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THE RELATIONSHIPS OF THE SOUTH AMERICAN PYGMY CHARACOID FISHES OF THE GENUS *ELACHOCHARAX*, WITH A REDESCRIPTION OF *ELACHOCHARAX JUNKI* (TELEOSTEI: CHARACIDAE)

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Abstract.—*Elachocharax junki* (Géry), previously known only from the holotype, is redescribed on the basis of four additional specimens from the Rio Madeira basin and one from a tributary of the Rio Negro, Amazonas, Brazil. This species, originally described as *Geisleria junki* and placed in a monotypic subfamily, Geisleriinae, is here considered to be a species of *Elachocharax* of the characid subfamily Characidiinae. *Elachocharax* consists of three species, *E. pulcher, E. geryi,* and *E. junki.* Their relationships are discussed and a key is provided for their identification. The relationships of *Elachocharax* to the other genera of the Characidiinae is treated. The Geisleriinae and Elachocharacinae of Géry (1971) are rejected and placed as synonyms of the Characidiinae.

The first known pygmy characoid related to *Characidium* Reinhardt and *Jobertina* Boulenger but having a very long dorsal-fin base with 17 to 20 rather than 10 to 14 dorsal-fin rays was *Elachocharax pulcher* Myers (1927) from the central region of the Rio Orinoco in Venezuela. In recent years, further collecting in the Amazon basin has resulted in the description of additional nominal species of *Elachocharax. Elachocharax georgiae* Géry (1965) was shown by Weitzman and Kanazawa (1978) to be a synonym of *E. pulcher* but two additional valid species have been described. Géry (1971) established a new genus and species, *Geisleria junki* (here placed in *Elachocharax*), from the Rio Novo in an area about 45 km east of Porto Velho in the basin of the Rio Madeira, Brazil. Weitzman and Kanazawa (1978) described a new species, *Elachocharax geryi,* from the middle of the Amazon basin near Manaus, Brazil, and from Caño Muco, an upper tributary of the Rio Orinoco in Colombia. They further reported the extension of the known range of *Elachocharax pulcher* from the mid Rio Orinoco basin to an area covering much of the central Amazon basin.

Géry (1971) assigned *Geisleria junki* to a new subfamily, Geisleriinae, based on its apparent possession of two rows of premaxillary teeth, presumed absence of ectopterygoid teeth, the presence of what appeared to be maxillary teeth, a supposed absence of "suborbital" bones, and absence of a cranial fontanel. At that time Géry recognized two new, but related groups at the subfamily level, the Geisleriinae and the Elachocharacinae, the latter based on *Elachocharax* of Myers (1927). He included these taxa along with the Characidiinae in a family, the Characidiidae. This family, here tentatively recognized as a subfamily of the Characidae, includes *Characidium, Jobertina, Klausewitzia* Géry (1965), *Elachocharax,* and *Ammocryptocharax* Weitzman and Kanazawa (1976). Géry (1971) correctly pointed out that the phylogenetic relationships of this family group to other characoids are uncertain, a fact agreed to by Weitzman and Kanazawa (1978) who briefly reviewed the history of the placement of these fishes by ichthyologists. Géry further noted that the species of the Elachocharacinae and the Geisleriinae form a group of small fishes related to *Characidium* but with a long-based dorsal fin and apparently living in very slow-moving waters. Species of *Characidium, Jobertina,* and *Ammocryptocharax* are ordinarily found in streams of moderate to rapid flow whereas *Elachocharax, Klausewitzia,* and the nominal *Geisleria* occur in quiet waters of large river basins. Weitzman and Kanazawa (1976) tentatively rejected the Elachocharacinae and Geisleriinae as valid taxa at the subfamily level and adopted a hypothesis that all the genera noted above belong to a subfamily, the Characidiinae, whose characoid relationships are uncertain.

The examination of a specimen from the Rio Negro basin, here considered a female of the nominal *Geisleria junki,* of four specimens of this species from the Rio Madeira basin, and a reexamination of the holotype of *G. junki* has allowed a new interpretation to be placed on the phylogenetic relationships among the species *Elachocharax pulcher, Elachocharax junki,* and *Elachocharax geryi.*

A key is presented below to the species of *Elachocharax. Elachocharax junki* is redescribed and the relationships among the three species are discussed. Finally, the possible relationships of *Elachocharax* with other species and genera of the Characidiinae is reviewed.

Elachocharax Myers

Elachocharax Myers, 1927:114, original description, type by monotypy *Elachocharax pulcher* Myers (1927).—Géry, 1977:122, brief discussion.—Weitzman and Kanazawa, 1978:160, redefinition and discussion of relationships.

Elacocharax Weitzman and Kanazawa, 1976:328, misspelling for *Elachocharax.*

Geisleria Géry, 1971:154, original description, type by monotypy *Geisleria junki* Géry (1971).—Géry, 1977:122, brief discussion.

Weitzman and Kanazawa (1978) redefined the genus and discussed its presumed phylogenetic relationships. Inclusion herein of the species *E. jun-*

ki modifies that description. A discussion of the relationships of the genus will be found below, after the redescription of *E. junki.*

Diagnosis.—The following two correlated characters will distinguish *Elachocharax* from all other known genera in the Characidiinae. Total number of dorsal-fin rays 17–22. Anterior origin of the anal fin either ventral to or in advance of the posterior termination of the dorsal-fin base.

Description.—Other characters useful in defining *Elachocharax* are as follows. Premaxillary teeth in single series, partly tricuspid, bicuspid, and unicuspid, or only unicuspid. Maxillary and mesopterygoid teeth absent. Dentary teeth in two rows. Outer row of partly tricuspid, bicuspid, and unicuspid, or only unicuspid teeth. Inner row unicuspid. Ectopterygoid teeth present, unicuspid, and nearly uniserial. Mouth terminal or snout slightly in advance of lower jaw. Adipose fin present or absent. Scale rows between anterior dorsal-fin origin and pelvic-fin origin 8. Predorsal scales 8–10. Perforated lateral-line scales few, 5–9. Scales in a lateral series 26–33. Scale rows around caudal peduncle, 14 (Weitzman and Kanazawa, 1978, erroneously reported 12 scale rows around caudal peduncle for *E. pulcher*). Vertebrae 29–32, including those of Weberian apparatus and terminal centrum. Branchiostegal rays 4–5. Body relatively short, greatest depth at dorsal-fin origin 23–30% of standard length. First and second infraorbital bones with a well developed laterosensory canal. Third, fourth, and fifth infraorbital bones apparently absent.

Key to the Species of *Elachocharax*

1. Premaxillary teeth tricuspid anteriorly followed by a few bicuspid and/or unicuspid teeth. Dentary with tricuspid teeth anteriorly followed by none, one, or a very few bicuspid teeth and then several unicuspid teeth lateroposteriorly. Adipose fin present. Branchiostegal rays 5 .... *Elachocharax pulcher*
2. Premaxillary and dentary teeth unicuspid. Adipose fin absent. Branchiostegal rays 4 .... **3**
3. Caudal fin without obvious vertical dark bars. Teeth of ectopterygoid 8–13. Inner row dentary teeth 19–20. Upper limb gill rakers 5–6. Anterior anal-fin origin in advance of posterior termination of dorsal-fin base. Snout length about 5.4–6.1% of standard length. Caudal peduncle length about 19.0–22.0% of standard length .... *Elachocharax junki*
4. Caudal fin with 13–14 narrow vertical dark bars. Teeth of ectopterygoid 4–5. Inner row dentary teeth 13–16. Upper limb gill rakers 3. Anal-fin origin ventral to or slightly posterior to posterior termination of dorsal-fin base. Snout length about 6.0–8.0% of standard length. Caudal peduncle length about 16.0–19.0% of standard length .... *Elachocharax geryi*

A description and synonymies of *E. pulcher* and a description of *E. geryi* appear in Weitzman and Kanazawa (1978). Some additional localities for *Elachocharax pulcher* are as follows: FMNH 87812, (2), 13.8–14.6 mm SL, Peru, Rio Nanay, Mishana, about 33 km west of Iquitos (73°30'W, 3°50'S), 5 November 1974, Spieler and Poncho; MPM 24,697, (6), 12.1–14.7 mm SL, same locality as FMNH 87812; AMNH 38239, (2) 21.9–22.1 mm SL, Bolivia, Dept. Beni, Arroyo Grande, 4 km west of Guayaramerin, new road to Riberalta (65°27'W, 10°50'S), 23 October 1964, R. M. Bailey and W. Villaroel.

Elachocharax junki (Géry)

Figs. 1–6, Table 1

Geisleria junki Géry, 1971:154, original description, Brazil, Rondonia, Rio Novo, tributary to Rio Jamari about 45 km east of Porto Velho, Rio Madeira basin.—Géry, 1977:122, listed, brief discussion.—Weitzman and Kanazawa, 1978:161, discussion of relationships.

Material examined.—Holotype, collection of J. Géry, 22.4 mm SL, Brazil, locality as listed above in synonymy, collected 18 October 1967 by R. Geisler and W. Junk; MZUSP 14008, (1) 22.3 mm SL, Brazil, Amazonas, igarapé Cobrinha, left bank of Rio Cuieiras, approx. 20 km from its mouth (60°30'W, 2°50'S), 28 January 1977, H. Britski and N. Menezes; collection of J. Géry, (4) 21.5–23.1 mm SL, Brazil, Amazonas, 44 km east of Humaitá along rodovia Trans-Amazonica, Rio Madeira basin (62°35'W, 7°35'S), 22 August 1976, H. R. Axelrod. Figure 1 is a map of localities.

Description.—Body relatively short in comparison to most members of Characidiinae; greatest depth at dorsal-fin origin. Profile of head and back from snout tip to dorsal-fin origin gently convex with a slight concavity at nape and dorsal to area of eyes. (Note holotype, Fig. 2, preserved with branchial apparatus and gill covers expanded and head extended dorsally, giving a greater concavity at nape than is present in specimens with branchial apparatus, gill cover, and head not in extended position, Figs. 3, 4.) Dorsal-fin origin in advance of pelvic-fin origin. Anal-fin origin in advance of posterior termination of dorsal-fin base. Profile of ventral surface of head convex. Belly slightly convex from region of isthmus to pelvic-fin origin. Profile of body between pelvic-fin origin and anal-fin origin gently convex to nearly straight. Caudal peduncle relatively short and deep. Both dorsal and ventral profiles of caudal peduncle slightly concave.

Head moderately long. Mouth nearly terminal or snout slightly in advance of lower jaw tip. Snout relatively blunt. Eye large, horizontal diameter exceeding snout length.

Teeth on dentary in 2 rows (Figs. 5, 6). Outer (anterior and lateral) row with 14 (13–17, $\bar{x}$ = 15.5) 16 conic teeth. Inner row with 19 (19–20, $\bar{x}$ = 19.5) 20 conic teeth. Premaxillary (Fig. 5) with a single row of 11 (12–15,

Fig. 1. Localities reported for *Elachocharax junki*. **1.** Type locality Rio Novo, tributary to Rio Jamari, Rio Madeira basin, Brazil. **2.** 44 km east of Humaitá along rodovia Trans-Amazonica, Rio Madeira basin. **3.** Igarapé Cobrinha, Rio Cuieiras, Rio Negro basin.

$\bar{x}$ = 13) 14 conic teeth. Maxillary toothless. Ectopterygoid with 8 (10–13, $\bar{x}$ = 11.3) 12 conic teeth in nearly a single row.

Branchiostegal rays 4, two slender anterior rays attached to anterior part of ceratohyal followed by a broad ray attached to posterior part of ceratohyal and another broad ray attached to epihyal. Gill rakers 6 (5–6, $\bar{x}$ = 5.8) 5 on upper limb and 6 (6–7, $\bar{x}$ = 6.8) 6 on lower limb. Frontal-parietal foramen greatly reduced, bounded by posterior borders of parietals and supraoccipital. A narrow antorbital bone present dorsal and posterolateral to posterior dorsal portion of first infraorbital. First (anterior) infraorbital of moderate size and well ossified in stained face bones of right side of specimen from Rio Cuieiras. First infraorbital with an anterior process extending dorsal and anterior to anterior dorsal slender process of maxillary bone. Second infraorbital bone primarily a narrow laterosensory tube but some additional bone present. Both first and second circumorbitals contain laterosensory canals. Other infraorbital bones apparently absent.

Scales cycloid, usually 4–5 radii on exposed field. Lateral line with 7 (7–

Table 1.—Morphometrics of *Elachocharax junki*. Standard length is expressed in mm. Other measurements are percentages of standard length. The coefficient of variation (CV%) is an expression of variation of the original measurements.

Locality	Brazil, Rio Novo (Holotype)	Brazil, 44 km east of Humaitá				Brazil, Rio Cuieiras	Range	$\bar{x}$	SD	CV%
Standard length	22.4	21.2	21.5	22.4	23.1	22.3	21.2–23.1	22.2	0.689	3.112
Depth at dorsal-fin origin	29.9	28.3	26.0	27.7	29.4	30.0	26.0–30.0	28.6	1.545	7.583
Snout to dorsal-fin origin	47.8	47.6	46.5	49.1	45.9	48.4	45.9–49.1	47.6	1.184	3.782
Snout to pectoral-fin origin	29.0	28.8	28.8	28.1	28.1	27.4	27.4–29.0	28.4	0.609	2.920
Snout to pelvic-fin origin	55.8	51.9	51.2	50.9	50.2	53.4	50.2–55.8	52.2	2.058	4.971
Snout to anal-fin origin	77.2	73.1	74.0	72.8	71.9	74.9	71.9–77.2	74.0	1.882	3.868
Caudal-peduncle depth	16.1	14.6	14.0	14.3	15.2	15.2	14.0–16.1	14.9	0.759	7.171
Caudal-peduncle length	21.9	20.3	20.0	19.2	19.5	20.6	19.2–21.9	20.3	0.957	5.356
Pectoral-fin length	31.1	30.2	28.4	27.2	27.3	32.3	27.2–32.3	29.5	2.140	7.225
Pelvic-fin length	21.0	19.3	20.0	18.3	19.9	18.8	18.3–21.0	19.6	0.961	5.958
Length dorsal-fin base	33.0	33.5	33.5	31.7	34.6	33.2	31.7–34.6	33.3	0.940	4.697
Length longest dorsal-fin ray	17.9	16.5	16.3	15.6	17.7	17.9	15.6–17.9	17.0	0.981	9.070
Length anal-fin base	9.4	9.4	10.2	8.9	10.8	9.9	8.9–10.8	9.8	0.677	8.593
Length longest anal-fin ray	18.8	20.8	21.9	20.5	22.9	18.8	18.8–22.9	20.6	1.644	9.046
Bony head length	26.3	30.2	30.2	29.0	28.6	25.6	25.6–30.2	28.3	1.954	6.705
Head length to soft opercular border	28.6	31.6	31.6	30.8	30.3	29.6	28.6–31.6	30.4	1.777	3.208
Horizontal eye diameter	8.9	8.5	8.4	8.0	7.8	9.0	7.8–9.0	8.4	0.476	5.533
Snout length	5.4	6.1	6.0	5.8	6.1	5.4	5.4–6.1	5.8	0.329	8.154
Fleshy interorbital width	7.6	7.5	7.0	7.6	7.4	7.6	7.0–7.6	7.5	0.235	7.902
Upper jaw length	7.1	8.0	7.4	7.6	7.8	7.2	7.1–8.0	7.5	0.349	4.899
Eye to dorsal-fin origin	36.2	33.5	33.5	34.8	32.9	34.1	32.9–36.2	34.2	1.186	4.921
Dorsal-fin origin to caudal fin base	55.8	58.5	55.3	55.8	58.4	58.3	55.3–58.5	57.0	1.528	4.355

Fig. 2. **Above,** *Elachocharax junki* (Géry), holotype, SL 22.4 mm, left side, Rio Novo, tributary of Rio Jamari, Rio Madeira basin, Rondonia, Brazil. **Below,** right side of same specimen.

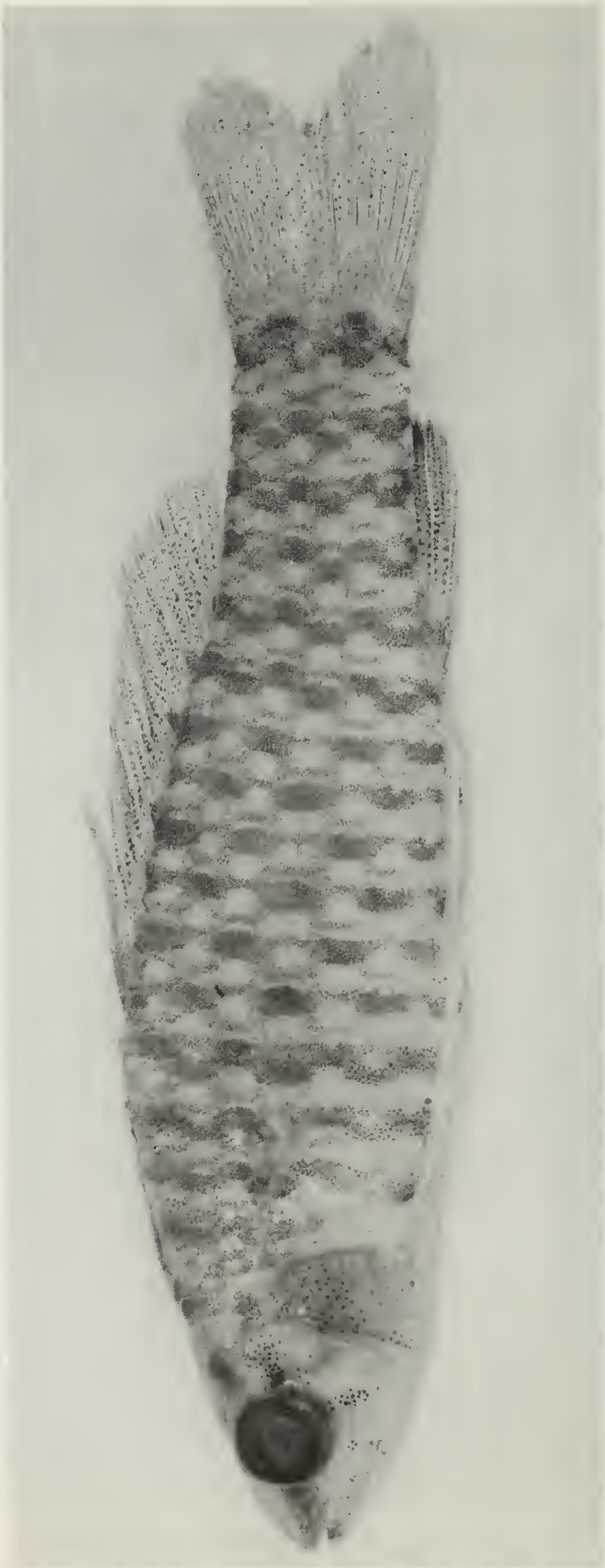


Fig. 3. *Elachocharax junki* (Géry), SL 23.1 mm, 44 km east of Humaitá, Rio Madeira basin, Amazônas, Brazil.

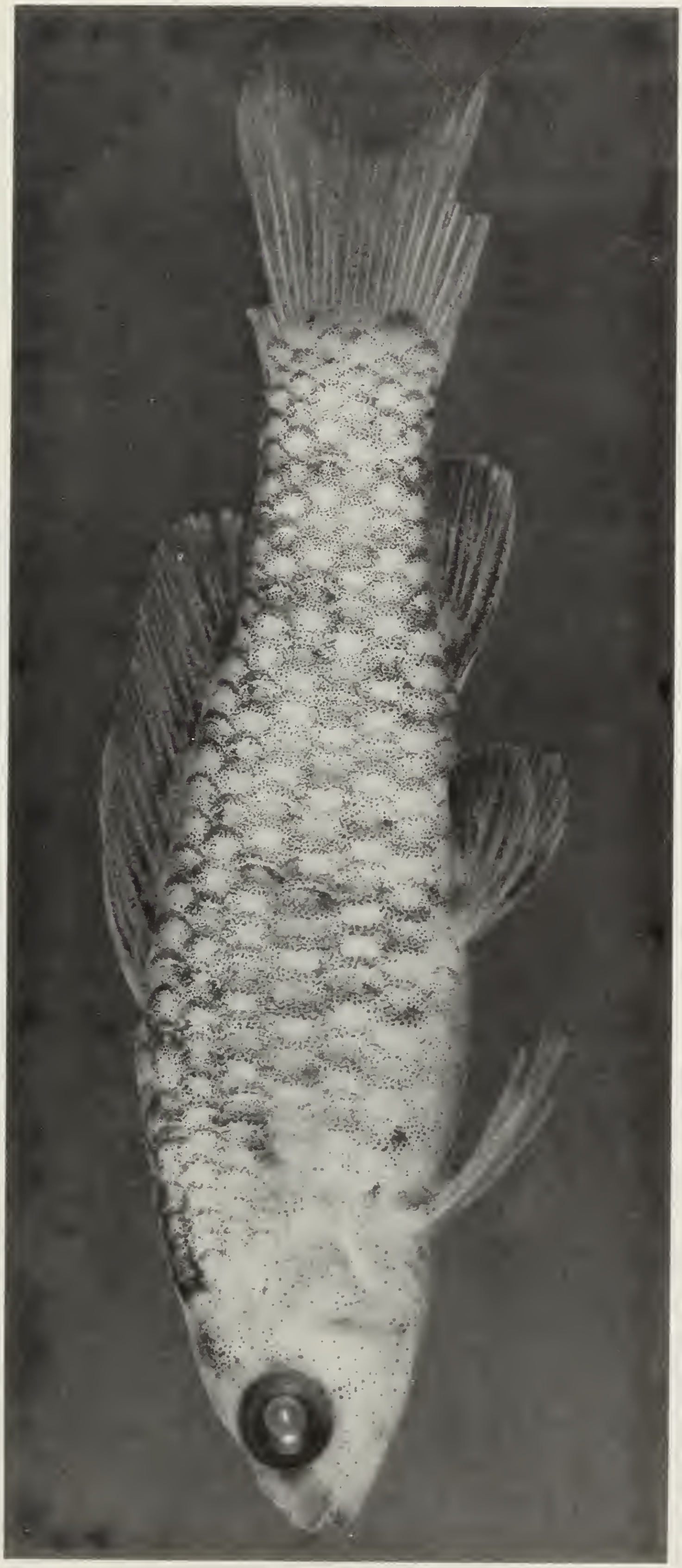


Fig. 4. *Elachocharax junki* (Géry) MZUSP 14008, SL 22.3 mm, igarapé Cobrinha, Rio Cueiras, Rio Negro basin, Amazônas, Brazil.

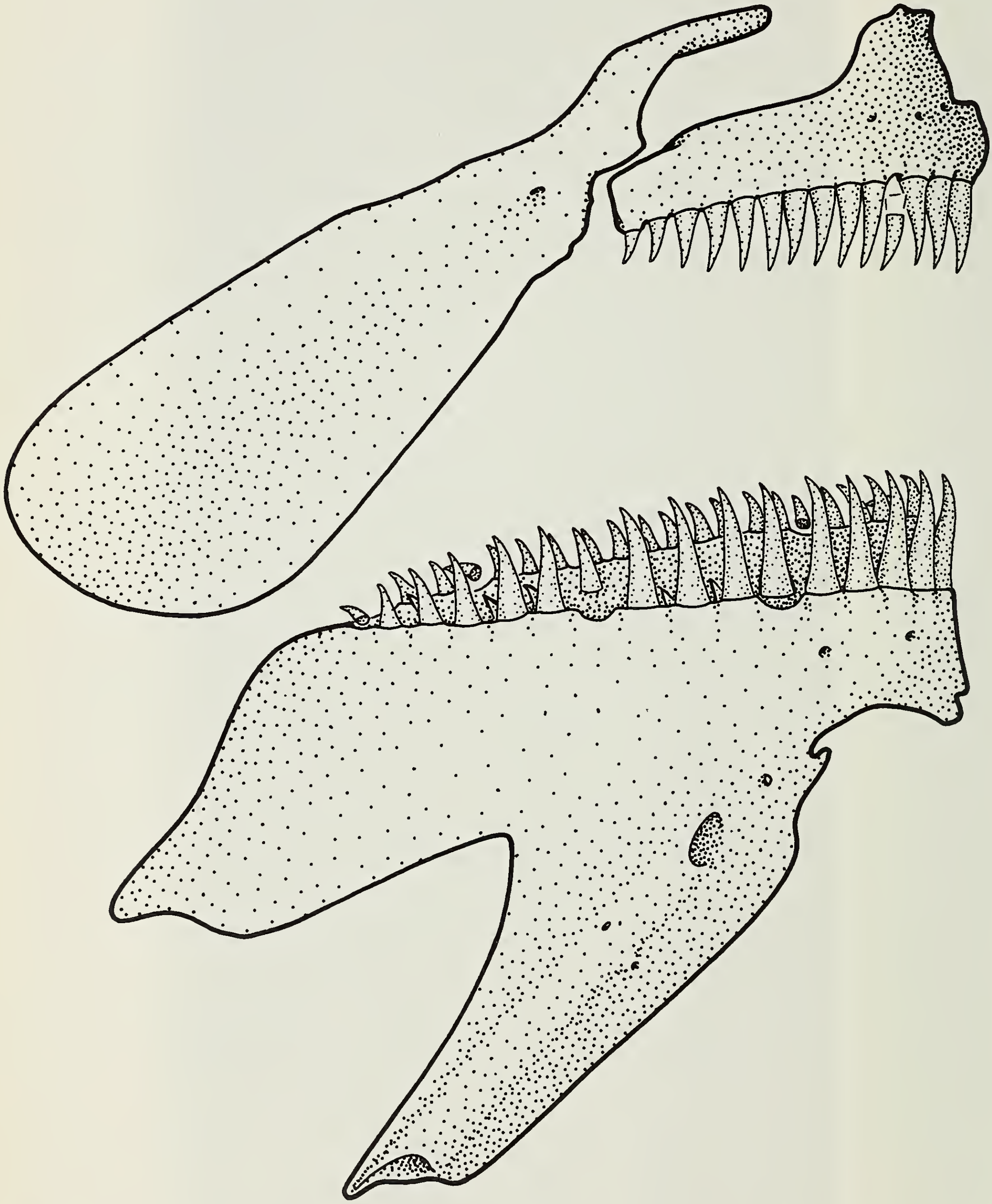


Fig. 5. *Elachocharax junki* (Géry), MZUSP 14008, SL 22.3 mm, igarapé Cobrinha, Rio Cuieiras, Amazônas, Brazil. Lateral view of premaxillary and maxillary and dentary bones of right side. Anterior is to the right. Outer dentary tooth row lies in a deep groove. Their replacement teeth develop in that groove. The inner row dentary teeth are seen posterior to the ridge behind the groove.

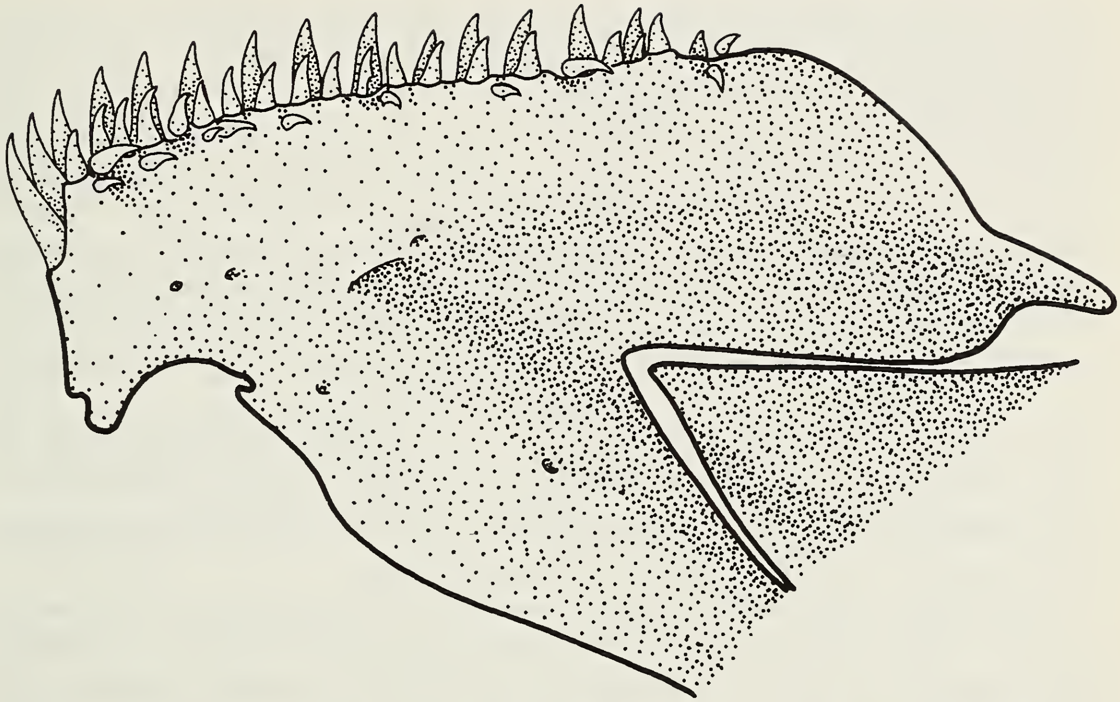


Fig. 6. *Elachocharax junki* (Géry), MZUSP 14008, SL 22.3 mm, igarapé Cobrinha, Rio Cuieiras, Amazônas, Brazil. Medial view of right dentary bone. Twenty inner row teeth are visible on the dentary ridge. Nine replacement teeth can be seen posterior to the inner row teeth. These replacement teeth point inwards toward the oral cavity. Anterior is to the left.

8, $\bar{x}$ = 7.8) 8 scales. Scales in a lateral series 31 (30–33, $\bar{x}$ = 31.5) 31. Scale rows between dorsal and pelvic fins 8 in all specimens. Scale rows around caudal peduncle 14 in all specimens. Predorsal scales 10 (9–10, $\bar{x}$ = 9.3) 9. Area on belly anterior to pectoral fin with scales.

Dorsal-fin rays iii,16 (iii,17 in two, iii,18 in one, and ii,19 in one) iii,18, last ray not split to its base. Adipose fin absent. Anal-fin rays ii,6 in all specimens, last ray split to its base. Pectoral fin elongate reaching to or somewhat beyond pelvic-fin origin. Pectoral-fin rays total 8 in all specimens, most rays undivided, sometimes middle two or three divided. Pelvic fin i,7 in all specimens. Pelvic fin relatively short, reaching anus, or near to it. Caudal fin forked with principal ray count 10/9 in all specimens.

Total number of vertebrae including Weberian apparatus and terminal centrum 32 in all specimens except one from near Humaitá which has 33.

Color in alcohol.—Background color pale yellowish brown, with dark brown chromatophores relatively dense except in central areas of pale scales. Definite dark vertical bars not readily apparent in some specimens (Figs. 2, 4) although in areas where scales have dark centers as well as dark borders, bars may appear in life as well as in preserved specimens (Fig. 3). If this is so, about 16 to 18 dark vertical bars appear present. Géry (1971:159) remarked that other than scales being bordered in dark pigment, no really dark markings were present on body of holotype. Body pigment in preserved specimens of all three species of *Elachocharax* seems quite variable; see Weitzman and Kanazawa (1978: Figs. 2, 3, 4, 9, 10) for illustration of this variation in *E. pulcher* and *E. geryi. E. pulcher* especially appears to have a dark as well as a light colored phase that may be changed in life; compare Figs. 2 and 3 in Weitzman and Kanazawa (1978). *E. junki* may have a similar ability to change color pattern in life by selective expansion and contraction of dark chromatophores. All specimens from 44 km east of Humaitá have color pattern illustrated in Fig. 3. Detailed examination of Fig. 2 of holotype of *E. junki* reveals traces of color pattern of parallel vertical rows of dark scales clearly shown in Fig. 3; the same is true for the specimen in Fig. 4. This color pattern of parallel vertical rows of darkly pigmented scales in *E. junki* is most like that of *E. geryi*; compare with Figs. 9 and 10 in Weitzman and Kanazawa (1978:174) and see discussion below.

Top of head pale brown, darker from dorso-posterior border of eye to near nape. Snout pale brown dorsally; a prominent dark stripe extends from snout tip and oral border of premaxillary and anterior part of maxillary to anterior border of eye. Anterior tip of lower jaw dark brown. Dark brown chromatophores ventral to eye organized into one or two short vertical bars. Opercle with scattered dark chromatophores apparently somewhat organized according to borders of opercular, preopercular, subopercular, and interopercular bones (Fig. 4). Ventral surface of head pale yellow with small, scattered brown chromatophores.

Caudal fin without vertical bars; interradial membranes with dark chromatophores producing a dusky appearance to fin which in life may be quite dark when chromatophores expanded. Dorsal fin rather evenly dusky with distal parts of interradial membranes quite dark, especially anteriorly, in some specimens (Fig. 2). As in other species of *Elachocharax,* a dark horizontal band present along length of dorsal fin near its base (sometimes indistinct as in Fig. 3); see especially Fig. 4. Anal fin with interradial membranes usually very dark; anal fin probably black in life when dark chromatophores expanded. Pelvic fins with pigment distributed as in anal fin. Pectoral fin dusky, with pigment distributed as in pelvic and anal fins but not as dense as in these fins. Specimens from 44 km east of Humaitá appear to have pale pelvic fins.

Relationships

The three species of *Elachocharax* are related by the following analysis. Table 2 shows relative primitive and derived states of 12 characters and Fig. 7 is a diagram showing the relationships of the three species and the distributions of the synapomorphies and autapomorphies discussed below. In the

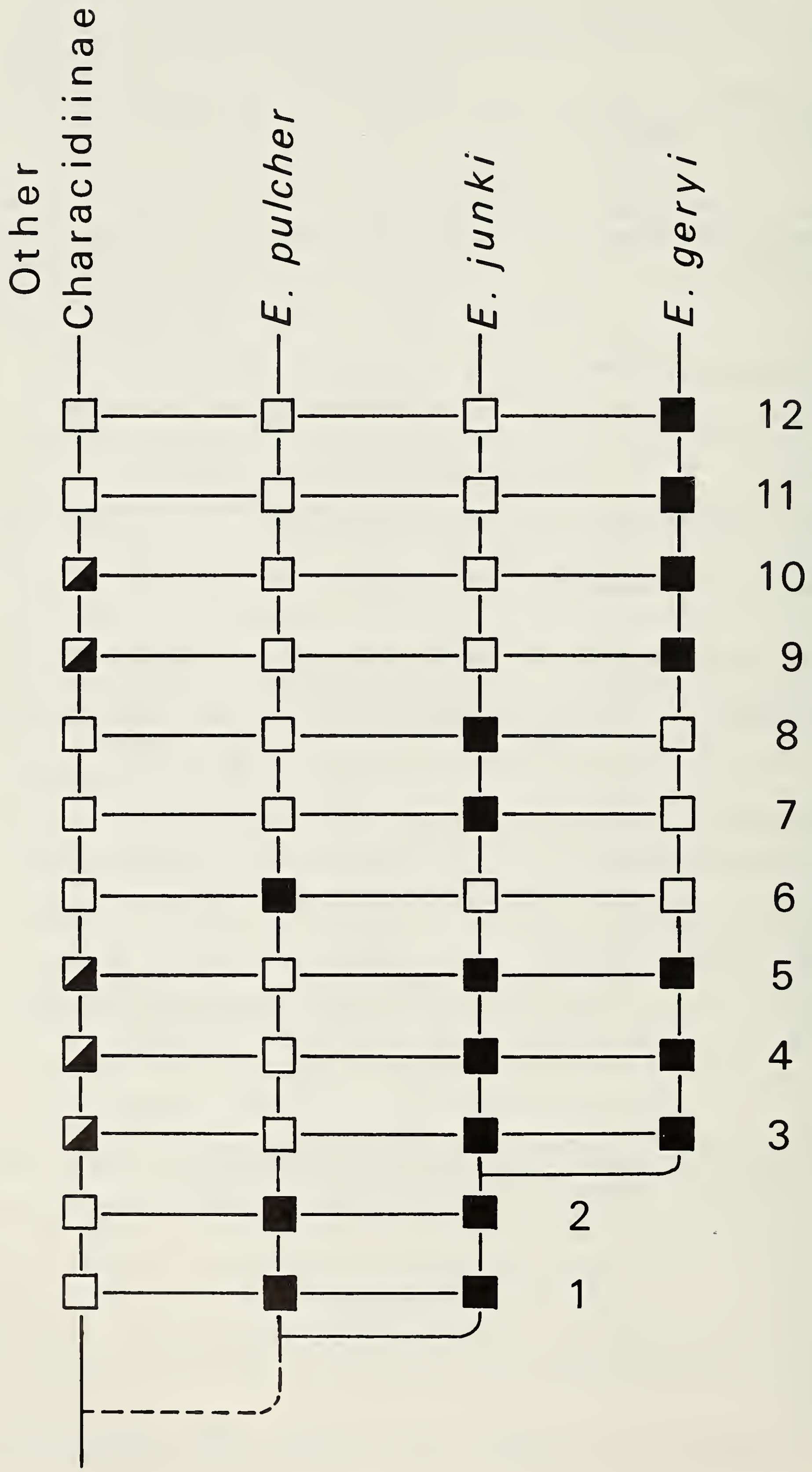
Table 2.—Characters used in synapomorphy and autapomorphy diagram (Fig. 7).

Character	Plesiomorphic (relatively primitive) state	Apomorphic (relatively derived) state
1. Total number of dorsal-fin rays	11 to 14	17 to 22
2. Position of anal-fin origin with respect to dorsal-fin base termination	Anal-fin origin posterior to dorsal-fin base	Anal-fin origin below, very slightly posterior, or in advance of termination of dorsal-fin base
3. Branchiostegal-ray number	5	4
4. Adipose fin	Present	Absent
5. Premaxillary and dentary tooth cusps	Tricuspid	Unicuspid
6. Number of vertical body bars	9 to 12 narrow bars	8 wide bars
7. Number of vertical body bars	9 to 12	16 to 17
8. Position of anal-fin origin with respect to dorsal-fin base termination	Anal-fin origin below posterior termination of dorsal-fin base	Anal-fin origin anterior to posterior termination of dorsal-fin base
9. Number of teeth in inner dentary tooth row	19 to 24	13 to 16
10. Number of ectopterygoid teeth	7 to 24	4 to 5
11. Number of caudal-fin bars	0 to 5	13 to 14
12. Number of epibranchial gill rakers	5 to 6	3

discussion of the polarity of the characters below and in Table 2 and Fig. 7, each character is represented by the same numeral.

1. The number of dorsal-fin rays in *Elachocharax* is 17 to 22. In all other known species of the other genera of the Characidiinae the number of dorsal-fin rays is 11 to 14. By far the greater number of new world characoids have a total of 11 dorsal-fin rays. Thus by outgroup comparison the high number of dorsal-fin rays in the species of *Elachocharax* should be a derived shared character.

2. The reasons for the position of the anal-fin origin, ventral to the posterior termination of the dorsal-fin base, in *Elachocharax* being considered


Other Characidiinae
E. pulcher
E. junki
E. geryi
12
11
10
9
8
7
6
5
4
3
2
1

a uniquely derived character is not as clear as the reasons that the increased number of dorsal-fin rays is a singularly derived condition. The reasons for the acceptance of this character as advanced are as follows. Most characoids including the other Characidiinae have the dorsal fin in advance of the anal fin. It is only in specialized groups such as the Gasteropelecidae, some of the glandulocaudin characids, certain genera such as *Charax, Iguanodectes, Agoniates,* and *Paragoniates,* that the dorsal fin is over or posterior to the origin of the anal fin. The members of each of these characoid groups share their own unique set of synapomorphies and therefore appear unrelated to the Characidiinae. Thus it is assumed here that the similarity among these groups of the position of the anal fin and the dorsal fin is of independent origin. Two further comments should demonstrate the verity of this statement. In most characoid species or groups with a posteriorly placed dorsal fin such as *Xenagoniates bondi* Myers, the gasteropelecids, and some of the glandulocaudins, the relative position of the dorsal and anal fins has been derived by an increase in the number of anal-fin rays and an anteriorly advanced migration of the origin of the anal fin. In *Elachocharax* the relative position of the dorsal fin and anal fin is correlated with an increase in the number of dorsal-fin rays and a posterior extension of the posterior termination of the dorsal fin over the anal fin, which does not have an increased number of rays. The relative positions of the dorsal fin in *Elachocharax* on the one hand and such characoids as *Xenagoniates bondi,* the species of the gasteropelecids and of the glandulocaudins on the other, are not the same thing. Characters 1 and 2 discussed here are correlated synapomorphies for the species of *Elachocharax.*

The other characters mentioned in the generic description above are not unique to *Elachocharax* and only form a combination which will separate the species of *Elachocharax* from other species of the Characidiinae. We cannot at present offer evidence, pro or con, that the other characters mentioned in the generic description above for *Elachocharax* are independently

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Fig. 7. Synapomorphy and autapomorphy diagram for species of *Elachocharax.* Solid black squares indicate a derived condition, empty squares indicate a plesiomorphic condition and half-black squares indicate the same derived condition as the black squares but indicate an independent origin of that condition. The outgroup line to the left in the diagram labeled "other Characidiinae" represents species of all other genera of the Characidiinae. The use of half-black and empty squares along this left hand line indicates that both plesiomorphic and apomorphic (derived) conditions of the character in question occur in various of these species. When the squares are empty along the outgroup line it means that the derived condition of the character in question is not known outside of *Elachocharax.* Only a broken line is shown joining *Elachocharax* to the "other Characidiinae" and no characters are shown as synapomorphies for the Characidiinae because this problem is only partly treated in this paper.

derived. Many of the characters separating *Elachocharax* are reductive or perhaps labile and therefore may have been repetitively evolved, or altered in similar fashion independently. Such characters appear to be of low value in phylogenetic evolutionary studies, especially at generic and higher taxonomic levels.

The following three derived characters can be used to unite *E. junki* and *E. geryi,* and exclude *E. pulcher.*

3. Branchiostegal rays. Five branchiostegal rays are present in *E. pulcher.* According to Weitzman (1962) five branchiostegal rays appear to be primitive for the Characidae and independent repetitive reductions in branchiostegal rays appear common in characoid fishes. In some groups of characoids, branchiostegal ray counts appear invariate in species and genera, for example, the Lebiasinidae (Weitzman, 1964). On the other hand Weitzman and Kanazawa (1976:330) find that the number of branchiostegal rays can be variable within genera of the Characidiinae and that the number can occasionally vary from one side to the other side of the head of a single specimen. We have not found this kind of variation in *Elachocharax,* but our sample size of *E. junki* and *E. geryi* is small. In any case the occurrence of four branchiostegal rays in *E. junki* and *E. geryi* is a shared derived state within *Elachocharax* and is probably a derived homology and therefore a synapomorphy for these two fishes at this taxonomic level.

4. Adipose fin absent. Again this character is one that is repeatedly and independently lost in a wide variety of characoid groups, frequently disappearing in small or miniature species (Myers, 1958; Weitzman, 1962) and may even be found to be present or absent in individuals of one species of the Characidiinae (Weitzman and Kanazawa, 1977). Within each species of *Elachocharax* the presence or absence of the adipose fin appears stable and therefore within this genus the absence of the fin may be considered a derived state shared by *E. junki* and *E. geryi.*

5. Premaxillary and dentary teeth unicuspid. As in the previous two characters, the presence of lateral cusps is quite variable among characoids. The use of the number of tooth cusps in relating the member species and genera of subfamilies, tribes, and genera in characoids has a long history (see Eigenmann, 1912, 1915, 1917; Myers and Böhlke, 1956; Weitzman, 1964). Such practice may be valid in certain groups of characoids, but it now appears that using this character at traditional generic and family-group levels should be done with caution. For example, Myers and Böhlke (1956) proposed the tribe Xenurobryconini for a group of pygmy characoids apparently related to glandulocaudin characids. One of the characters used to unite the two included genera and separate the Xenurobryconini from the remainder of the glandulocaudins was the possession of unicuspid teeth in the former and tricuspid teeth in the latter. Weitzman and Fink (in prep.) have described a new species of *Xenurobrycon* which in nearly all its characters except the number of tooth cusps and shape of the enlarged caudal-fin scale is extremely similar to the previously known species, *Xenurobrycon macropus* Myers and P. de Miranda Ribeiro. The new species bears tricuspid and biscuspid teeth as well as unicuspid teeth. In this instance, at least, the nature of the cusps appears useful as a species difference only, rather than at generic or tribal levels. Fewer tooth cusps is a reductive character probably subject to much independent evolution so that the assumption of its homology among characoid taxa and its use as a synapmorphy must be treated with great caution in any given instance. In the genera *Characidium, Jobertina, Ammocryptocharax* and *Klausewitzia* there are species which have tricuspid teeth in the jaws and others which have only unicuspid teeth. If these genera, as they are currently constituted, are monophyletic groups, it would appear that unicuspid teeth evolved at least four separate times in the Characidiinae, given the assumption that the presence of multicuspid teeth is primitive for the Characidiinae based on an outgroup comparison with other characoids. The presence of species with tricuspid or only unicuspid teeth in *Elachocharax* would make at least a fifth independent occurrence of this derived character in the Characidiinae.

Although we are unable to accept the hypothesis that the loss of tooth cusps is homologous at the currently recognized generic levels in the Characidiinae, we incline to believe that it may be a synapomorphy at the level of relationships in the case under discussion. We favor this position because the three characters discussed immediately above represent congruent synapomorphies and thus "reinforce" one another. No synapomorphies were found to indicate either that *E. pulcher* and *E. geryi* are more closely related to each other than each is to *E. junki,* or that *E. pulcher* and *E. junki* are more closely related to each other than each is to *E. geryi.*

The following series of characters appear to be autapomorphies, derived features allowing separation and identification of the species of *Elachocharax* but providing no information about their relationships.

6. Eight wide vertical bars on body sides. The case for the derived nature of this character is as follows. In most if not all species of the Characidiinae, relatively narrow vertical body bars or large mid-side dark marks are present, usually 9 to 11 or rarely 12 in number. The wide nature and capability of these bars to expand so that the whole body is black or dark brown in *E. pulcher* would seem, by outgroup comparison with the remainder of the Characidiinae, to be a derived state.

7. Sides of body with 16 or 17 narrow vertical body bars. This character, present in *E. junki,* appears to be an increase in the number of body bars in comparison with any other known species within the Characidiinae and is therefore derived. *E. geryi,* with 11 to 12 vertical body bars, is plesiomorphic in this respect.

The above analyses of vertical body bars is not without problems. The number of vertical body bars in *E. pulcher,* 8–9, overlaps that, 9–11, found in the other characidiin genera. However, the width is apomorphic. In *E. geryi* the number of vertical body bars is slightly higher, 11–12 versus 9–11, than those found in most other characidiin species, and again overlaps the plesiomorphic number. However, the bars in *E. geryi* and *E. junki* remain narrow, a plesiomorphic state.

Two features are found in *E. geryi* which are not present in *E. pulcher* and *E. junki* and at least most of the other species of the Characidiinae.

8. Anal-fin origin anterior to posterior termination of dorsal-fin base. This character is a further derived state of the character discussed under 2 above. The character is autapomorphic for *E. junki.*

9. Inner dentary tooth row with 13 to 16 teeth. *Elachocharax junki* and *E. pulcher* respectively have 19–20 and 20–24 inner row dentary teeth in adults. Weitzman and Kanazawa (1978) reported a single exceptional specimen of *E. pulcher* with 14 inner row dentary teeth. Most other species of Characidiinae have more than 16 teeth in the inner dentary row of adults but some pygmy species such as *Klausewitzia aphanes* have 16 or fewer. It is to be expected that a reduction in tooth row number would evolve independently in separately derived pygmy species.

10. Four to five conic ectopterygoid teeth in a single row. *E. pulcher* has 7–10 and *E. junki* has 8–13 ectopterygoid teeth. Most other species of the Characidiinae have more than eight ectopterygoid teeth and sometimes two or more rows with as many as 24 teeth. Reductions do occur, apparently independently, in other genera. For example, *Klausewitzia aphanes* has 6–8 in a single row and *Ammocryptocharax elegans* varies greatly, having 4–22 in a single row.

Finally *E. geryi* bears a couple of autapomorphic characters which are not found anywhere else in the Characidiinae as far as is known.

11. Caudal fin with 13 to 14 narrow vertical dark bars. There are no more than four or five vertical caudal-fin bars in any other known member of the Characidiinae, and usually there are none. Caudal-fin bars, especially vertical ones, are not found in most characoids.

12. Three upper limb gill rakers. There are five or six upper limb gill rakers in the other species of *Elachocharax* and in the other members of the Characidiinae known to us. There are usually more than six upper limb rakers in other characoids. Therefore a reduction to three may be taken as a derived character for *E. geryi.*

There are a few other differences among the three species of *Elachocharax* but polarity of derived versus plesiomorphic states of these characters was difficult to hypothesize by outgroup comparison. For example, peduncle length was 14.4 to 18.0, $\bar{x}$ = 16.5, n = 36 in *E. pulcher*; 16.0 to 19.2, $\bar{x}$ = 17.7, n = 8 in *E. geryi*; and 19.2 to 21.9, $\bar{x}$ = 20.3, n = 6 in *E. junki. Elachocharax junki* has more lateral series scales, 30–33, $\bar{x}$ = 31.3, than either *E. pulcher,* 26–30, $\bar{x}$ = 28, n = 36, or *E. geryi,* 27–29, $\bar{x}$ = 27.8, n = 8. There also appear to be differences in vertebral numbers, 29–31, $\bar{x}$ = 30.4, n = 62 for *E. pulcher*; 31–32, $\bar{x}$ = 31.5, n = 8 for *E. geryi*; and 32, $\bar{x}$ = 32, n = 2 for *E. junki.*

Additional characters were used by Géry (1971) to distinguish *E. junki* at generic (*Geisleria*) and subfamily (Geisleriinae) levels from the Characidiinae and from the Elachocharacinae. As noted in the introduction, of these four taxa the only one recognized here is the Characidiinae. The reasons for the rejection of the two subfamilies are based on the following analysis.

Géry (1971:162, table, and 163, key) in discussing *Geisleria* indicates that *E. junki* has two rows of premaxillary teeth, a "suspected" presence of maxillary teeth, a "suspected" absence of ectopterygoid teeth, a stated absence of "suborbital" bones, and no cranial fontanel. These characters, as presented by Géry, are in error because no alizarin preparation was available. The primary character of those above used by Géry to separate *Geisleria* from *Elachocharax* was the presence of two rows of premaxillary teeth. Géry's placement was an attempt to be consistent with a classification of other characoids as established by Eigenmann (1915, 1917) wherein the Cheirodontinae were separated from the Tetragonopterinae on the basis of one versus two rows of teeth on the premaxillary bone. Fink and Weitzman (1974) have reviewed the problems associated with basing a classification of characoids at the family-subfamily level on this character. They suggest the character may not be useful at some taxonomic levels in some characoid groups due to independent appearance. However, in the instance of *Geisleria* versus *Elachocharax* the question is moot because the holotype of *Geisleria* does not have a second inner row of premaxillary teeth. The appearance of a second row of teeth is due to thick, very papillose flesh immediately external to the oral valve and just posterior to the prominent row of premaxillary teeth which are firmly ankylosed to the premaxillary bone. Buried in this papillose flesh are some well developed replacement teeth which are not firmly bound to the premaxillary. They are smaller than the anterior teeth and point posteriorly and ventrally in the oral cavity. When the premaxillary teeth of the holotype were first reexamined, two rows of teeth seemed apparent. In part this was due to the well-developed state of the replacement teeth and in part to the outward-thrust position of the premaxillary of the holotype which was preserved with its mouth open and gill apparatus expanded. However, application of an extremely fine jet of air to the region to shrink the flesh somewhat away from the second tooth row revealed that some of the "teeth" deformed and shrank away as papillous flesh. The remaining teeth did not deform but did move with the receding flesh, indicating that they are not firmly attached to the premaxillary bone. This movement is typical of even well developed replacement teeth in characoids. Resoaking the fish in alcohol brought the papillous flesh and replacement premaxillary teeth back into normal position. Examination of the cleared and stained jaws, orbital bones, palatine and pterygoid arches, opercle, and branchiostegal rays of the right side of the head in the specimen of *E. junki* from the Rio Cuieiras revealed 9 premaxillary replacement teeth posterior to a single row of 14 prominent teeth firmly ankylosed to the premaxillary bone. In Fig. 5 the replacement teeth are posterior to the visible row of teeth and cannot be seen. One tooth has been shed (4th from the right) and was being replaced by a tooth that is not as yet firmly ankylosed to the jaw margin. There is only one row of premaxillary teeth in all the specimens of *E. junki* examined. Weitzman and Kanazawa (1978) report only one row of premaxillary teeth in *E. pulcher* and *E. geryi.*

Similar investigation of the maxillary bone revealed no maxillary teeth in the holotype of *E. junki* and examination of the cleared and stained jaws showed no maxillary teeth. There were no teeth on the left maxillary bone in any of the new specimens. There are no maxillary teeth in *E. pulcher* or *E. geryi.*

There are 8 conic ectopterygoid teeth in nearly a single row on both sides of the holotype of *E. junki* and 11–13 ectopterygoid teeth in the other specimens examined. Weitzman and Kanazawa (1978:168, 175) report a single row of 7–10 unicuspid ectopterygoid teeth in *E. pulcher* and 4–5 in *E. geryi.*

Géry (1971:154) stated that the circumorbital series was very reduced or perhaps even totally absent in *E. junki.* On pages 162 and 163 he states that the suborbitals are absent and uses this as one of the characters to distinguish his Geisleriinae and Elachocharacinae. The suborbitals are usually considered to be circumorbitals two, three, and sometimes the remainder of the posterior orbital series exclusive of the supraorbital and antorbital. Tube-bearing circumorbitals, more properly infraorbitals (see Weitzman, 1962:28 and footnote 7), one and two are present in the holotype of *E. junki* and are moderately well ossified on the right side. They are much less ossified on the left side where they may have been damaged by a greater exposure to acid formalin. These two bones are well ossified and each bears a canal along its entire length in the stained side of the specimen of *E. junki* from the Rio Cuieiras. Infraorbital three and the subsequent infraorbitals four, five, and six appear absent or at least not ossified in the holotype. The bone, if present, did not take up alizarin stain in the specimen from Rio Cuieiras. In all specimens the skin in the area of infraorbital three is thicker and tougher than the skin of other parts of the orbit. At least the specimen of *E. junki* from the Rio Cuieiras was exposed to formalin for about eight months and may therefore have had the bone of this normally thin bony plate dissolved away. No bony canal bone was found in the region of the infraorbitals three to five. In summary, a slender, tubeless antorbital and tube-bearing infraorbitals one and two are present. The "great suborbital" of Eigenmann (1912) (infraorbital three) and all the remaining more posterior orbitals are either greatly reduced in ossification or absent. The same condition occurs in cleared and stained specimens of *E. geryi* and *E. pulcher* examined for this report.

Another reductive character used by Géry (1971:163) to separate *Geisleria* and *Elachocharax* at the subfamily level was the absence of a cranial fontanel in the former and its presence in the latter. The fontanel is not actually absent in *E. junki* but occurs as a very small opening where the posterior medial borders of the parietals of each side meet the supraocciptial and surround the anterior portion of the supraoccipital fossa. In fishes with this anatomical arrangement a very slender needle can be passed between the parietals and supraoccipital into the brain cavity. In the Characidiinae the posterior cranial fontanel (that part posterior to the epiphyseal bar) is all that remains. Usually this is represented by a separation of the parietal bones from each other along the midline. The resulting fontanel is continuous with and part of the median fossa along the dorsal surface of the supraoccipital spine. Apparently in many species of *Characidium* the parietals are completely separated but in some species (and in some species of *Jobertina*) they contact each other anteriorly, restricting the fontanel to a more posterior postion and reducing it in relative size. Near closure of the fontanel is not restricted to pygmy members of the Characidiinae. There is an unidentified species of robust, large (to at least 64 mm SL) relatively high altitude *Characidium* from the Rio Uruyen on the south slopes of Mt. Auyantepuy, State of Bolivar, Venezuela (USNM 219847), which has the parietals completely jointed along their medial borders as in *E. junki,* leaving only the area immediately bordered by the posterior part of the parietals and the supraoccipital as a fontanel. *Elachocharax pulcher* and *E. geryi* have reduced fontanels, the parietals usually being closely jointed anteriorly and not posteriorly. The larger specimens of *E. pulcher* examined by Weitzman and Kanazawa (1978) usually had the fontanel more restricted than the smaller specimens and sometimes it was almost as restricted in *E. pulcher* as in *E. junki*. The extent of the restriction of the fontanel thus seems to vary somewhat with the size of the specimens examined in the instance of *Elachocharax* and a small fontanel is subject to repetitive independent appearance in the Characidiinae.

Géry (1971:163) separated his Elachocharacinae and Geisleriinae on the one hand from his Characidiinae on the other by the former two having a very small size, a long dorsal fin of at least a total of 17 rays and poorly developed pectoral fins. He also noted that the species of these genera apparently live a relatively "secondary" specialized existence in a quiet water habitat whereas Characidiinae live in stream habitats requiring an active existence to resist current. The habitat differentiation is true when compared to the larger species of *Characidium*. However, some other pygmy species such as *Jobertina eleotrioides* Géry and *Klausewitzia aphanes* appear to live in similar, "quiet" habitats. One of us (Weitzman) has recovered specimens (USNM 221046) of miniature *Jobertina* 13.0 to 14.5 mm standard length from a mass of algae collected by Bruce Collette in a very slow moving stream, Rio Marituba, Pará, Brazil. Meinken (1969) erroneously identified *Klausewitzia aphanes* as *Characidium voladorita* Schultz while describing its swimming habits, indicating that it is a quiet water fish, and Weitzman and Kanazawa (1977) report that aquarium specimens of *K. aphanes* appear adapted to quiet waters. The habitat reported for *K. aphanes* by Weitzman and Kanazawa is a slow moving blackwater stream.

These two fishes, *J. eleotrioides* and *K. aphanes,* also have pectoral fins somewhat elongate in form and with a reduced number of fin rays, like that of the three species of *Elachocharax* recognized here. There is usually a total of 11 fin rays in the pectoral fin of species of *Characidium.* Some species will have one or two less. This is the same count found in most "tetragonopterin" characids and may therefore be primitive for the Characidiinae. In *Characidium* the number of unbranched anterior rays varies from one to four or rarely five. Most "tetragonopterin" characids only have on unbranched anterior pectoral fin ray. The propensity to have two or more in the Characidiinae appears to be a synapomorphy for the Characidiinae. *Elachocharax pulcher* and *E. junki* usually have eight pectoral-fin rays and usually all the rays are undivided, but occasionally one, two or three of the middle rays may be divided, especially in *E. junki.* We found one specimen of *E. pulcher* with seven undivided rays on one side and nine undivided rays on the other. Weitzman and Kanazawa (1978:170) report six to nine rays in this species with very few specimens with any branched rays. Weitzman and Kanazawa (1978:177) report six to eight unbranched rays in *E. geryi.* Two specimens of a *Jobertina,* apparently related to *Jobertina eleotrioides* and 13.0 mm in standard length from Rio Marituba, Pará, Brazil, had eight pectoral-fin rays, the anterior four undivided, the posterior four divided. Two paratypes of *Jobertina eleotrioides* had nine pectoral-fin rays, the anterior four undivided, the posterior five divided. *Klausewitzia aphanes* has a total of eight, rarely nine, unbranched pectoral-fin rays. Furthermore, there is a series of 10 or more undescribed species of miniature to small members of the Characidiinae, mostly from the Amazon basin, which have 10 or fewer pectoral-fin rays. As the genera are currently defined, these species "fit" *Characidium* or *Jobertina.* It appears that a reduced number of pectoral-fin rays and a trend for all of them to be undivided is common in small to miniature Characidiinae regardless of their apparent phylogenetic origin. This character should not be used to define genera and subfamilies within this group, at least not unless further investigation substantiates a hypothesis that all miniature Characidiinae belong to a single monophyletic group.

Thus, of all reasons that Géry (1971) separated the Elachocharacinae and the Geisleriinae from the Characidiinae, the only characters that we now can find to serve as synapomorphies for their members are the two characters used above and in Fig. 7 to differentiate *Elachocharax* as here defined from the other genera of the Characidiinae.

Géry (1971:163) separated his Elachocharacinae and Geisleriinae on the basis of the following characters: teeth triscupid, uniserial in the premaxillary, pterygoid teeth present, maxillary teeth apparently absent, infraorbitals reduced and with a small posterior cranial fontanel for Elachocharacinae, and teeth conic, biserial in the premaxillary, pterygoid apparently absent, maxillary teeth apparently present, infraorbitals absent and no cranial fontanel for the Geisleriinae. Of all these differences or apparent differences only that of the tooth cusps remains and all the species included by these two nominal subfamilies have uniserial premaxillary teeth, pterygoid teeth present, maxillary teeth absent, infraorbitals 1 and 2 present but the posterior infraorbitals reduced or absent, and with a small to very small cranial fontanel.

As described above, the differences in tooth cusps (the reduction to conic teeth) has been found to be a synapomorphy uniting *E. junki* and *E. geryi*. *Elachocharax pulcher* has the less derived state of tricuspid cusped teeth. This is correlated with two other synapomorphies present in *E. junki* and *E. geryi*, a loss of the adipose fin and a branchiostegal ray number reduced from five to four. To recognize these two species as belonging to a subfamily or a genus separate from *E. pulcher* on the basis of these three synapomorphies seems to us poor systematic practice, especially in view of the fact that these characters could be independent derivations since they are apparently independently derived in other sections of the Characidiinae. *Elachocharax* is then a pygmy genus of the Characidiinae with three known species, of which *E. pulcher* is the least derived and of which *E. junki* and *E. geryi* apparently are related and more derived; *E. geryi* appears the most derived. Table 2 and Fig. 7 give a summary of the characters and suggested relationships.

There is not enough information available to attempt a productive analysis of the relationships of *Elachocharax* to the other genera of the Characidiinae. There is a basic color pattern shared by the species here assigned to *Elachocharax* which does not appear in quite the same form in many other species of the Characidiinae. The pattern of a stripe of dark pigment along the length of the dorsal fin, near its base or at least nearer than half the length of the fin rays toward the base, is shared with *Klausewitzia aphanes*, another miniature species (up to 16.5 mm SL) in the Characidiinae, and in *Characidium surumnense* Steindachner, *Characidium boavistae* Steindachner, and a few other species of *Characidium*. *Klausewitzia ritae* Géry (1965), also of small size (at least 25.0 mm SL), is stated to have two very narrow bands on the dorsal fin. Both species of *Klausewitzia* have a much shorter dorsal fin and have maxillary teeth. Both of these characters are plesiomorphic to the state found in *Elachocharax.* The latter character, the presence of maxillary teeth, is a presumably plesiomorphic character otherwise found only in the two species of the otherwise specialized genus *Ammocryptocharax. Klausewitzia ritae* is probably less specialized than *K. aphanes,* being of larger size and having tricuspid as well as unicuspid teeth (teeth are all unicuspid in *K. aphanes*), in always having an adipose fin (present or absent in *K. aphanes*), and in having a complete lateral line (much reduced in length in *K. aphanes*). *Klausewitzia ritae* needs further study in order to outline more clearly its possible reductive apomorphies in orbital bones and other characters, but of the known species of relatively short-bodied small or pygmy Characidiinae this species appears to be the most primitive.

Some species of *Jobertina* have an increase in the number of dorsal-fin rays, to 14, and some, *Jobertina interruptua* Pellegrin and *Jobertina theageri* Travassos, have the longitudinal dorsal-fin stripe as found in *Elachocharax. Jobertina* and *Elachocharax* (along with *Klausewitizia aphanes*) share a reductive character, a short lateral line of 10 or fewer perforated lateral-line scales. As with most reductive characters, this one is hard to evaluate because of its repetitive independent appearance in miniature fishes. The genus *Jobertina,* for example, separated from *Characidium* on the basis of a lateral line of few perforated scales and a tendency to slightly increase the number of dorsal-fin rays in some species, may be polyphyletic and its members may have arisen more than once from a *Characidium*-like ancestor. The relationships of *Elachocharax* are currently indefinable but may be with certain of the pygmy species of *Klausewitzia* or *Jobertina.*

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Summary

Based on the characters analyzed here, *Elachocharax* is a genus of the Characidiinae of uncertain relationships. Its species have a relatively short body and a long-based dorsal fin (17–22 rays) with its posterior termination over or posterior to the anal-fin origin. All the known species are miniature, 25 mm or less in standard length. The genus may be most closely related to *Klausewitzia* or to certain members of *Jobertina*. *Elachocharax* consists of three species further characterized by reductions in the orbital bones and other features of the lateral sensory system such as the lateral-line scales of the body. *Elachocharax pulcher* is apparently the least derived and has tricuspid, bicuspid, and unicuspid teeth, usually five branchiostegal rays, and an adipose fin; *E. geryi* and *E. junki* appear more advanced or derived with regard to these characters and have unicuspid teeth, four branchiostegal rays, and no adipose fin. *Elachocharax junki* is the most specialized with regard to the origin of the anal fin which is noticeably in advance of the posterior termination of the dorsal-fin base. This species also has the largest number of body bars, about 17, presumably an advanced condition. *Elachocharax pulcher* may be advanced in a different direction in having a decrease in the number of vertical body bars and a widening of those bars when compared to species in other genera of the Characidiinae. *Elachocharax geryi* may be the least advanced in some of its color pattern, having 11 to 12 vertical body bars, but the most advanced in having many narrow, vertical, caudal-fin bars.

The nominal subfamilies Elachocharacinae and Geisleriinae are rejected, the type species of the latter being considered a species of *Elachocharax* and the Elachocharacinae being recognizable as a member of the Characidiinae at the generic level.

Resumo

O exame do holotipo e de cinco novos exemplares da espécie nominal *Geisleria junki,* juntamente com uma reconsideração sobre as espécies *Elachocharax pulcher* e *Elachocharax geryi,* permitiu uma reavalição das subfamílias nominais Geisleriinae e Elachocharacinae, bem como do gênero nominal *Geisleria,* da subordem Characoidei. Ficou evidenciado que alguns

dos caracteres usados por Géry (1971) para separar *Geisleria* de *Elachocharax* e Geisleriinae de Elachocharacinae não apresentam diferenças nestes ''taxa'' nominais. Todas as espécies anteriormente incluídas nestes ''taxa'' têm uma única série de dentes premaxilares, dentes no ectopterigóide, maxilar sem dentes, ossos orbitais com configuracao idêntica ou muito semelhante e fontanelas cranianas reduzidas mas distintas. As três espécies aquí consideradas como pertencendo a *Elachocharax, E. pulcher, E. junki* e *E. geryi,* têm em comum os seguintes caracteres que as separam de outros gêneros de Characidiinae reconhecidos neste trabalho: nadadeira dorsal alongada, com 17 a 22 raios, sua base terminando acima da origem da nadadeira anal, ou ultrapassando-a um pouco. Nos outros Characidiinae ha 11 a 14 raios na nadadeira dorsal e a origem da nadadeira anal é muito posterior à nadadeira dorsal.

Um caráter usado por Géry (1971) para separar *Geisleria* e Geisleriinae de *Elachocharax* de Elachocharacinae—a presença de dentes apenas unicúspides nos primeiros e tricúspides nos segundos—tem sido utilizado para separar famílias, tribos e gêneros em outros grupos de Characoidei. Weitzman and S. V. Fink (no prelo) demonstraram, por exemplo, que em Xenurobryconini o caráter e útil apenas para separar as espécies de um gênero, não tendo portanto utilidade ao nível de tribo. Em Characidiinae, dentes unicúspides podem ter aparecido independentemente em espécies de cinco gêneros: *Characidium, Jobertina, Ammocryptocharax, Klausewitzia,* e agora *Elachocharax.*

Originalmente *Geisleria* foi em parte definido com base na ausência de uma nadadeira adiposa e em caracteres que consideramos no presente trabalho como não pertinentes. Além de não possuir nadadeira adiposa, *Geisleria* pode agora ser definido com base na existência de dentes unicuspides e presenca de quatro ao invés de cinco raios branquiostégios. Mostramos que estes caracteres apomórficos surgiram independentemente em outros gêneros de Characidiinae. Parece-nos desnecessário continuar a reconhecer *Geisleria* e *Elachocharax* como gêneros distintos com base na presença de caracteres de redução que podem ter surgido independentemente.

As subfamílias nominais Elachocharacinae e Geisleriinae e o gênero *Geisleria* são rejeitados, a espécie-tipo deste último é considerada uma espécie de *Elachocharax* e Elachocharacinae considerado como membro de Characidiinae ao nível de gênero.

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