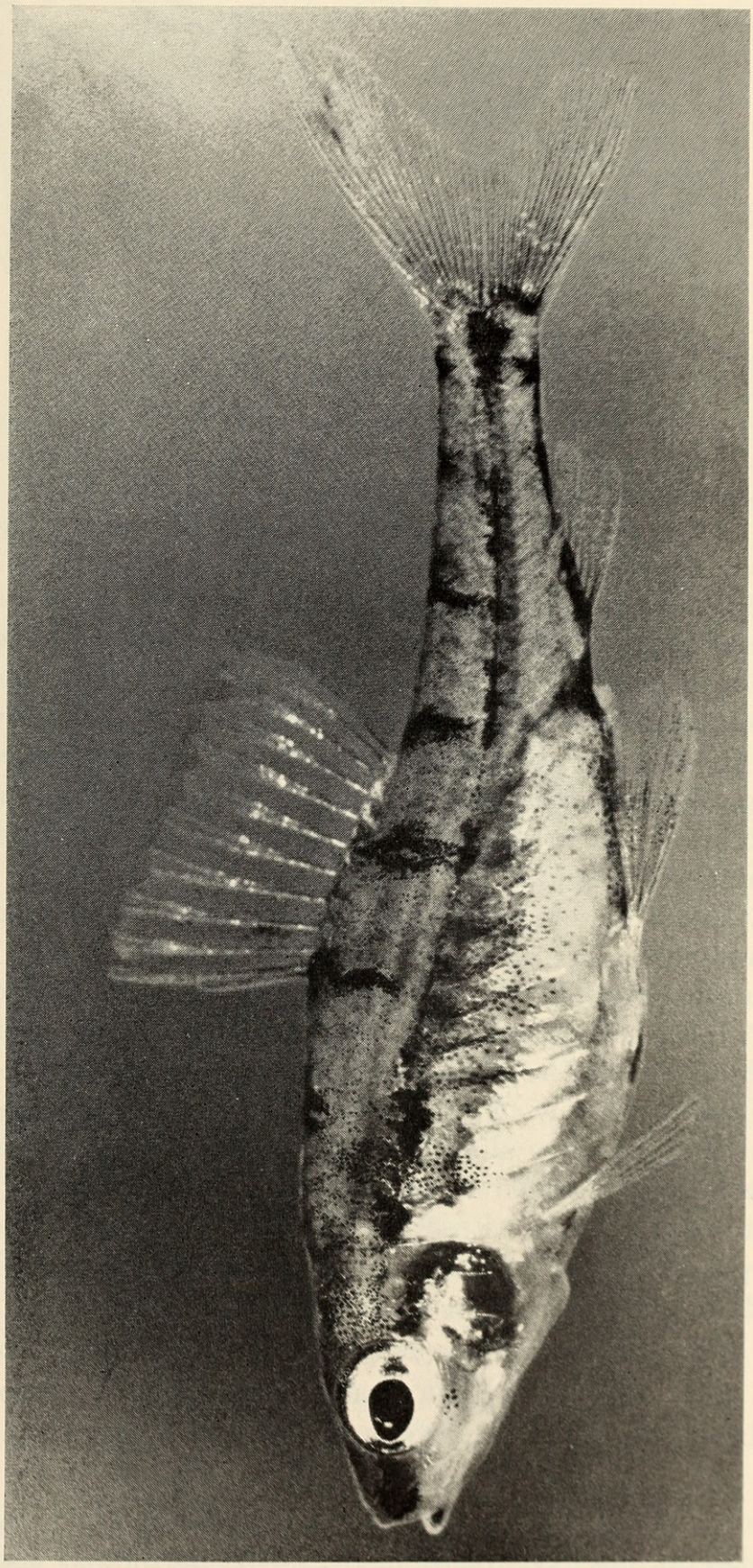

Fig. 3. *Klausewitzia aphanes*, new species, USNM 213783, female, 15.7 mm SL; live specimen, locality unknown but see text.

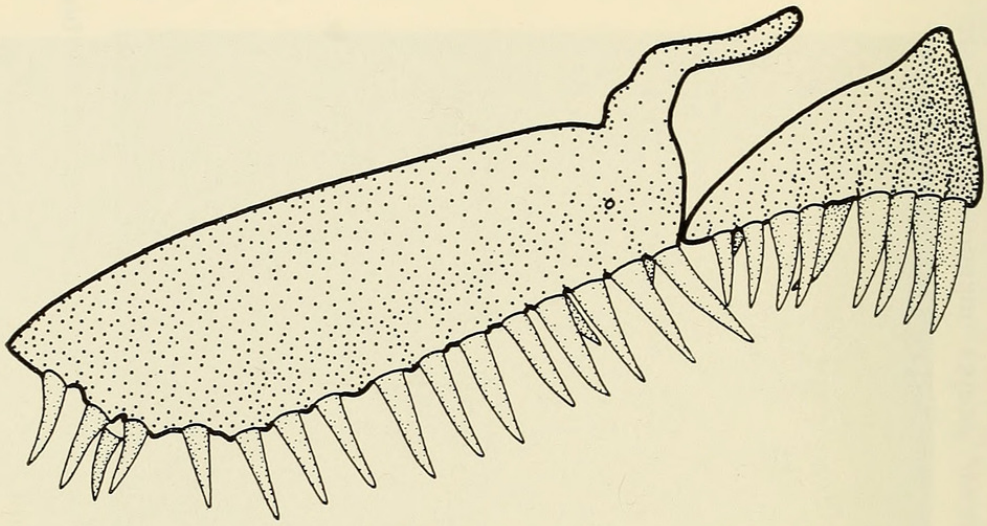

Fig. 4. *Klausewitzia aphanes*, new species, USNM 213783, 14.9 mm SL; locality unknown. Lateral view of premaxillary and maxillary bones. Anterior is to right.

rather blunt snout. Profile along root of dorsal fin slightly convex. Body profile posterior to dorsal-fin origin concave to end of body. Ventral body profile nearly straight (in males) to gently convex in females with eggs. Entire dorsal fin anterior to vertical line through anus. Pelvic-fin origin posterior to vertical line through anterior origin of dorsal fin. Anterior anal-fin origin posterior to vertical line from posterior dorsal-fin origin. Caudal peduncle long, slender.

Head large. Snout moderately blunt. Mouth terminal. Eye large. Bony interorbital moderate.

Teeth all simple, conic. Two rows of teeth on dentary, anterior (outer) row with [8] (7–8) teeth, inner row [11] (11–13) teeth; premaxillary with one row of [8] (8–9) teeth; maxillary with one row of [9] (9–17) teeth; ectopterygoid with one row of (6–8) teeth in two alizarin preparations. Branchiostegal rays 3 in two alizarin preparations; ceratohyal with 2 rays, and 1 ray articulated between ceratohyal and epihyal. Gill rakers 4 + 8 in two alizarin preparations. Frontal-parietal fontanel of moderate size, completely separating parietal bones and separating frontals only at their posterior median margins. In two alizarin preparations first (anterior) circumorbital bone ossified, with a laterosensory canal and second orbital bone ossified anteriorly and with a canal in that region. Antorbital and supraorbital bones not ossified, apparently absent in two alizarin specimens.

Scales cycloid with up to 5–6 radii on exposed field in two alizarin preparations, lateral line incomplete, of [4] (4–5) perforated scales. Scales in a lateral series [33] (31–33), usually 32. Scales rows between dorsal and

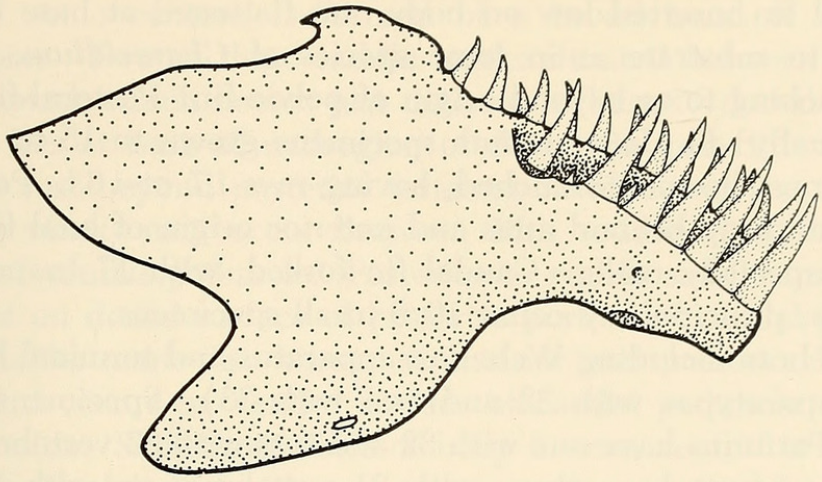

Fig. 5. *Klausewitzia aphanes*, new species, USNM 213783, 14.9 mm SL; locality unknown. Lateral view of dentary bone. Note outer (anterior) tooth row lies on a more ventrally placed ridge of bone than inner (posterior) row. Anterior is to right.

anal fin 8; 12 scale rows around caudal peduncle in all specimens. Predorsal scales [9] (9–10). Area on belly anterior to pectoral fin bases without scales.

Dorsal-fin rays ii,8,i in all specimens with locality data, some aquarium specimens with ii,8,i; ii,9; ii,9,i; or ii,10. Adipose fin present or absent, absent in holotype. Anal-fin rays [ii,6] (ii,6; ii,6,i; ii,7; or ii,7,i), usually ii,6 or

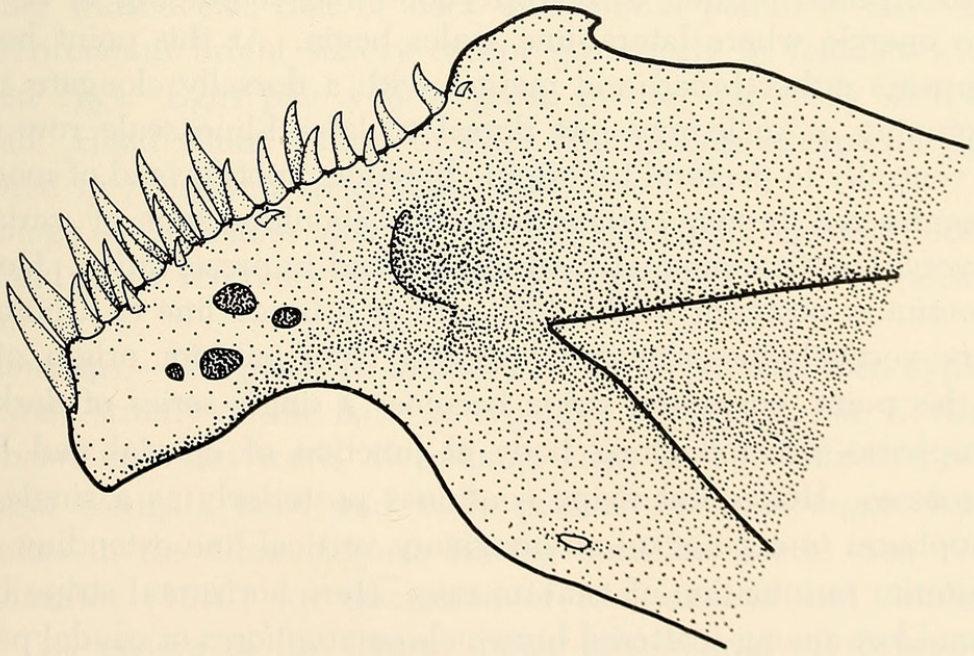

Fig. 6. *Klausewitzia aphanes*, new species, USNM 213783, 14.9 mm SL; locality unknown. Medial view of dentary bone. Note 5 small replacement teeth shown posterior to inner (posterior) row of teeth. Anterior is to left.

ii,7. Pectoral fin inserted low on body, not flattened at base to provide a flat surface to substrate as in some species of *Characidium*; pectoral fin elongate, reaching to or beyond origin of pelvic fin. Pectoral-fin rays [viii] (viii–ix), usually viii. In aquarium specimens grown to 15 to 16.5 mm SL pectoral-fin rays became branched, having rays i,7 or i,6,i. Pelvic-fin rays reaching posteriorly beyond anus and anterior origin of anal fin in several specimens, especially males. Caudal fin forked, with 17 branched rays in all specimens; principal ray count 10/9 in all specimens.

Total vertebrae including Weberian apparatus and terminal half centrum [33] (three paratypes with 32 and two with 33). Specimens from Lago José-Acu at Parintins have one with 32 and two with 33 vertebrae while the aquarium specimens have three with 31 vertebrae, six with 32 vertebrae and five with 33 vertebrae. First and second hypurals not fused, supraneurals present, 3 or 4. At least 2 postcleithra on each side; cleithra anteriorly articulate with each other in a specialized but movable joint. Coracoid of each side with their medial plates not in contact or parallel with each other, diverging laterally from their anterior point of contact.

Color in alcohol.—Body color pale yellowish brown, nearly white, spotted profusely with small, apparently contracted brown chromatophores. These chromatophores oriented mostly along scale borders, especially on back, forming a reticulate pattern. A single median horizontal stripe beginning anteriorly at tip of snout and lower jaw, then passing posteriorly through maxillary bone and on to anterior border of eye. Posterior to eye horizontal stripe not obvious on head, but extending posteriorly across head just ventral to exposed portion of pterotic bone and continuing to region just dorsal to opercle where lateral-line scales begin. At this point horizontal stripe appears rather broad and merges with a dorsally elongate shoulder spot beginning at scale row just dorsal to lateral-line scale row and extending ventrally to pectoral fin origin. Shoulder spot formed of moderately dense, contracted brown chromatophores. Shoulder spot of variable intensity, very dark in some males during life and in preservative. Horizontal stripe continues posterior to shoulder spot as a broad line to a point on an imaginary vertical line extended ventrally from anterior origin of dorsal fin. At this point, horizontal stripe becomes a single series of dark brown chromatophores situated along body at junction of epaxial and hypaxial muscle masses. Horizontal stripe continues posteriorly as a single row of chromatophores to a point on an imaginary vertical line extending dorsally from posterior termination of anal-fin rays. Here horizontal stripe becomes diffuse and lost among scattered brown chromatophores of caudal peduncle. Top of head dark brown, covered with chromatophores of moderate size. Up to eight transverse, brown dorsal saddle marks across back. Saddle marks conspicuous because pigment of scale borders, which is much darker

than that of scale centers, is formed of a broad band of dark brown chromatophores. Two of these saddle marks situated between nape and a third saddle mark which occurs just anterior to base of dorsal fin. Fourth saddle mark lies at base of midregion of dorsal fin and fifth saddle mark located at or just beyond posterior termination of dorsal fin. Three additional saddle marks may occur between fifth saddle mark and posterior termination of caudal peduncle. Posterior to eighth saddle mark is a central dark spot on dorsal surface of posterior portion of caudal peduncle. A ventral saddlelike mark also occurs at anterior and posterior base of anal fin and a third occurs on ventral surface of caudal peduncle near its posterior termination. Sometimes sides of body in area ventral to narrow portion of longitudinal stripe with one or two narrow vertical bars. Intensity of saddle marks variable, sometimes very dark, sometimes very pale both during life and in preservative. Vertical length of saddle marks quite variable on live and preserved specimens. Several specimens with a small lateral spot on caudal peduncle at base of tail fin.

All fins mostly hyaline but dorsal, anal, and pelvic fins with considerable amount of brown pigment along fin rays and fin membranes. Area of dorsal fin formed by anterior 3 rays quite dusky. At about one-third of distance of each ray length from body, all dorsal-fin rays have additional dark brown pigment. These pigment spots form a dusky stripe on fin parallel to profile of back.

Color in life.—Color much as in preserved specimens; no bright colors. Dark brown pigment of preserved specimens black in life. Body musculature rather translucent, that of back and caudal peduncle olive green in color. Peritoneum bright silvery except posteriorly in females with well-developed eggs. Eggs pale yellow green in life and easily seen through body wall. Head white ventral to eye. Fins hyaline except for dark pigment noted in preserved specimens.

Etymology.—The name *aphanes* is from the Greek meaning obscure or unseen and is in reference to the cryptic qualities of live specimens of this fish.

Relationships.—We place *K. aphanes* in the previously monotypic genus *Klausewitzia* strictly on the basis of typology because it, like *K. ritae* Géry (1965) bears maxillary teeth. *K. aphanes* lacks the specialization of ventral mouth and elongate head and body present in *Ammocryptocharax*, the other genus in the Characidiinae having maxillary teeth. See Weitzman and Kanazawa (1976) for discussion of *Klausewitzia* and *Ammocryptocharax*. The genera of the Characidiinae are in need of revision from a phylogenetic point of view, a project we have in progress. We do not necessarily believe that *K. aphanes* is phylogenetically closely related to *K. ritae*, especially since the primary typological character "relating" them

Table 1. Morphometrics of *Klausewitzia aphanes*.

	Rio Negro, Tapurucuara			Rio Amazonas, Parintins		Aquarium specimens, probably from Rio Negro	
	Holotype	Range ($N = 7$)	$\bar{x}$	Range ($N = 3$)	$\bar{x}$	Range ($N = 9$)	$\bar{x}$
Standard length	13.0	11.0–13.0	12.2	12.5–13.0	12.7	13.5–16.5	15.1
Greatest depth	25.4	23.2–26.4	24.5	24.8–25.6	25.3	24.7–28.5	26.5
Snout to dorsal-fin origin	52.3	45.8–52.3	50.0	50.1–51.2	50.8	46.1–50.8	48.6
Snout to pelvic-fin origin	53.8	48.0–54.6	52.4	51.6–52.0	51.9	49.7–54.0	52.1
Snout to anal-fin origin	76.9	70.0–80.0	75.4	76.0–76.8	76.5	72.7–77.3	75.1
Caudal peduncle depth	10.0	8.8–10.8	9.9	9.6–10.4	9.9	8.5–10.7	9.8
Caudal peduncle length	19.2	17.5–19.2	18.6	17.5–20.0	19.3	18.6–21.4	19.3
Pectoral-fin length	—	18.3–22.4*	20.2	20.6–20.8	20.8	18.8–22.2†	19.8
Pelvic-fin length	26.2	25.6–30.9	27.6	30.4–31.2	30.7	23.3–27.7	24.9
Head length	33.1	32.6–36.3	34.2	34.4–36.0	35.3	31.8–34.3	32.3
Eye diameter	11.5	10.0–12.0	11.2	11.2–12.0	11.5	9.1–12.4	10.3
Interorbital width	8.5	8.0– 8.5*	8.3	8.0– 8.0	8.0	7.6– 8.5	7.9
Snout length	9.2	8.0– 9.2	8.4	8.0– 8.8	8.5	7.4– 8.1	7.7

* $N = 4$.
† $N = 8$.

is the presence of maxillary teeth, a character probably primitive for the subfamily. See Weitzman and Kanazawa (1976) for a brief discussion of the primitive nature of maxillary teeth. The original definition of *Klausewitzia* by Géry (1965) needs much revision if *K. aphanes* is to be included. For example, in addition to the presence of maxillary teeth, *Klausewitzia* was originally proposed and defined by having the lateral line complete (it is incomplete in *K. aphanes*), an adipose fin present (it is present or absent in *K. aphanes*), the isthmus covered with scales (they are absent in *K. aphanes*), with the pectoral-fin rays not branched (they are branched in the larger specimens and unbranched in the smaller specimens of *K. aphanes*), fontanels absent (they are present in *K. aphanes*), and with both bicuspid and conical maxillary and premaxillary teeth (they are all unicuspid in *K. aphanes*). We do not think that many of these characters can be used as a satisfactory test of phylogenetic relationships because of their possible lability and because several of them are reductive and perhaps convergent. See Weitzman and Fink (in press) for discussion of the problem of convergence in small characoid fishes. Furthermore some of these characters are labile in *K. aphanes*, for example the presence or absence of the adipose fin. These are certainly not characters indicating stability and therefore we suggest they may possess a very low degree of phylogenetic information for consideration of relationships at the generic level. They are not characters suitable for testing relationship in these fishes and we therefore reject them as characters for the description of genera in the Characidiinae.

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Footnote

[1] We follow Bailey, et al. (1970) in placing *Elassoma* in the Centrarchidae. Branson and Moore (1962) maintained the family Elassomidae for the genus *Elassoma*. They hypothesized that their Elassomidae was not related to the Centrarchidae. However, the many characters they listed on p. 76 separating the two families, such as reduced size of orbital bones, and reduced ossification of head canal bones and reduction in associated soft structures are common character states associated with pygmy fishes in many teleost groups such as small gobies, characoids, and cyprinids. We do not find that Branson and Moore demonstrated any fundamental differences between the Centrarchidae and their Elassomidae and therefore do not accept family status for the pygmy sunfishes.

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