

Redescription of the Dwarf Neotropical Eleotrid Genus *Leptophilypnus* (Teleostei: Gobioidae), Including a New Species and Comments on *Microphilypnus*

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Among the eight genera of Eleotridae known from the Neotropics, two, *Microphilypnus* and *Leptophilypnus*, are greatly reduced in size and, along with the Australian genus *Philypnodon*, form a separate phylogenetic radiation from the other six genera. *Microeleotris* was described with *Leptophilypnus*, but Hildebrand later placed the two in synonymy. The original descriptions for these taxa were brief and did not include illustrations. As a result, confusion exists, particularly with regard to the identity of the three described species of *Microphilypnus*: *M. ternetzi*, *M. amazonicus*, and *M. macrostoma*. Three valid species of *Leptophilypnus* are known: *L. fluviatilis*, *L. panamensis*, and a new species from the Gulf of Mexico drainages of Guatemala that is described herein. *Microphilypnus* is diagnosed and new information is offered on types of the three nominal species and the habitat characteristics of the genus.

ELEOTRIDAE (gudgeons or sleepers) is a family of 30 genera and approximately 135 species, distributed primarily throughout the fresh and brackish waters of the old world tropics (Birdsong et al., 1988; Hoese and Gill, 1993). Eight eleotrid genera inhabit the Neotropics, and of those, two genera are distinctive in that they are reduced in size and are placed in a clade (together with the Australian genus *Philypnodon*) separate from the remaining genera (Thacker and Hardman, 2005). These dwarf genera, *Leptophilypnus* and *Microphilypnus*, do not overlap in distribution; *Leptophilypnus* is known from drainages on both coasts of Central America, *Microphilypnus* from Atlantic and Caribbean drainages of South America only. Few collections are available for either genus, and their systematics have not been examined since the various works of the original authors. In this study, we clarify the descriptions of both genera and include figures, examine and evaluate species identity based on museum collections, describe a new species of *Leptophilypnus*, and provide additional information on the ecology of both genera.

MATERIALS AND METHODS

Museum specimens as listed below were examined with a dissecting microscope and photographed with Nikon Coolpix 8700 and Sony DSC-F717 digital cameras. Radiographs were taken with a Faxitron 43855c cabinet x-ray machine using Kodak Industrex M film. Images used for neuromast illustrations were captured using a Leica MZ 12.5 imaging station with an Evolution LC digital camera and Image Pro

Express and drawn with CorelDRAW 11. Counts of meristic characters were taken from radiographs and cleared-and-stained specimens; frequently in these small fishes the fin rays were so tiny that determination of fin element number was best accomplished by counting pterygiophores. First dorsal-fin pterygiophore insertion patterns are denoted per the formula given by Birdsong et al. (1988): the first digit indicates the interneural space where the first pterygiophore is located, the digits following the dash indicate how many pterygiophores are found in each successive interneural space, up to the start of the second dorsal fin. Thus, a formula of 3-12210 indicates that one pterygiophore is present in the third interneural space, two in the fourth, two in the fifth, one in the sixth and none in the seventh; the eighth interneural space is where the second dorsal fin begins. Vertebrae are presented as precaudal+caudal=total, where precaudal vertebrae are those without a closed haemal arch (following Birdsong et al., 1988). The caudal vertebral count includes the terminal vertebral element, which in these species is fused to the hypurals. Cephalic lateralis canal pores are identified using the lettering system of Akihito et al. (1984) and Pezold (1993). Cephalic free neuromast patterns are described using terminology developed by Sanzo (1911) with modifications employed by Miller and Wongrat (1991). Transverse suborbital rows are designated with Arabic numbers and major horizontal rows on the cheek are indicated with the letters *b* and *d*. Transverse opercular rows are labeled *ol* and *ol'*, upper and lower longitudinal rows on the operculum are labeled *os* and *oi*, respectively. Institutional abbreviations are as listed in Leviton

et al. (1985). Other abbreviations: radiograph (x); cleared and stained (CS); standard length (SL).

Mensural data were obtained with digital calipers and a dissecting microscope. Measurements taken were standard length (tip of the snout not including the jaw to the base of the caudal fin), head length (tip of the snout not including the jaw to the upper posterior corner of the bony opercle), head width (greatest width at preopercle), jaw length (from tip of lower jaw to angle of the jaws), eye length (longitudinal diameter of eye), interorbital width (least distance between left and right orbits), caudal-peduncle length (distance from insertion of last anal-fin ray to midpoint of caudal-fin base), second dorsal-fin length (origin of second dorsal fin to appressed tip of last ray), anal-fin length (anal-fin origin to appressed tip of last ray), pectoral-fin length (from base to tip of longest ray), pelvic-fin length (from base to tip of longest ray), and caudal-fin length (base to tip of longest ray). Meristic data included lateral scale rows (number of rows from posterodorsal tip of opercle to base of caudal fin, not counting scales on caudal fin), transverse scale rows (number of scale rows along diagonal from anal-fin origin to base of second dorsal fin), caudal-peduncle rows (number of scale rows along diagonal from insertion of last anal-fin ray to middorsal line of caudal peduncle), predorsal scales (number of scale rows along nape midline anterior to first dorsal-fin origin), pectoral-fin ray number, second dorsal-fin elements (last ray counted as one if split), anal-fin rays (last ray usually split and counted as one), and caudal-fin rays (the number of segmented but unbranched, and segmented and branched rays).

Leptophilypnus Meek and Hildebrand, 1916

Leptophilypnus Meek and Hildebrand, 1916:361 (type species: *Leptophilypnus fluviatilis* Meek and Hildebrand, 1916, by original designation and monotypy.)

Microeleotris Meek and Hildebrand, 1916:362 (type species: *Microeleotris panamensis* Meek and Hildebrand, 1916, by original designation and monotypy).

Diagnosis.—Species of the genus may be distinguished from all other Eleotridae by the following combination of characters. Mouth large and oblique with prominent lower jaw; no preopercular spine; no spines on first or second branchiostegal rays; no serrations on bony supraorbital ridge; eyes dorsolateral; interorbital not wider than eye diameter; gill opening

extending forward nearly to vertical from posterior margin of eye; infraorbital free neuromasts present in transverse rows; transverse rows of free neuromasts above pectoral-fin base and midlaterally on trunk, at least one very long row beneath pectoral-fin base that extends onto upper abdomen; three roughly parallel rows of free neuromasts on caudal fin extending from base to posterior margin; six spines in first dorsal fin; head, predorsal, and prepelvic regions without scales; scales on trunk ctenoid with 30–36 scales in a longitudinal series.

Description.—Head large, about 27–34% SL; lower jaw prominent; anterior nares short tubes overhanging edge of snout, posterior nares small open pits; fleshy interorbital narrow, smaller than eye diameter; eyes dorsolateral; tongue truncate, slightly bilobed; teeth small highly recurved canines in several rows forming bands in both jaws; no teeth on vomer; gill membranes approach closely but do not meet across isthmus, opening reaches forward to vertical through posterior margin of eye; dorsal fins widely spaced; first dorsal fin with six spines, the last spaced more distantly than the remainder; second dorsal fin with one spine and seven to nine soft rays; anal fin with one spine and seven to nine soft rays; second dorsal-fin, pectoral-fin, and anal-fin rays branched distally; pelvic fins separate, each with one spine and five soft rays; pectoral-fin rays reaching to vertical through second dorsal- and anal-fin origins; appressed second dorsal and anal fins not reaching caudal-fin base; caudal fin with 2–4 segmented and 11–13 branched rays; vertebrae 10 + 16–17 = 26–27; genital papilla present in both sexes; small size, less than 55 mm standard length.

Remarks.—In Meek and Hildebrand's (1916) original description, they distinguished the genera *Leptophilypnus* and *Microeleotris* by the extent to which the dentary bones were expanded medioventrally on the underside of the jaw. They state in the diagnosis of *Leptophilypnus*: "dentary bones meeting under posterior angle of mouth, leaving an oval-shaped naked area at chin . . . readily distinguished from all other Eleotridinae by the broad and expanded dentary bones". In a later analysis, Hildebrand (1938) examined additional specimens of both genera and concluded that the degree of dentary expansion varied continuously from one to the other, and so placed the two genera in synonymy, placing *M. mindii* in synonymy with *L. fluviatilis*, and reassigning *M. panamensis* to *Leptophilypnus*.



Fig. 1. *Leptophilypnus fluviatilis*, UMMZ 199560, 31.8–36.6 mm SL. Scale bar = 5 mm.

***Leptophilypnus fluviatilis* Meek and Hildebrand,
1916**

Figure 1

Leptophilypnus fluviatilis Meek and Hildebrand, 1916:361–362 (type locality very muddy brackish creek, Mindi, Canal Zone, Panama; holotype FMNH 8952).

Microeleotris mindii Meek and Hildebrand, 1916:364 (type locality muddy brackish creek, Mindi, Canal Zone, Panama; holotype FMNH 8954.)

Diagnosis.—A *Leptophilypnus* with dorsal pterygiophores 3–12210; second dorsal-fin elements I, 9; anal-fin elements I, 9; pectoral-fin rays 18–19; segmented rays in caudal fin 2 segmented + 11 (rarely 12) branched + 2 (rarely 1); vertebrae 10 + 16 = 26; *ot'* free neuromast row present on opercle (Fig. 2); cephalic lateralis canals present with pores 'BDF''KL''MNO' (pore N lost on one side in at least one specimen examined); jaws reaching vertical through anterior third or middle of eye; prominent basicaudal spot present.

Description.—Six or seven short gill rakers on the lower portion of the first gill arch, not overlapping when appressed; generally no predorsal scales, occasionally one or two present at base of first dorsal-fin origin; scales in longitudinal series 28 to 32; 7–9 transverse scale rows; 6–7 transverse caudal-peduncle scale rows. Jaws reaching posteriorly only as far as a vertical through the anterior third or middle of the eye; head dorsoventrally compressed, width at preopercle moderate, averaging less than 1/3 head length; second dorsal-fin and anal-fin origins equal; first dorsal-fin spines not elongate, not reaching second dorsal-fin origin; pectoral fins reaching vertical

between second dorsal- and anal-fin origins; pelvic fins not reaching anal-fin origin; urogenital papillae longer and thinner in males than females, truncate in both. Body proportions given in Table 1.

Coloration in alcohol.—Description based primarily upon GCRL 7850 and GCRL 12147. Ground color (of preserved specimens) pale tan, with five prominent midlateral dark blotches, originating under pectoral fin and terminating at caudal peduncle, basicaudal blotch darkest. Four dark saddles across dorsal midline, offset from lateral blotches. Nape and head mottled; head pigment includes two diagonal slashes, one extending strap-like from eye forward across jaws just behind tip of lower jaw, continuous with band crossing chin, another behind eye, extending from rear margin of mouth to top of preopercle, and a vertical bar running from the lower margin of the eye to the end of the lower jaw. First dorsal fin with prominent diagonal band just above base, second dorsal fin with several bands more or less parallel to fin base, anal fin dusky in males, unpigmented in females. Pair of spots present on upper and lower pectoral-fin base with a few melanophores extending onto fin membrane, thin edging of pigment along fin rays, otherwise clear. Pelvic fin unpigmented in females and small males, becoming dusky in maturing males. Caudal fin with four or five vertical bars in some specimens.

Remarks.—Distinguished from *L. panamensis* by possession of one more soft dorsal-fin and anal-fin ray, caudal-fin rays usually 2 + 11 + 2, and a forked row of sensory neuromasts on the opercle (*ot'* present). Distinguished from the

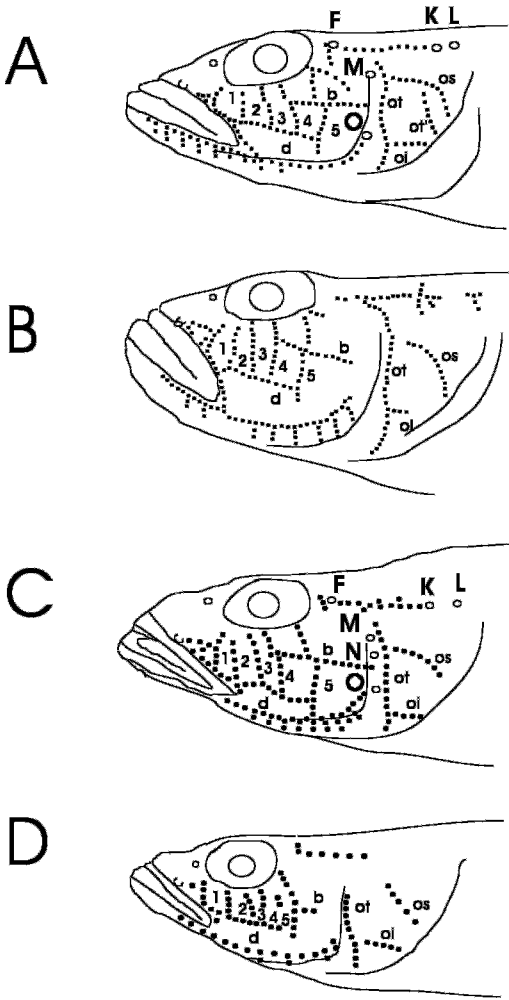


Fig. 2. Stylized infraorbital and opercular free neuromast rows of (A) *Leptophilypnus fluviatilis*, (B) *L. guatemalensis*, (C) *L. panamensis*, and (D) *Microleptophilypnus ternetzi*. Neuromast rows and visible cephalic lateralis canal pores labelled.

new species in having a prominent rectangular or triangular basicaudal blotch rather than a narrow bar at caudal-fin base, row *ot'* present on the opercle, 18 or 19 pectoral-fin rays, second dorsal- and anal-fin origins equal, larger jaws, and cephalic lateralis canals present.

Distribution.—Estuaries of Atlantic drainages of Central America, Honduras to Panama. Most specimens have been taken from Panama. Although not included by Bussing (1998) as a component of the freshwater ichthyofauna of Costa Rica, six specimens of *L. fluviatilis* have been recorded from the Tortuguero estuary (Gilbert and Kelso, 1971).

Leptophilypnus panamensis
(Meek and Hildebrand, 1916)

Figure 3

Eleotris macrolepis Meek, 1914:130–131 (not of Bleeker, 1875) (type locality Jesus Maria, Costa Rica; holotype FMNH 7775)

Microeleotris panamensis Meek and Hildebrand, 1916:363 (type locality Rio Juan Diaz, Panama; holotype FMNH 8953)

Diagnosis.—A *Leptophilypnus* with first dorsal-fin pterygiophore formula 3-12210; second dorsal-fin elements I, 8; anal-fin elements I, 8; pectoral-fin rays 17–20 (usually 18 or 19); caudal fin with 2 segmented (occasionally 1) + 12 (occasionally 13) branched + 1 segmented rays; vertebrae 9–10 + 16–17 = 25 (one specimen with 9 + 17), no *ot'* free neuromast row on opercle (Fig. 2); cephalic lateralis canals present with pores 'BDF' 'KL' 'MNO'; jaws reaching vertical through mideye in females, posterior margin of eye in males; basicaudal spot present.

Description.—Four or five short gill rakers on the lower portion of the first gill arch, not overlapping when appressed; generally no predorsal scales, occasionally one to three present at base of first dorsal-fin origin; scales in longitudinal series 31–33; 8–10 (usually 8) transverse scale rows; 6–8 (usually 7) transverse caudal-peduncle scale rows. Jaws reaching posterior to a vertical through mideye in females, to rear margin of eye in males; head broad and dorsoventrally compressed, width at preopercle usually greater than half head length; second dorsal-fin and anal-fin origins equal; first dorsal-fin spines not elongate, not reaching second dorsal-fin origin; pectoral fins reaching vertical between second dorsal- and anal-fin origins in males, just shy of vertical in females; pelvic fins usually not reaching anus, longer in males than females; urogenital papillae long, thin and truncate in males, broad and triangulate in females. Body proportions given in Table 1.

Coloration in alcohol.—Based primarily upon TU 25132 and AMNH uncat. Body brown dorsally becoming light tan ventrally and on abdomen. Three to six dark vertical streaks beneath pectoral fins. Four indistinct saddles across dorsal midline, one beneath first dorsal fin, two beneath posterior two-thirds of second dorsal fin, one on caudal peduncle at base of caudal fin. Small scattered melanophores peppering trunk, nape, and head. Brown spots on trunk, coalescing in some to form four or five indistinct midlateral blotches, last forming a basicaudal

TABLE 1. STANDARD LENGTHS AND PROPORTIONAL MEASUREMENTS FOR SPECIES OF *Leptophilypnus* (MEAN AND STANDARD DEVIATION). First four proportions of head length, others proportions of SL. SL reported as measured value.

	<i>L. fluviatilis</i>			<i>L. panamensis</i>			<i>L. guatemalensis</i>		
	mean	SD	n	mean	SD	n	mean	SD	n
Head width	0.31	0.04	20	0.57	0.06	15	0.30	0.03	20
Jaw length	0.26	0.03	22	0.42	0.10	17	0.18	0.03	20
Eye length	0.15	0.02	22	0.19	0.03	17	0.12	0.01	20
Interorbital	0.07	0.02	22	0.12	0.03	17	0.06	0.01	20
Head length	0.32	0.01	22	0.30	0.01	17	0.29	0.01	20
CPD length	0.28	0.02	13	0.26	0.01	15	0.29	0.01	20
Pectoral length	0.25	0.02	21	0.24	0.01	15	0.28	0.02	20
Pelvic length	0.20	0.01	21	0.18	0.01	17	0.21	0.01	20
Caudal length	0.27	0.02	20	0.25	0.02	15	0.28	0.01	20
2 nd dorsal length	0.30	0.04	20	0.32	0.03	15	0.30	0.03	20
Anal-fin length	0.30	0.03	20	0.31	0.02	15	0.28	0.02	20
SL	34.44	3.73	22	46.33	6.75	17	29.10	2.22	20

spot. Midanterior opercle dark. Pectoral fins with about nine vertical bars. Pelvic fins with some speckling in females suggesting bars, dusky in males. First dorsal fin with dark base in females, about three diagonal bars. First dorsal fin in males with dark margin, medial dark wishbone-shaped diagonal band. Second dorsal fin with about five diagonal bands formed from spots largely restricted to elements in females but also on interradiial membranes in males. Anal fins in females with elements edged in melanophores, clear interradiial membranes; dusky in males with a dark submargin and light margin. Caudal fin with about seven vertical bars formed from spots with two or three dark spots on dorsal margin near base, dusker in males than females.

Distribution.—Tidal freshwater of Pacific slope of Panama and Costa Rica.

Remarks.—Distinguished from congener *L. fluviatilis* by the possession of one fewer dorsal- and anal-fin rays, greater head width, lack of the *o'* sensory neuromast row on opercle, and number of segmented and branched caudal-fin rays. Distinguished from the new species by a diamond-shaped basicaudal spot rounded at the posterior margin, rather than a narrow bar, presence of cephalic lateralis canals, greater head width, larger jaws, and 18–19 pectoral-fin rays.

Grey (1947:142) noted that Isaac Ginsburg examined the type of *Eleotris macrolepis* Meek,

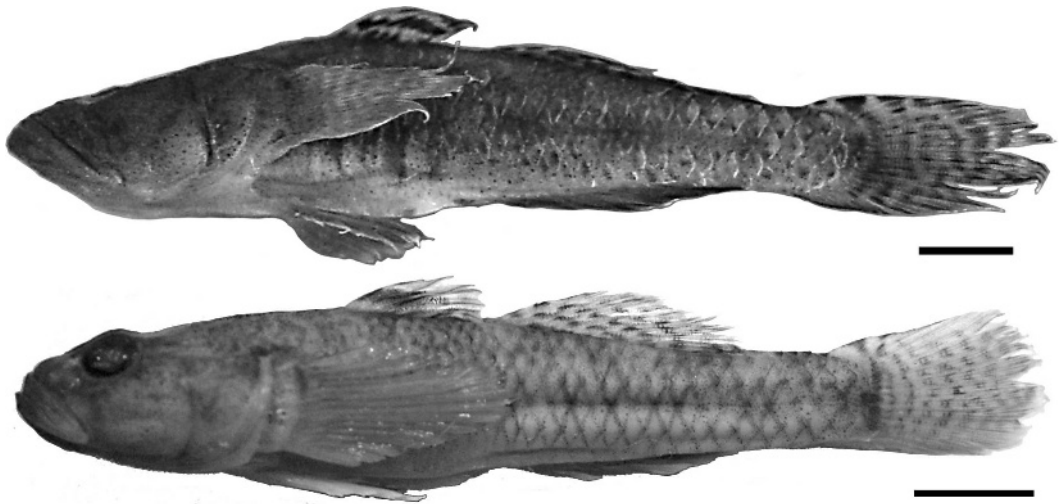


Fig. 3. Top: *Leptophilypnus panamensis*, TU 25132, 44.6 mm SL. Scale bar = 5 mm. Bottom: *Leptophilypnus guatemalensis*, UMMZ 245081, holotype, 36.6 mm SL. Scale bar = 5 mm.

1914 and "found it identical with *L. panamensis*." Another species (*Culius macrolepis* Bleeker, 1875, revised to *Eleotris* by Weber, 1908) preoccupies *E. macrolepis*, but *E. macrolepis* Meek, 1914 is simply reassigned to the available name *L. panamensis*. We follow this conclusion.

***Leptophilypnus guatemalensis*, new species,
Thacker and Pezold**

Figure 3

Holotype.—UMMZ 245081 (ex UMMZ 197087), male, 36.6 mm SL, Guatemala, Huehuetenango, Rio San Ramon, ca. 300 m below outfall from underground, elev. 240 m, Rio Ixcán drainage, 3 April 1974, D. E. Rosen and R. M. Bailey.

Paratypes.—UMMZ 197087 (32); LACM 56288-1 (2), female, 38.3 mm SL and male, 32.0 mm SL; FMNH 116467 (2), 33.8–35.4 mm SL; NLU 78593 (2), 29.5–30.7 mm SL. All with same locality information as holotype.

Diagnosis.—A *Leptophilypnus* with first dorsal-fin pterygiophore formula 3-12210 or 3-12201 (rarely 3-22110 or 3-22101); second dorsal-fin elements I, 7–9, usually I, 8; anal-fin elements I, 7–8, usually I, 7; pectoral-fin rays 14 or 15; caudal fin generally with 1 segmented + 13 branched + 1 segmented ray; vertebrae 10 + 16–17 = 26–27; opercular free neuromast row *ol'* absent (Fig. 2); cephalic lateralis canals absent; jaws reaching vertical through anterior margin of eye; thin basicaudal bar, sometimes separated into two thin vertical dashes. Distinguished from *L. fluviatilis* and *L. panamensis* by: pigment forming a narrow bar at base of caudal fin, rather than a diamond or rectangular spot; fewer than 17 pectoral-fin rays (usually 14 or 15); no cephalic lateralis canals; small jaws not reaching posterior to the anterior margin of the eye; first dorsal-fin spines not elongate, not reaching second dorsal-fin origin in females, may reach just beyond second dorsal-fin origin in males; and second dorsal-fin origin anterior to anal-fin origin.

Description.—Four or five short gill rakers on the lower portion of the first gill arch, not overlapping when appressed; no predorsal scales; 26 to 31 scales in longitudinal series; 8 transverse scale rows; 7 transverse caudal-peduncle scale rows. Jaws reaching posteriorly to a vertical through anterior margin of eye; head dorsoventrally compressed, width moderate, 26–35% head length at preopercle; anal-fin origin slightly posterior to second dorsal-fin origin, about equal to placement of first segmented ray of second

dorsal fin; first dorsal-fin spines not elongate, reaching near second dorsal-fin origin in most, reaching just beyond second dorsal-fin origin in some males; pectoral fins reaching vertical between second dorsal-fin and anal-fin origins; pelvic fins not reaching anus; urogenital papillae long and truncate, thin in males, broad and truncate in females (width 2/3–3/4 length). Body proportions given in Table 1.

Coloration in alcohol.—Based upon UMMZ 144145 and UMMZ 197094. Ground color pale tan, with fairly uniform distribution of tiny dark spots on head, dorsal and lateral surfaces, scales laterally with brownish posterior margins, merging in some to form indistinct reticulate pattern with a variable number of midlateral paired X-shaped concentrations. Spot present on side of nape at upper corner of opercle. A thin vertical bar or two thin disconnected but aligned vertical dashes on caudal peduncle at base of caudal fin. Thin dark line or lines variably developed midventrally on caudal peduncle. In females usually a pair of spots, one above the other, on pectoral-fin support and a spot as large as pupil on upper pectoral fin near dorsobasal margin usually with no other pigment on pectoral fin; in males tiny melanophores are more generally distributed on pectoral fins and do not form prominent spots as described for females. Pelvic fins unpigmented in females, dusky in males. Anal fin sometimes lightly pigmented in females, dusky in males. First dorsal fin with broad dark margin separated from wide dark diagonal band by broad unpigmented band, dark diagonal band beginning just above unpigmented base of first spine. Second dorsal fin with four or five diagonal rows of spots. Caudal fin with spots forming about six vertical bands.

Distribution.—Known from inland rivers of Guatemala in the Usumacinta watershed that drains into the Gulf of Mexico west of the Yucatan peninsula.

Remarks.—At this time we are unable to polarize unique character states associated with the dwarf Neotropical eleotrid species, but can associate the new species with *Leptophilypnus* based on overall similarity of different aspects of body form, meristic features, pigmentation, and free neuromast patterns.

Etymology.—This species is named for the collection localities, all in the states of Huehuetenango, Quiché, or Alta Verapaz, Guatemala.



Fig. 4. Top: *Microphilypnus ternetzi*, FMNH 110190, 34.7 mm SL. Scale bar = 5 mm. Bottom: *Microphilypnus ternetzi*, showing live coloration. Size not recorded.

***Microphilypnus* Myers, 1927**

Figure 4

Microphilypnus Myers, 1927:133–135 (type species: *Microphilypnus ternetzi* Myers, 1927 by original designation).

Diagnosis.—Prominent diagnostic characters of the genus provided by Myers (1927) include: gill openings extending forward to below posterior border or center of pupil; isthmus moderately narrow; vomerine teeth apparently absent; skull without ridges posteriorly, slightly ridged or irregular anterior to orbits; interorbital very narrow; head and snout more or less elongate; lower jaw projecting; scales large; opercles and occiput scaled; cheeks and breast naked; size minute. Additional diagnostic characters include: first dorsal fin with six spines, the last spaced more distantly than the remainder; dorsal-fin formula 3-22110, 3-21210 (Birdsong et al., 1988) and possibly 3-221100; second dorsal fin with one spine and seven or eight soft rays; anal fin with one spine and seven or eight soft rays, the last split to its base but counted as a single element; vertebrae 11–13 + 15–17 = 27–28; genital papilla present in both sexes; gill membranes approach closely but do not meet across isthmus; pelvic fins separate, each with one spine and five soft rays; four or five very short transverse infraorbital rows of free neuromasts; a single diagonal row of free neuromasts on posterior field of opercle (Fig. 2).

Pale ground color, with scattered melanophores over entire body, concentrated in a diffuse series midlaterally; dorsal, caudal, and anal fins also stippled with melanophores; pectoral and pelvic fins dusky but otherwise unmarked; distinct line of melanophores at ventral midline; minute size, less than 40 mm standard length.

Remarks.—When Myers (1927) described *Microphilypnus*, he included three species: *M. amazonicus*, *M. macrostoma*, and *M. ternetzi*. At the time, he expressed doubts about the placement of both *M. amazonicus* and *M. macrostoma*, indicating in his description of *M. amazonicus* (p. 135) that “this species and the next are probably not congeneric with *M. ternetzi* or with each other, but I hesitate to erect new genera on the poor material available.” Our examination of types and additional specimens of *Microphilypnus* does not support Myers’ (1927) concern.

The holotypes of both *Microphilypnus amazonicus* (CAS 76819 [formerly IU 17703], Igarape do Mai Joana, Manaus, Brazil) and *M. macrostoma* (CAS 76820 [formerly IU 17704], Igarape do Mai Joana, Manaus, Brazil) are tiny, discolored, and shrunken. Although pigmentation is poorly preserved, both types have a pigmented ventral midline on the caudal peduncle as seen in *M. ternetzi*. Also as observed in the syntypes of *M. ternetzi* (CAS 76818 [2; formerly IU 17702] Cano de Quiribana near Caicara, Venezuela), both specimens have 13 pectoral-fin rays, 5–7 large predorsal scales, fewer than 30 large scales in a longitudinal row, and a jaw extending to below mideye. Contrary to the Myers’ report (1927), the holotype and other specimens of *M. amazonicus* collected by Ternetz (CAS 76108 [1], 17.5 mm SL, Rio Negro, Cucuhy (Sto. Antonio) Brazil; CAS 76109 [1], 16.1 mm SL, Rio Negro, Cucuhy, Columbian border, Brazil) and the holotype of *M. macrostoma* do not have a spine on the ventral side of the preopercle, below the eye, a feature synapomorphic for the *Eleotris* and *Erotelis* clade (Pezold and Cage, 2002). Also in contradiction to Myers’ (1927) description, there is no evidence of a lateral line in the type and only known specimen of *M. macrostoma*. Types of

all three nominal species possess a urogenital papilla, a feature characteristic of Gobioidae but rare among other percomorphs (Johnson and Brothers, 1993).

Myers (1927) reported the *M. macrostoma* holotype to have a first dorsal fin with five spines, and a second dorsal fin and anal fin each with ten elements. Our observations indicate that there are six spines in the first dorsal fin and that the anal fin has nine elements. The body in the vicinity of the second dorsal fin has been damaged making a count difficult, but it may contain ten elements as observed by Myers. The shape of *M. macrostoma* is atypical: the lower jaw protrudes more noticeably beyond the upper jaw than as seen in other *Microphilypnus*, and the body is greatly compressed laterally. Close inspection of the jaws suggests that the upper jaw may be malformed. Radiographs also reveal a significant curvature of the spine for the specimen which may have contributed to the increased body depth posteriorly, but the specimen is torn and appears to have been smashed—perhaps during capture. Whether this unique representative of *M. macrostoma* represents a valid taxon or an accidental anomaly, it is nonetheless a specimen of *Microphilypnus*.

DISCUSSION

The two dwarf eleotrid genera, *Leptophilypnus* and *Microphilypnus*, are widespread in the Neotropics. *Leptophilypnus* is recorded from Central America, including Guatemala, Panama, Honduras, and Costa Rica. Information on the ecology of *Leptophilypnus panamensis* comes primarily from collection notes. This species was collected by Meek and Hildebrand (1916:363), “in fresh water, not far above the head of tide, in the Rio Chorrera near Chorrera and in the Rio Juan Diaz at Juan Diaz on the Pacific slope.” It was similarly taken in 1961 by one of the authors (RDS) in fresh water not far from the outlet of Rio Baru and in the lower Rio Grande de Terraba in Costa Rica in 1962. Both streams were white water. Substrates were boulder and rubble in Rio Baru and sand and mud in Rio Grande de Terraba. Vegetation was absent in Rio Baru and limited to very little along the shore of the Rio Grande de Terraba. Collections along steep sandy and rocky shore of a tidal pass at the mouth of the Rio Baru and 4 km north of Dominical did not find the species. The apparent absence at two sites on the lower Rio Baru could reflect a very restricted habitat association or differences in collection methods. Rotenone was used 1 km N of Dominical, while 3-m seines were used at the other two sites.

While *Leptophilypnus panamensis* seems to inhabit tidal freshwater, *L. fluviatilis* appears to be a more estuarine species. They are reported from a muddy brackish creek on the Atlantic versant of Panama in the Canal Zone (Meek and Hildebrand, 1916, as *L. fluviatilis* and *Microeleotris mindii*). Gilbert and Kelso (1971) collected six specimens from the Tortuguero Lagoon estuary. One collection site was characterized by open shallow bays 0.6 m or less in depth with a bottom varying from open to having filamentous algae and some submerged vegetation. The other site had a narrow shoreline with a steep slope and few shallows. This shore had much emergent, submerged, and floating vegetation. The new species, *L. guatemalensis*, is strictly a freshwater species, being known only from the upper Usumacinta River basin in Guatemala.

Microphilypnus also may be restricted to freshwater and has been recorded from throughout the Amazon and Orinoco drainages in Brazil, Venezuela, Colombia, Bolivia, and Guyana. Recent collections have yielded information on the habitat of this taxon (Mark Sabaj, pers. comm.). The *M. ternetzi* photographed in Figure 4 was collected in Guyana, 10 km northeast of Lethem, in the Manari River (clear to weakly blackwater). The collection was made by seining during the low water season, in calm shallows near the bank of the river (approximately 3–6 m in depth), over a substrate of sand and mud/silt among vegetation. *Microphilypnus* have also been captured from the Rio Negro (blackwater) in Amazonas, 7.2 km northwest of San Carlos do Rio Negro, by similar methods. At this locality numerous specimens were found after sunset at the tail end of a small, narrow but deep (over 2 m), backwater with steep banks and a sand/silt substrate without vegetation. The backwater opened directly into the Rio Negro and was separated from this large channel by a long, narrow spit of sand. Specimens were not found on the channel side of the spit where the substrate was entirely sand and current was moderate. Another recent collection of *Microphilypnus* is from the Rio Yutaje upstream from the mouth of the Rio Manapiare (Ventuari-Orinoco drainage), Amazonas, Venezuela. At this site the river expanded into a large shallow lake (clear to weakly blackwater) with abundant marsh habitat. *Microphilypnus* were common among submerged vegetation in shallow still water (less than 0.6 m) over a substrate of sand and mud/silt.

MATERIAL EXAMINED

Leptophilypnus fluviatilis.—CAS 6822 (4), Panama, Canal Zone, Gatun Locks, upper chamber. CAS

- 124774 (2), Panama, Chagres River. Paratypes of *L. fluviatilis*: FMNH 8569 (1), FMNH 8570 (1), FMNH 8571 (1), FMNH 8572 (1), FMNH 8573 (1), FMNH 8574 (1), FMNH 8575 (1, c), FMNH 8576 (1), FMNH 8577 (1), FMNH 8578 (1, CS), FMNH 8579 (1), FMNH 8581 (1), FMNH 8582 (1), FMNH 8583 (1, CS), FMNH 8584 (1), FMNH 8585 (1), FMNH 8586 (1), FMNH 8587 (1), FMNH 8588 (1), all with the same collection data as the holotype. FMNH 55284 (1), Panama, Canal Zone, Mindi Cut. Paratypes of *M. mindii*: FMNH 27218 (1), FMNH 27219 (1, CS), FMNH 27220 (1, CS), FMNH 27221 (1), FMNH 27222 (1, CS), FMNH 27223 (1, x), FMNH 27224 (1, x), FMNH 27225 (1, x), FMNH 27226 (1, x), FMNH 27227 (1, x), FMNH 27228 (1, x), FMNH 27229 (1, x), FMNH 27230 (1, x), FMNH 27231 (1, x), FMNH 27232 (1, x), FMNH 27233 (1, x), FMNH 27234 (1, x), FMNH 27235 (1, x), FMNH 27236 (1, x), FMNH 27237 (1, x), all same collection data as holotype of *M. mindii*. FMNH 32171 (1, x), FMNH 32172 (1, x), FMNH 32173 (1, x), FMNH 32174 (1, x), FMNH 32175 (1, x), Panama, Mindi Cut, Canal Zone. FMNH 37009 (1, x), FMNH 37010 (1), FMNH 37011 (1), FMNH 37012 (1), FMNH 37013 (1), FMNH 37014 (1), FMNH 37015 (1), FMNH 37016 (1), Panama, Pedro Miguel Locks. FMNH 37017 (1, x), FMNH 37018 (1), FMNH 37019 (1), FMNH 37020 (1), Panama, Gatun Lake, Barro Colorado Canal Zone. FMNH 84980 (1, x), Honduras, small stream feeding into a tributary of the Rio Patuca. GCRL 7850 (10), Panama, Colon, 1 km E of Maria Chiquita at small bridge on Portobello Road. GCRL 12147 (11), Panama, Colon, Devil's Beach, Fort Sherman, 09°22'00"N, 79°58'03"W (from creek). GCRL 12674 (1), Panama, Canal Zone, Gatun Locks, East Lane, upper chamber. GCRL 12695 (13), Panama, Canal Zone, Gatun Locks, East Lane, lower chamber. GCRL 12726 (41), Panama, Canal Zone, Gatun Locks, East Lane, middle chambers. GCRL 12740 (1), Panama, Colon, Devil's Beach, Fort Sherman, 09°22'00"N, 79°58'03"W, 200 m upstream on E side. UMMZ 180649 (1, x), Costa Rica, Limon, Tortuguero Lagoon. UMMZ 180758 (5, x), Panama, Barro Colorado Island, Gatun Lake. UMMZ 197253 (1), Guatemala, Izabal, Rio Paujila above El Golfete. UMMZ 199560 (2, x), Honduras, Rio Patuca. UMMZ 199575 (4), Honduras, Rio Patuca. UMMZ 199594 (1), Honduras, Rio Patuca, Rapa Laguna. UMMZ 199611 (20, x), Honduras, Rio Sicre, Laguna Sikalanka.
- Leptophilypnus panamensis*.—Paratypes of *M. panamensis*: CAS 78978 (1), Panama, Rio Juan Diaz. FMNH 27089 (1, CS), FMNH 27090 (1), FMNH 27091 (1, CS), FMNH 27092 (1, CS), FMNH 27093 (1, x), FMNH 27094 (1), FMNH 27095 (1), FMNH 27096 (1), FMNH 27097 (1), FMNH 27098 (1), Panama, Rio Juan Diaz. FMNH 27099 (1, x), FMNH 27100 (1, x), FMNH 27101 (1, x), FMNH 27102 (1, x), FMNH 27103 (1, x), FMNH 27104 (1, x), FMNH 27105 (1, x), FMNH 27106 (1, x), Panama, Rio Chorrera. FMNH 55285 (1), Panama, Rio Juan Diaz. AMNH uncat. (20), Costa Rica, Puntarenas, Rio Baru 1 km N of Dominical. TU 25132 (109), Costa Rica, Puntarenas, Rio Baru 1 km N of Dominical. TU 84526 (6), Costa Rica, Rio Grande de Terraba at Puerto Cortes.
- Leptophilypnus guatemalensis*.—UMMZ 144145 (40), Guatemala, upper Rio de la Pasion. UMMZ 144147 (102), Guatemala, upper Rio de la Pasion. UMMZ 187938 (34), Guatemala, Alta Verapaz, Arroyo Salaguna. UMMZ 187953 (52), Guatemala, Alta Verapaz, Rio Semococh. UMMZ 188006 (5), Guatemala, Quiche, Arroyo Negro, tributary of Rio Xacbal. UMMZ 187938 (34), Guatemala, Alta Verapaz, Arroyo Salaguna. UMMZ 190494 (22, x), Guatemala, Alta Verapaz, Rio Candelaria de Yalicar. UMMZ 190770, Guatemala, Alta Verapaz, tributary of Rio Canilla. UMMZ 193916 (7), Guatemala, Alta Verapaz, tributary to Rio Icbolay. UMMZ 194060 (10), Guatemala, Alta Verapaz, Rio Chiyu. UMMZ 197087 (39, x), Guatemala, Huehuetenango, Rio San Ramon. UMMZ 197094 (51), Guatemala, Alta Verapaz, Rio Candelaria de Yalicar.
- Microphilypnus amazonicus*.—Holotype CAS 76819 (1), Brazil, Manaus, Igarape do Mai Joana. CAS 76108 (1), Brazil, Cucuhy (Sto. Antonio), Rio Negro. CAS 76109 (1), Brazil, Colombian bord, Cucuhy, Rio Negro. USNM 316898 (48, x), Brazil, Amazonas, Janauaca, Lago do Castanho, Sao Jose. USNM 316903 (18), Brazil, Amazonas, near Manaus, Lago Januari. USNM 316906 (30, x), Brazil, Amazonas, Janauaca, Lago do Castanho, Sao Jose. USNM 316945 (33), Brazil, Amazonas, Janauaca, Plantagao de Juta, Lago Murumuru. USNM 316948 (30), Brazil, Amazonas, Ilha de Marchantaria, Camaleao. USNM 316961 (30, x), Brazil, Amazonas, Janauaca, Cural de Gado, Lago Murumuru.
- Microphilypnus macrostoma*.—Holotype CAS 76820 (1), Brazil, Manaus, Igarape do Mai Joana.
- Microphilypnus ternetzi*.—Syntypes CAS 76818 (2; formerly IU 17702), Venezuela, Cano de Quiribana near Caicara. CAS 118080 (2; formerly SU 18080), Venezuela, Rio Orinoco, Cano de Quiribana. FMNH 110189 (1), FMNH 110190 (37, x), Venezuela, Bolivar, Cano Mato.

Microphilypnus sp.—ANSP 162696 (8), Venezuela, Amazonas, Cano Caripo (1st R. Caiquiare cano ca. 5 min. from confluence of Casiquiare and Orinoco, left side). ANSP 162697 (1), Venezuela, Amazonas, Cano of Rio Casiquiare ca. 22 km downstream from mouth of Rio Pamoni (east side). CAS 41734 (3), Colombia, ca. 20 mi. NW of Leticia, Quebrada Tucuchira. FMNH 70136 (1), Brazil, Lago Timbo. FMNH 70137 (2, x), Brazil, Lago Jurucui. FMNH 70138 (1), Brazil, Igarape Agua Preta. FMNH 70139 (1), Brazil, Lago do Caxias. FMNH 70140 (1), Brazil, Lago Curí. FMNH 85517 (1), Venezuela, Amazonas, San Fernando de Atabapo, Titi Lagoon. FMNH 85589 (3, x), Venezuela, Amazonas, Rio Pacia Grande. UMMZ 204318 (6), UMMZ 204333 (4), UMMZ 204355 (4), UMMZ 204531 (5), UMMZ 204392 (8, x), UMMZ 209803 (15, x), all Bolivia, Beni, Rio Itenez. USNM 270004 (34), Venezuela, Amazonas, Departamento Ature, Cano south of El Burro. USNM 270006 (40+, x), Venezuela, Amazonas, Departamento Rio Negro, Cano Urami. USNM 326286 (23), Brazil, Amazonas, Rio Urubu.

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LITERATURE CITED

- PRINCE AKIHITO, M. HAYASHI, AND T. YOSHINO. 1984. Suborder Gobioidi, p. 236–289, pl. 235–258. *In: The Fishes of the Japanese Archipelago*. H. Masuda, K. Amaoka, C. Araga, and T. Uyeno (eds.). Tokai Univ. Press, Tokyo.
- BIRDSONG, R. S., E. O. MURDY, AND F. L. PEZOLD. 1988. A study of the vertebral column and median fin osteology in gobioid fishes with comments on gobioid relationships. *Bull. Mar. Sci.* 4:174–214.
- BLEEKER, P. 1875. Notice sur les Eleotriiformes et description de trois espèces nouvelles. *Arch. Néerl. Sci. Nat., Haarlem v.* 10:101–112.
- BUSSING, W. A. 1998. Freshwater fishes of Costa Rica. *Rev. Biol. Trop.* 46, Suppl. 2:1–468.
- GILBERT, C. R., AND D. P. KELSO. 1971. Fishes of the Tortuguero area, Caribbean Costa Rica. *Bull. Fla. State Mus., Biol. Sci.* 16:1–54.
- GREY, M. 1947. Catalogue of the type specimens of fishes in Chicago Natural History Museum. *Fieldiana: Zoology* 32:109–205.
- HILDEBRAND, S. F. 1938. A new catalogue of the freshwater fishes of Panama. *FMNH Publ. Zool., Ser* 22:217–359.
- HOESE, D. F., AND A. C. GILL. 1993. Phylogenetic relationships of eleotrid fishes (Perciformes: Gobioidi). *Bull. Mar. Sci.* 52:415–440.
- JOHNSON, G. D., AND E. B. BROTHERS. 1993. *Schindleria*: a paedomorphic goby (Teleostei: Gobioidi). *Ibid.* 52:441–471.
- LEVITON, A. E., R. H. GIBBS, JR., E. HEAL, AND C. E. DAWSON. 1985. Standards in ichthyology and herpetology: part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia* 1985:802–832.
- MEEK, S. E. 1914. An annotated checklist of fishes known to occur in the freshwaters of Costa Rica. *FMNH Publ. Zool., Ser* 10:101–134.
- , AND S. F. HILDEBRAND. 1916. The fishes of the fresh waters of Panama. *Ibid.* 10:217–374.
- MILLER, P. J., AND P. WONGRAT. 1991. The innervation of head neuromast rows in eleotridine gobies (Teleostei: Gobioidi). *J. Zool* 225:27–42.
- MYERS, G. S. 1927. Descriptions of new South American fresh-water fishes collected by Dr. Carl Ternetz. *Bull. Mus. Comp. Zool.* 68:107–135.
- PEZOLD, F. 1993. Evidence for a monophyletic Gobiinae. *Copeia* 1993:634–643.
- , AND B. CAGE. 2002. A review of the spinycheek sleepers, genus *Eleotris* (Teleostei: Eleotridae), of the western hemisphere, with comparison to the West African species. *Tulane Stud. Zool. Bot.* 31:19–63.
- SANZO, L. 1911. Distribuzione delle papille cutanee (organi ciatiforme) e suo valore sistematico nei gobi. *Mitt. zool. Stn. Neapel* 20:249–328.
- THACKER, C. E., AND M. HARDMAN. 2005. Molecular phylogeny of basal gobioid fishes: Rhyacichthyidae, Odontobutidae, Xenisthmidae, Eleotridae (Teleostei: Perciformes: Gobioidi). *Mol. Phylogenet. Evol.* 37:858–871.
- WEBER, M. 1908. Süßwasserfische von Neu-Guinea ein Beitrag zur Frage nach dem früheren Zusammenhang von Neu-Guinea und Australien. *In: Résultats de l'Expédition Scientifique Néerlandaise à la Nouvelle-Guinée. Süßwasserfische Neu-Guinea* 5:201–267.

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