



***Micralestes* (Characiformes, Alestidae) of the lower Congo River, with a description of a new species endemic to the lower Congo River rapids in the Democratic Republic of Congo**

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Abstract

A new dwarf alestid from the vicinity of Inga on the lower Congo River, Bas Congo Province, Democratic Republic of Congo is described. Assignment of the new taxon to the poorly defined genus, *Micralestes*, is discussed and justified on the basis of available morphological character data. With the recognition of *Micralestes schelly* **sp. nov.**, a total of six *Micralestes* are now known to inhabit the 350 km stretch of the Congo River from Pool Malebo to Boma near the river's estuary. These are *Micralestes acutidens* (Peters, 1852), *Micralestes humilis* Boulenger, 1899, *Micralestes lualabae* Poll, 1967, *Micralestes holargyreus* (Günther, 1873), *Micralestes stormsi* Boulenger, 1902, and the new species *Micralestes schelly*. Of these *Micralestes schelly* and *Micralestes holargyreus* are considered herein as restricted-range endemics of the lower Congo River. An illustrated key to *Micralestes* of the lower Congo River is provided.

Key words: *Micralestes*, lower Congo River, identification key, new species

Résumé

Un nouveau Alestidae nain est décrit des environs d'Inga dans le cours inférieur du fleuve Congo, Province du Bas-Congo en République Démocratique du Congo. L'assignation du nouveau taxon au genre *Micralestes* mal défini, est discutée et justifiée sur la base des données des caractères morphologiques disponibles. Avec la reconnaissance de *Micralestes schelly* **sp. nov.**, le nombre total de *Micralestes* vivant sur les 350 km de rapides du Bas-Congo, allant du Pool Malebo à Boma vers l'estuaire est maintenant de six. Il s'agit de *Micralestes acutidens* (Peters, 1852), *Micralestes humilis* Boulenger, 1899, *Micralestes lualabae* Poll, 1967, *Micralestes holargyreus* (Günther, 1873), *Micralestes stormsi* Boulenger, 1902 et *Micralestes schelly* décrit dans ce travail. De ses espèces, *Micralestes schelly* et *Micralestes holargyreus* sont dans la gamme restreinte des endémiques du cours inférieur du fleuve Congo. Une clé illustrée des *Micralestes* de cette région est donnée.

Introduction

Generic-level classification of the African Alestidae, and more particularly that of the taxa assigned to the Petersiini, or 'dwarf African alestids', is generally poorly supported by apomorphy-based diagnoses (Stiassny and Schaefer, 2005; Zanata and Vari, 2005; Paugy and Schaefer, in press). Despite these shortcomings, an accurate accounting of species diversity remains of central importance for the phylogenetic resolution of this group as well as for realistic conservation efforts in the region. Species discovery and description remain the

fundamental task for advancing biodiversity studies in poorly documented regions such as the Congo River basin. Fortunately the recent phylogenetic analysis of Zanata and Vari (2005) provides a provisional character-based scheme of alestid intrarelations that can serve as an aid to generic assignment for species of this taxonomically problematical assemblage of African fishes. Based primarily on the character scheme of Zanata and Vari (2005) a newly discovered alestid from the vicinity of Inga on the lower Congo River is herein assigned to the poorly defined genus *Micralestes* and a phylogenetic rationale for this generic assignment is presented.

Roberts & Stewart (1976) in their work on the fishes of the lower Congo River reported the presence of two *Micralestes* in their collections: *M. acutidens* (Fig. 1A) and *M. humilis* (Fig. 1C). Recent collections in the region also include specimens of *M. lualabae* (Fig. 1D), *M. stormsi* (Fig. 1E) and *M. holargyreus* (Fig. 1B). In addition to these, a collection made in the vicinity of Inga revealed the presence of a population of diminutive alestid that appears most closely to resemble *Micralestes* but that are not assignable to any described *Micralestes* or to any other species dwarf African alestid.

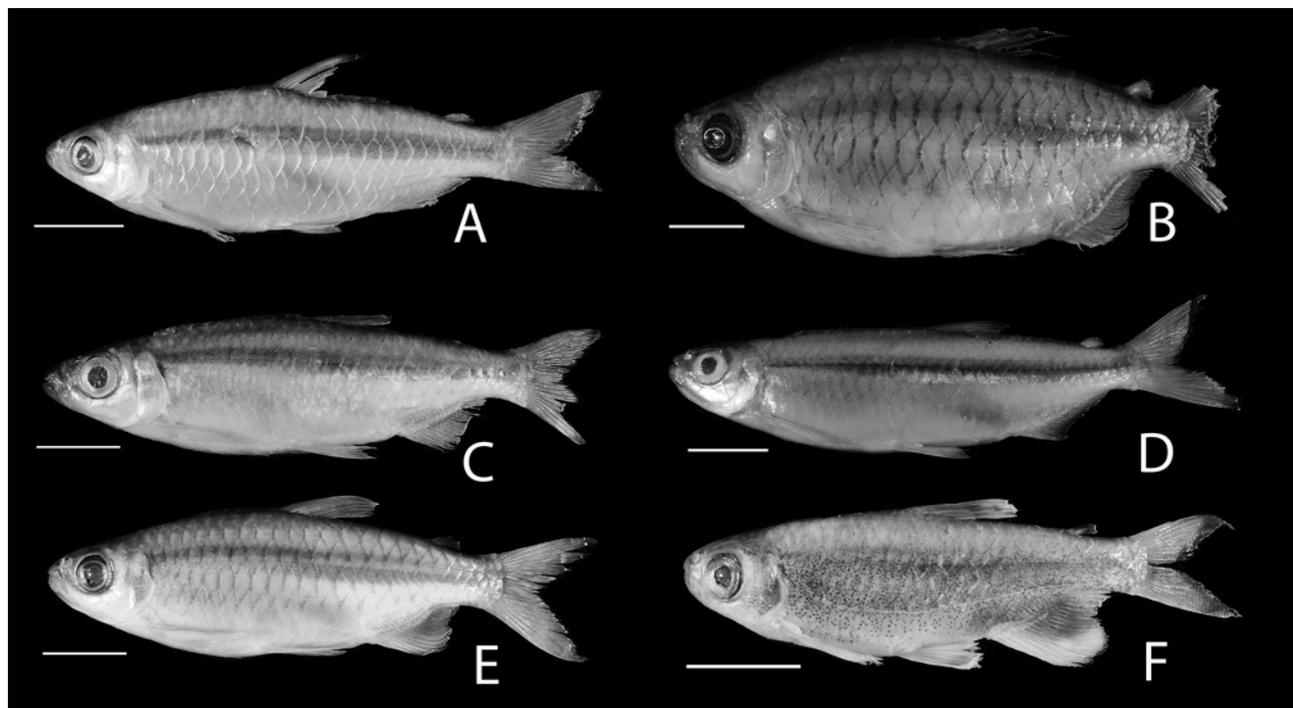


FIGURE 1. *Micralestes* of the lower Congo River. A) *Micralestes acutidens*, AMNH 238378, female, 51.1 mm SL, B) *Micralestes holargyreus*, AMNH 239479, male, 60.5 mm SL, C) *Micralestes humilis*, AMNH 238406, female, 56.8 mm SL, D) *Micralestes lualabae*, AMNH 238386, female, 65.4 mm SL, E) *Micralestes stormsi*, AMNH 238440, male, 51.0 mm SL, F) *Micralestes schelly* sp. nov., AMNH 239518, male, 37.7 mm SL. Scale bars = 1 cm.

Material and methods

Unless mentioned otherwise, counts and measurements follow Paugy *et al.* (2003). Visualization of canal-bearing scales and teeth was aided by directing a fine jet of compressed air onto the structures. In order to count vertebrae and fin rays, and to visualize other skeletal features, all specimens were x-rayed and some were cleared and stained following a modified protocol based on Taylor & van Dyke (1985). Vertebral counts include the four modified Weberian centra but exclude the terminal, hypural-bearing vertebra. Gill raker counts correspond to the total number of rakers arrayed along the first arch. Longitudinal and lateral line scale counts terminate at the hypural fold and do not include the few scales on the base of the caudal fin. Throughout this paper the phylogenetic species concept is adopted as a basis for species diagnosis.

The following comparative materials have been included in this study (values after catalog number indicate number of specimens examined and do not necessarily correspond to the total number of specimens in the lot; C&S indicates cleared-and-stained preparation and SL indicates standard length. Institutional abbreviations follow Leviton *et al.* (1985).

Alestopetersius brichardi—AMNH 240416, 5, 2 C&S; *A. hilgendorfi*—AMNH 240421, 3, 1 C&S; *Bathyaethiops caudomaculatus*—AMNH 238423, 5, 2 C&S; *Brachypetersius altus*—AMNH 240420, 5; AMNH 240485, 2 C&S; *B. huloti*—AMNH 238374, 2, 1 C&S; *Brycinus macrolepidotus*—AMNH 240383, 6, 1 C&S; *B. poptae*—AMNH 240385, 5, 1 C&S; *Bryconaethiops microstoma*—AMNH 238328, 4, 2 C&S; *B. yseuxi*—AMNH 239455, 10, 2 C&S; *Duboisialestes tumbensis*—AMNH 238391, 5, 3 C&S; *Hemmigrammopetersius barnardi*—AMNH 19861, 10, 3 C&S; *Micralestes acutidens*—BMNH 1861.3.10: 3–4, syntype, 1; AMNH 227634, 1; AMNH 239475, 5, 2 C&S; *M. ambiguous*—MRAC G.966 a–c, paratypes, 2; *M. comoensis*—AMNH 097605, 4; *M. congicus*—MRAC 96582, 1, holotype; AMNH 238430, 5, 1 C&S; *M. eburneensis*—AMNH 32763, 5, 1 C&S; *M. elongatus*—AMNH 215347, 8, 1 C&S; *M. fodori*—MRAC 140901, 1, holotype; *M. holargyreus*—BMNH 1873.7.28: 19, 1, syntype; AMNH 239257, 4 C&S; AMNH 239479, 10; AMNH 239480, 3; *M. humilis*—MRAC 805, 1, holotype; AMNH 238406, 1; AMNH 238427, 1; AMNH 240417, 4, 1 C&S; *M. lualabae*—MNHN 1967-0668, paratypes, 2; AMNH 5805, 10, 2 C&S; AMNH 238386, 3; *M. occidentalis*—AMNH 215533, 1; *M. sardina*—MRAC 50040, lectotype, 1; MRAC 50041–51, paralectotypes, 3; *M. stormsi*—BMNH 1902.4.14: 28–31, syntypes, 3; AMNH 239197, 5; AMNH 238440, 5; AMNH 238437, 4 C&S; *Nannopetersius ansorgii*—BMNH 1910.11.28: 71–80, paralectotypes, 4; *N. lamberti*—AMNH 238370, 3, 2 C&S; *Rhabdalestes aeratus*—AMNH 235768, paratypes, 10, 1 C&S; *R. maunensis*—AMNH 217434, 5, 1 C&S; *R. rhodesiensis*—AMNH 50894, 2; *R. septentrionalis*—AMNH 230605, 10, 5 C&S; *Rhabdalestes sp.*—AMNH 227602, 18, 1 C&S; *Virilia pabrensis*—AMNH 50858, 6, 1 C&S.

Generic assignment

In the following text and accompanying illustrations an asterisk precedes character numbers. Based on outgroup comparison and on the phylogenetic analysis of Zanata and Vari (2005) the use of superscript “1” indicates the hypothesized derived state and superscript “0” the plesiomorphic state for each figured character.

On the basis of the following six morphological synapomorphies Zanata and Vari (2005: clade 22) diagnosed a large clade of alestids broadly corresponding to the Petersiini of previous authors; an incomplete supraorbital ring (Fig. 2.*1¹ vs. Fig. 2.*1⁰), a shelf-like process on the anterolateral margin of the mesethmoid, the major cusp of the symphyseal inner row tooth on the dentary, when present, smaller than the cusps of the outer row symphyseal tooth (Fig. 3.*2¹), no supraneural associated with the fourth vertebra, postcleithrum 3, when present, without a lamella, sixth infraorbital without an anterodorsal branch of the laterosensory canal (Fig. 2.*3¹ vs. Fig. 2.*3⁰). *Micralestes schelly* exhibit all of these synapomorphies. Within clade 22, Zanata and Vari (2005) further diagnosed two large subclades. Subclade 23, comprised of the genera *Micralestes*, *Hemmigrammopetersius*, *Rhabdalestes* and *Virilia* is diagnosed on the basis of three characters; the absence of a supraorbital bone (Fig. 2.*4¹ vs. Fig. 2.*4⁰), the presence of a deep-lying midlateral stripe extending onto the caudal peduncle (Fig. 4.*5¹), and the presence of a band of dark chromatophores above the anal fin (Fig. 4.*6¹). *Micralestes schelly* exhibit all of these synapomorphies also. The second subclade of Zanata and Vari (2005), their clade 31, contains the remaining petersiini genera and is diagnosed on the basis of 7 characters, only one of which is (polymorphically) present in *Micralestes schelly*, i.e., outer tooth row of premaxilla with two teeth present. *Micralestes schelly* shares none of the six other features discussed by Zanata and Vari in their diagnosis of subclade 31 (see e.g., Fig. 2.*7⁰; Fig. 2.*8⁰). Based on this character distribution we place *M. schelly* as members of Zanata and Vari’s subclade 23.

Within subclade 23, Zanata and Vari (2005) were able to diagnose a clade formed of the genera *Rhabdalestes*, *Virilia* and *Hemmigrammopetersius* to the exclusion of *Micralestes*. In addition to the absence of inner row teeth on the dentary (reversed in *Virilia*), *Rhabdalestes*, *Hemmigrammopetersius* and *Virilia* share a series

of modifications of the anal fin, none of which are present in *Micralestes schelly* which, for example, lack all trace of hypertrophy of the third unbranched anal fin ray even in sexually mature males (see e.g., Fig. 4.*9⁰).

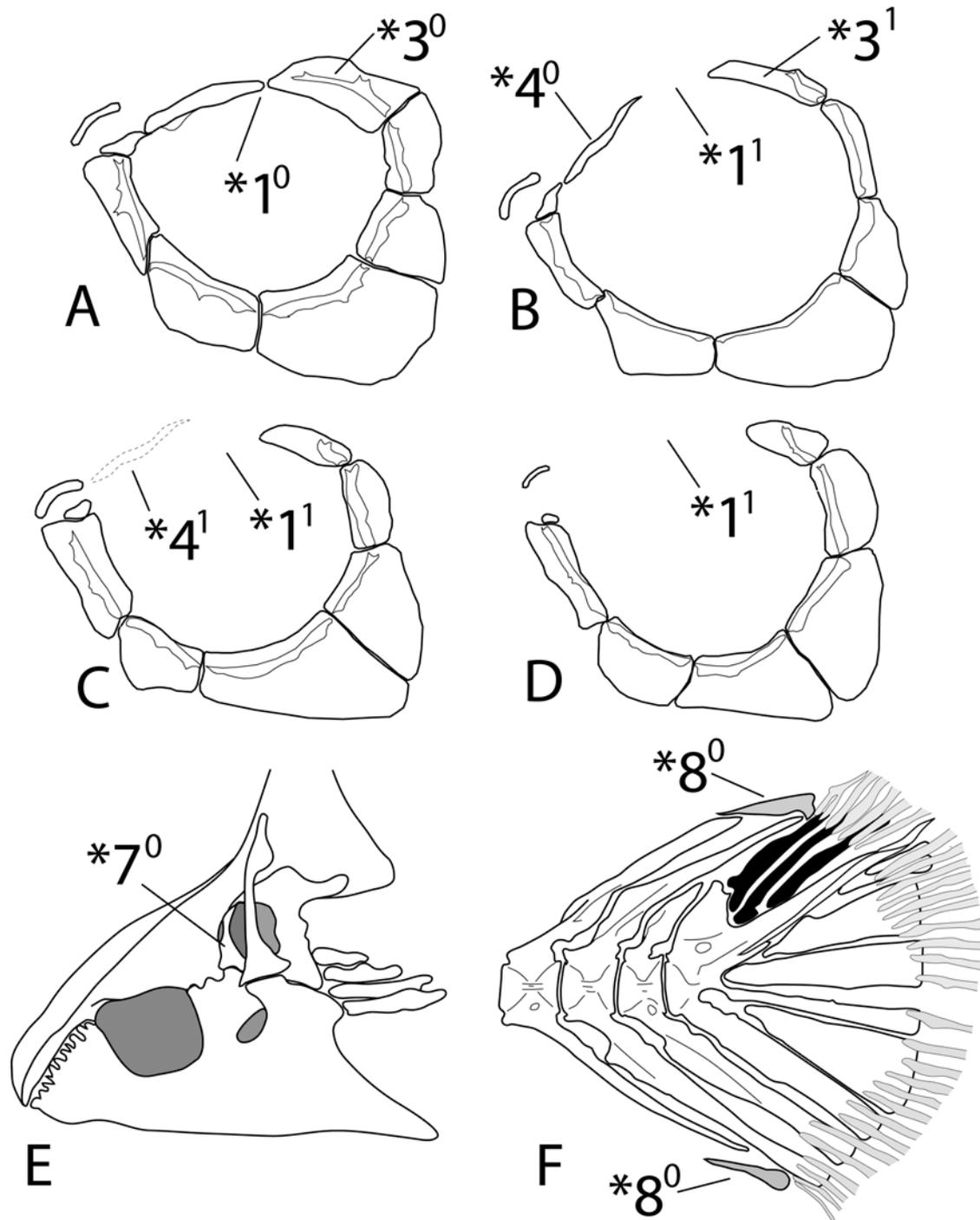


FIGURE 2. Isolated orbital series in A) *Bryconaethiops yseuxi*, B) *Brachypetersius altus*, C) *Micralestes humilis*, D) *Micralestes schelly* **sp. nov.**, E) pectoral girdle in medial view of *Micralestes humilis*, F) caudal skeleton and adjacent vertebrae in *Micralestes humilis*.

Unfortunately neither Zanata and Vari (2005) nor the present study has located any morphological characters supporting the monophyly of the residual *Micralestes*. The genus thus lacks a rigorous phylogenetic diagnosis and as currently conceived encompasses a wide range of external morphological diversity (see e.g., Fig. 1), and considerable anatomical variability. Ongoing morphological and molecular analyses may reveal the present grouping to be non-monophyletic, nonetheless given the data available, and as an expedient for a cor-

rect accounting of species diversity in the lower Congo River, it seems reasonable to provisionally assign the new species to this genus.

***Micralestes schelly*, new species**

(Figs 1F, 2D, 3–6)

Holotype (Fig. 5B) AMNH 240662, male, 40.1 mm SL; Democratic Republic of Congo, Bas Congo Province, Congo River main channel near Inga at point 50 (5°31.69 S 13°36.47 E), R.C. Schelly *et al.*, 26 Sept. 2002.

Paratypes (Fig. 1F, 5B), with same data as holotype. AMNH 239518, 33.9 – 48.9 mm SL (24 alcoholic, 5 cleared and stained), MRAC 2007-26-P-1-2, 36.5 – 39.0 mm SL (2 alcoholic), MNHN 2007-1629, 35.3 – 40.1 mm SL (2 alcoholic), ZSM 33982, 39.0 – 44.2 mm SL (2 alcoholic), MCZ 166773, 34.6 – 36.5 mm SL (2 alcoholic), CU 93431, 36.9 – 40.0 mm SL (2 alcoholic).

Diagnosis. A member of a clade of small alestid fishes characterized by the combination of the absence of a supraorbital bone, and the presence of a deep-lying midlateral stripe extending along the body onto the caudal peduncle, a band of chromatophores above the anal fin, and a small pair of inner row symphyseal teeth on the dentary. *Micralestes schelly* is distinguished from all putative congeners in having an elevated vertebral count of 38 – 40 (mean 39) versus 34 – 36 (mean 35) vertebrae. Additionally the species is characterized by the presence of 4–6 outer row premaxillary teeth with a majority of specimens (23 of 40) with only four outer row teeth implanted in an alternating pattern with respect to the anterior inner row premaxillary teeth. Mature males are further diagnosed by live coloration, which is dominated by a broad, blue-green iridescent midlateral band extending from behind the opercle to the base of the caudal fin, and by a marked expansion of the band of black chromatophores above the anal fin.

Description. Based on the holotype and 39 paratypes. See Figs. 5 and 6 for general appearance, and Table 1 for summary of morphometric and meristic data. Diminutive species, maximum observed size 48.9 mm SL. Relatively deep bodied, somewhat laterally compressed with greatest body depth at, or a little in front of, dorsal-fin origin. Dorsal body profile more-or-less smoothly convex to caudal peduncle, less strongly so in mature males; ventral profile markedly convex to anal-fin insertion. Caudal peduncle slightly longer than deep. Mouth terminal, gape not reaching beyond level of anterior margin of eye. Eye moderately large, flanked by adipose membrane extending over snout to level of nostril and posterodorsally over postorbital region. Nostril large and prominent; nasal and antorbital bones greatly reduced in size (Fig. 2D).

Teeth. Stout tri- or quadri-cuspid teeth in outer row on premaxillae variable in number; majority of individual have two teeth on either premaxilla (23 of 40 specimens), 13 specimens have two teeth on one side and three teeth contralaterally, and four specimens have three teeth on both premaxillae. When only two teeth are present each is positioned opposite interspaces between and alternating with, anterior inner row teeth (Fig. 3A). Four inner row teeth on each premaxilla, most with one large central cusp and two or three minor cusps on either side, symphyseal teeth often with single minor cusp on medial face. Four outer row teeth on contralateral dentaries, each with large central cusp and two or three minor cusps on either side. A single pair of small, conically recurved, symphyseal inner row teeth on lower jaw invariably present (Fig. 3B).

Fins. Dorsal-fin rays ii, 6–7 (total rays, 8–9), anal-fin rays iii, 16–17 (total rays 19–20). Origin of dorsal fin at, or slightly behind, vertical through pelvic-fin origin. Marked sexual dimorphism in morphology of anal fin (see Figs. 4, 5). However, unlike condition in *Rhabdalestes*, *Hemigrammopetersius* and *Virilia* (Stiassny and Schaefer, 2005; Zanata and Vari, 2005) there is no posterior curvature or hypertrophy of third unbranched anterior ray of mature males (Fig. 4C).

Squamation. Scales in longitudinal series 26–28 (mean 27) to caudal fin flexure, 1–3 smaller scales continuing over caudal fin base, 4.5 transverse scales between lateral line and dorsal-fin origin, 2.5 transverse scale rows between lateral line and pelvic-fin insertion. Lateral line complete, with 25–29 canal-bearing scales to point of hypural flexure, 2–4 smaller pored scales continuing over caudal-fin base.

Total number of gill rakers on first gill arch 18–22 (mean 19). Total number of vertebrae 38–40 (mean 39).

Color in alcohol. Base body coloration yellowish brown dorsally and laterally, yellow-orange ventrally. A darkly pigmented, deep-lying midlateral stripe extends from posterior margin of opercle to base of caudal fin. Well-marked band of dark melanophores present above anal fin. Pectoral and pelvic fins pale yellow. Adipose fin tipped in black. Dorsal and caudal fins somewhat dusky. Anal fin of females dusky proximally, in males pigmentation is somewhat expanded distally in posterior portion of fin.

TABLE 1. Morphometric and meristic data for holotype and paratypes of *Micralestes*, new species.

Morphometrics	holotype	holotype + paratypes		n	mean
		min	max		
Standard length (mm)	40.1	33.9	48.9	40	38.1
% head length					
Eye diameter	35.9	32.1	43.7	37	37.8
Interorbital width	38.4	27.5	45.6	37	36.2
% standard length					
Head length	25.8	24.7	29.1	37	26.8
Body depth	30.5	26.6	33	37	31.1
Predorsal length	47.7	40.9	51	37	47.3
Prepectoral length	24.6	21.3	29.1	37	24.7
Prepelvic length	49.2	45.7	51.8	37	48.9
Preanal length	68.1	64.6	69.3	37	66.8
Dorsal-adipose	24.1	21.4	26.8	37	23.8
Dorsal-fin base	12.5	9.3	15.3	37	11.5
Anal-fin base	21.4	17.1	23.2	37	19.6
Caudal peduncle length	12.4	11.2	17.3	37	12.8
Caudal peduncle depth	10.4	9.3	12	37	10.9

continued.

Meristics		min	max	n	median
Total number of vertebrae	38	38	40	40	39
Dorsal fin rays	9	8	9	40	8
Anal fin rays	19	19	20	40	19
Gill rakers	19	18	22	40	19
Lateral line scales	27	25	29	40	28
Longitudinal scales	28	26	28	40	27
Lateral line – dorsal fin scale rows	4.5	4.5	4.5	40	4.5
Lateral line – pelvic fin scale rows	2.5	2.5	2.5	40	2.5
Circumpeduncular scales	10	10	10	40	10

Color in life. Recently two male specimens have been collected from the type locality and live coloration recorded (Fig. 6). In life a broad, blue-green iridescent midlateral band covers the lateral flanks and tail from behind the opercle to the base of the caudal fin. This iridescent band overlies and obscures the deep lying midlateral stripe evident in preserved specimens (Fig. 5). Above and below the midlateral band the body is silvery white. Numerous melanophores are present on the head and opercle, and scattered over the body with a concentration around lateral scale margins. An expanded band of black melanophores reaching to the lateral line

is present above anal fin. Dorsal fin and pectoral fins are dusky gray; adipose fin is pale gray with a dark distal margin. Caudal fin is dusky gray at its base with a median dark band extending to mid-fork, distally the fin is dusky gray and medially each fin fork is deep crimson red. Anterior and distal margins of the anal fin are white, while the remainder of the fin is jet black. Pelvic fins are white. Iris is silvery white with a small red patch dorsally. Unfortunately no female specimens were collected during a recent site visit and female life coloration remains unknown.

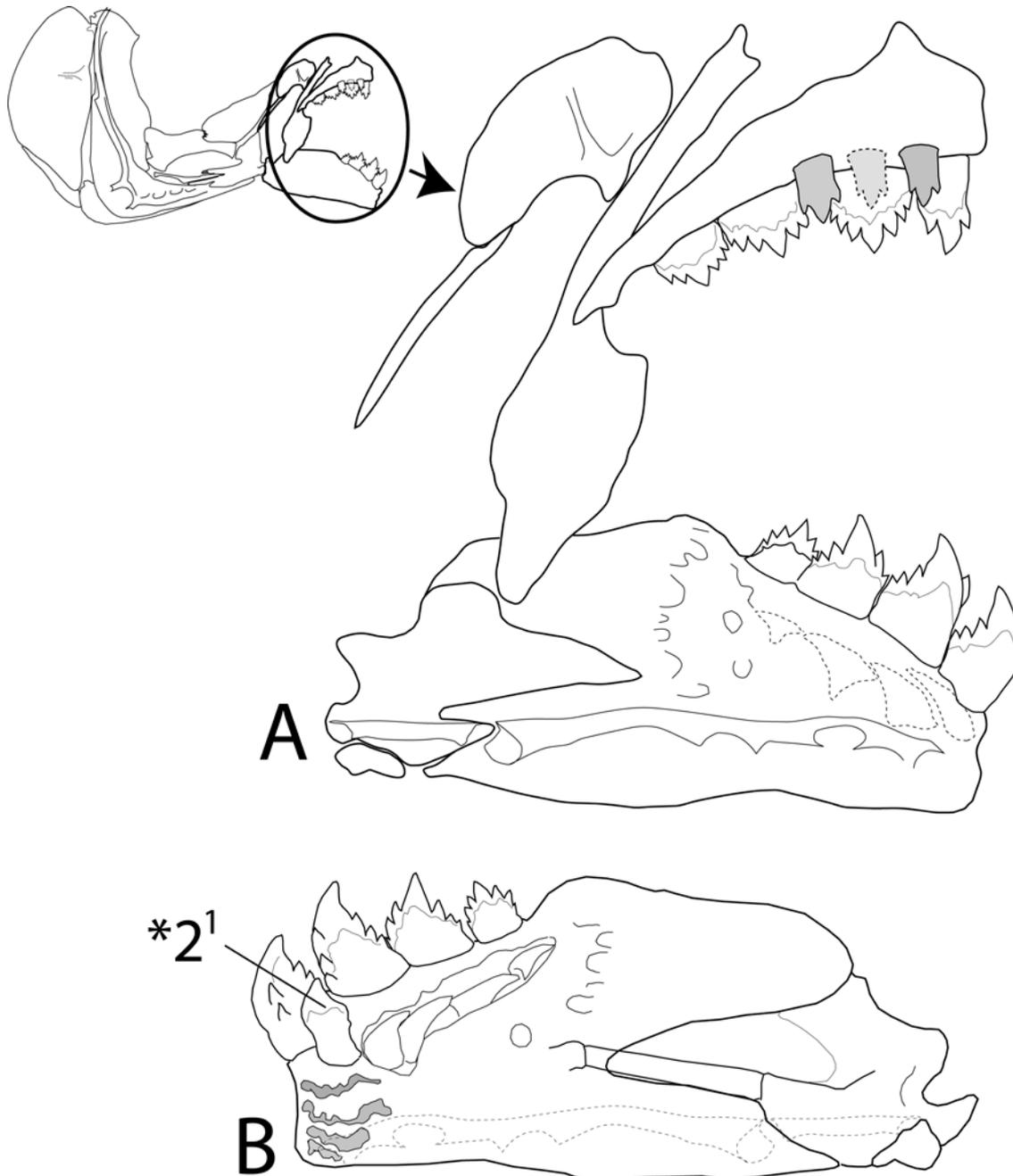


FIGURE 3. *Micralestes schelly* sp. nov. A) buccal jaws in lateral view, B) dentary in medial view.

Geographical distribution. Known only from the type locality in Bas Congo Province, at Point 50 on the Congo River main channel near Inga, Democratic Republic of Congo (5°31.69'S 13°36.47'E). Specimens were collected with cast nets in a complex, partially protected riffle habitat adjacent to rapids (Fig. 7). A small-unnamed stream enters the Congo River at this point and supports a patch of forest in the draw between two steep, mostly-bare hills. *Micralestes schelly* was collected over a sand and gravel substrate in the main chan-

nel amongst large rock slabs of up to 4 m high thrusting upward at angles of 60–70 degrees, in pools up to 2 m in depth. At this site water depth and flow is highly variable due to water surges every 5–10 minutes resulting in depth fluctuations in excess of half a meter.

Etymology. Named for our colleague and the intrepid collector of the type series, Robert C. Schelly.

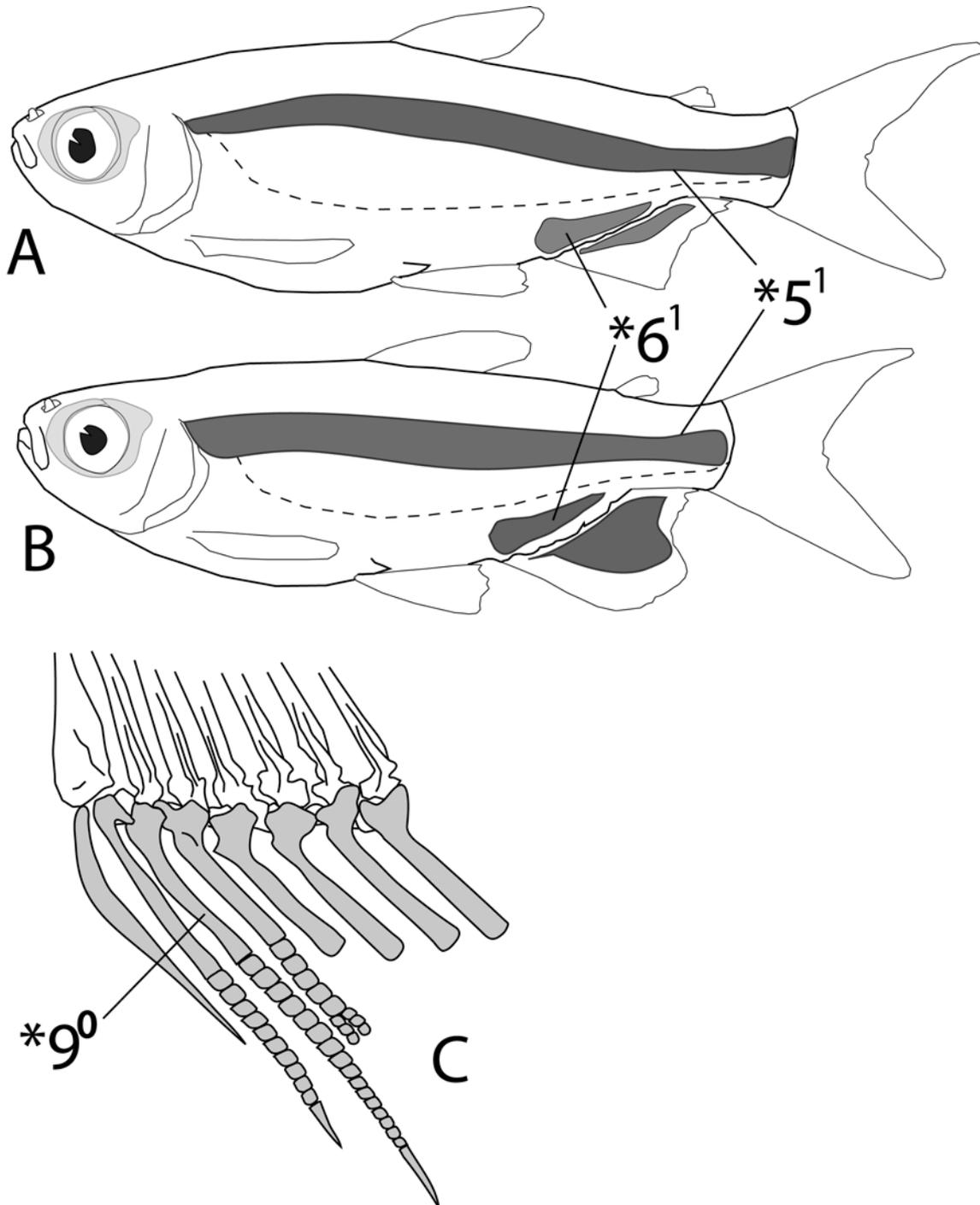


FIGURE 4. *Micralestes schelly* sp. nov. A) schematic of dominant color patterning in preservation in female, B) male. C) Skeletal elements of anterior region of anal fin of mature male.

Discussion. Recent collections in the region allow us to document the presence of six *Micralestes* in the stretch of the lower Congo River from Pool Malebo to Boma near the river's mouth, and as an aid for field identification we provide here an illustrated key to those species.



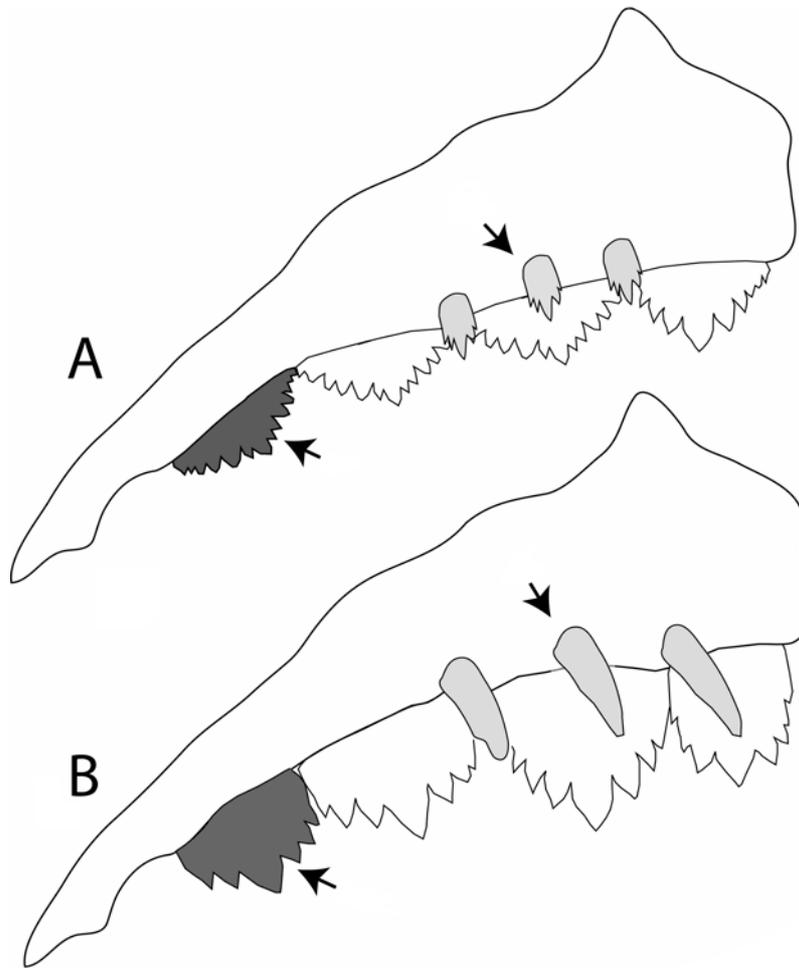
FIGURE 5. *Micralestes schelly* sp. nov. A) AMNH 239518, paratype, female, 44.5 mm SL, B) AMNH 240662, holotype, male, 40.1 mm SL.



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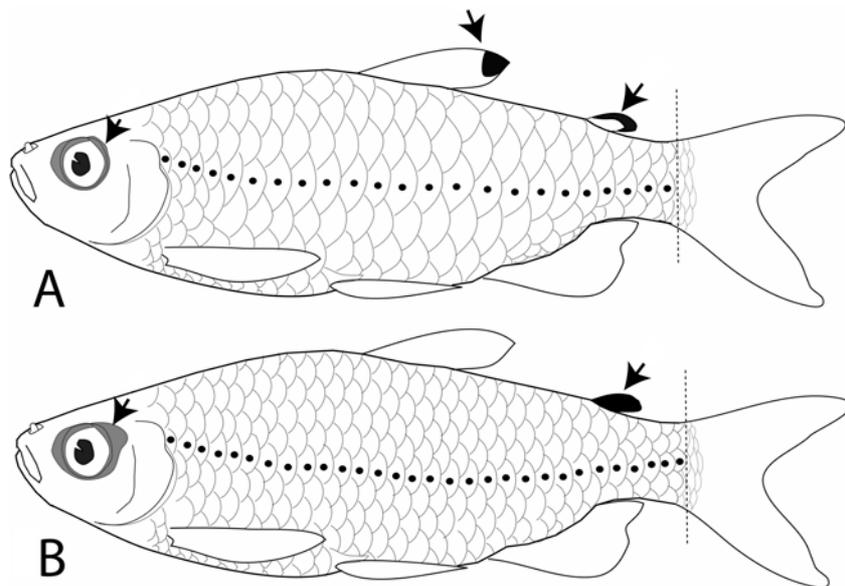
FIGURE 6. *Micralestes schelly* sp. nov. AMNH 240671, photograph of mature male taken immediately post mortem. Specimen collected from the type locality in July 2007, photo by Jake Lowenstein.

- 1A Teeth with numerous small cusps, first inner row premaxillary tooth with 10–12 cusps (Key Fig. 1A). Inner row tooth pair on dentary usually multicuspid (Key Fig. 3A). Dorsal fin with distinctive black apical patch (Key Fig. 2A)..... *M. acutidens*
- 1B Teeth with fewer cusps, first inner row premaxillary tooth with 6–8 cusps (Key Fig. 1B). Inner row tooth pair on dentary invariably unicuspid (Key Fig. 3B). Dorsal fin without black apical patch (Key Fig. 2B)..... 2
- 2A 23–28 scales in longitudinal series from opercle to point of caudal flexure (Key Fig. 2A)..... 3



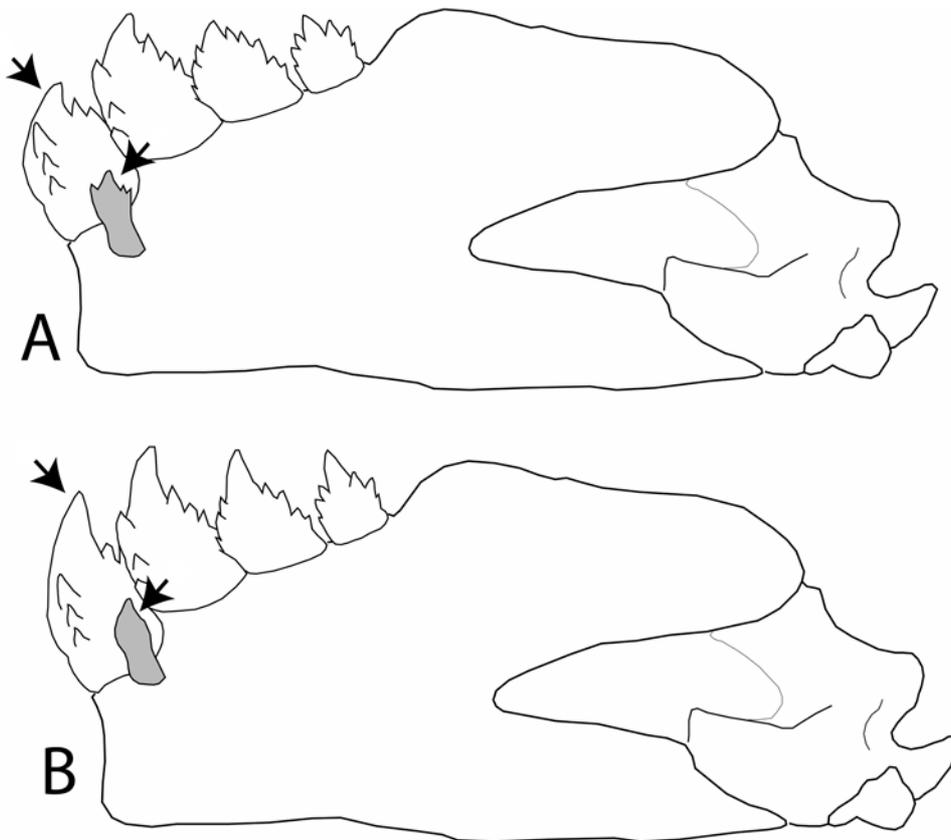
Key figure 1.

- 2B 29–33 scales in longitudinal series (Key Fig. 2B) *M. lualabae*
 3A Outer row premaxillary teeth small and tricuspid or quadricuspid (Key Fig. 1A) 4
 3B Outer row premaxillary teeth prominent, conical, or weakly shouldered, unicuspids (Key Fig. 1B)
 *M. holargyreus*



Key figure 2.

- 4A Median cusp of symphyseal teeth on dentary less than twice the height of adjacent cusps (Key Fig. 3A). 24–28 scales in longitudinal series from opercle to point of caudal flexure. Adipose fin black distally, pale proximally (Key Fig. 2A) 5
- 4B Median cusp of symphyseal teeth on dentary elongate and more than twice the height of adjacent cusps (Key Fig. 3B). 23–24 scales in longitudinal series from opercle to point of caudal flexure. Adipose fin black (Key Fig. 2B) *M. stormsi*
- 5A Relatively gracile, body depth 3.8–4.2 times into standard length. Adipose eyelid restricted posteriorly to orbital margin (Key Fig. 2A) *M. humilis*
- 5B Relatively deep-bodied, body depth 3.0–3.8 times into standard length. Adipose eyelid extending posterodorsally over postorbital region (Key Fig. 2B)..... *M. schelly*



Key figure 3.

Most of these species have widespread distributions encompassing most of the Congo basin and often also much of the rest of Central Africa (Poll, 1967). While we have not undertaken a revision of this genus and related taxa, a task that is ongoing, it is worthy of note that despite intensive collection and surveys in the region *Micralestes holargyreus* remains known only from the short stretch of the lower Congo River from Boma to Matadi, and *M. schelly* is only known from a single site in the vicinity of Inga. These two taxa are considered here to be lower Congo River endemics.



FIGURE 7. Type locality of *Micralestes schelly* sp. nov., Point 50 on the Congo River main channel near Inga, Bas Congo Province, Democratic Republic of Congo (5°31.69'S 13°36.47'E), photo by R.C. Schelly.

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