

A sexually dimorphic species of *Chrysichthys* (Siluriformes: Claroteidae) from Lac Mai-Ndombe, Democratic Republic of the Congo

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Chrysichthys praecox, new species, is described from Lac Mai-Ndombe (Democratic Republic of the Congo). It is a small and sexually dimorphic species distinguished on the basis of vomerine accessory toothplates broad posteriorly, narrow and sharply pointed supraoccipital process, upper jaw extending beyond lower, strong post-cleithral process, maxillary barbel length 2.7-4.8 times in SL, nasal barbel reaching the orbit, uniformly dark pigmentation and 14-19 simple gill rakers on the first gill arch. *Chrysichthys* reaches sexual maturity at a small size compared to congeners. We comment on its reproductive biology and the significance of its apparent endemism in Lac Mai-Ndombe.

Introduction

In the Cuvette Centrale of western Democratic Republic of the Congo, Lac Mai-Ndombe (Fig. 1; formerly Lake Leopold II) provides 2300 km² of permanent freshwater habitat to endemic fishes (e.g., Stewart & Roberts, 1984; Schliewen & Stiassny, 2006) and other aquatic animals. Similar to neighboring Lac Tumba (765 km²), the majority of its carbon input comes from allochthonous sources (e.g., terrestrial plant litter and associated invertebrates) that decompose to stain the water dark-brown and lower its pH to an acidic 4.0-5.5. Lying in a shallow basin, Lac Mai-Ndombe has a maximum depth of 10 m and its limits are known to increase dramatically during seasonal rains.

The Fimi River drains the lake at its southern tip and empties into the Kasai River (the latter being known as the Kwa in this region) the main southern tributary of the Congo River. Lakes Mai-Ndombe, Tumba and their intervening swamps and satellite lakes have been considered remnants of a large Pliocene lake that drained through a captured coastal stream at a point just below Pool Malebo (Beadle, 1974).

Claroteid catfishes are distributed throughout west and central Africa, the Nile, Lake Tanganyika and eastern streams of Mozambique. The Congo basin contains the bulk of claroteid diversity (Boulenger, 1901; Poll, 1957; Poll & Gosse, 1963; Risch, 1986). The claroteid catfishes of Lac Mai-Ndombe are poorly known although Matthes (1964) reported *Chrysichthys cranchii*, *C. longibarbis*,

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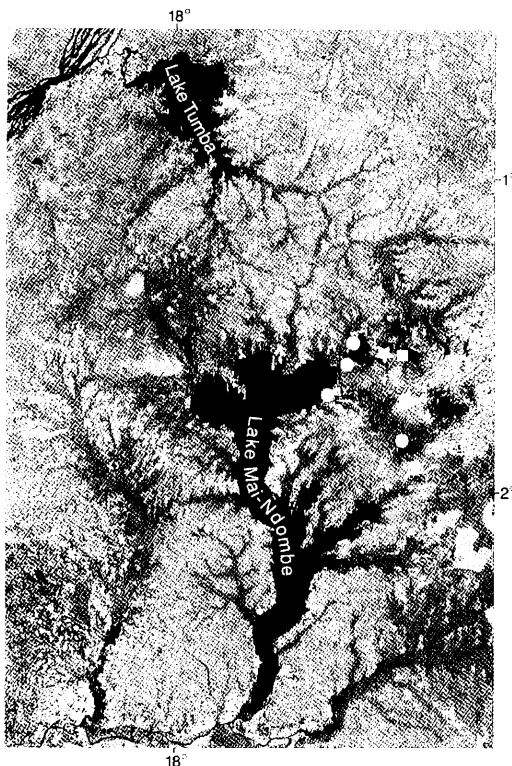


Fig. 1. Lac Mai-Ndombe-Lac Tumba region, Congo mainstem and major tributaries. Type locality of *Chrysichthys praecox* (Lac Ilungu, Mai-Ndombe, Bandundu, Democratic Republic of the Congo: 1°33'44"S 18°38'33"E) marked by asterisk.

C. ornatus, *C. punctatus* and *C. uniformis* from Lac Tumba, 80 km to the north. Many of the species reported by Matthes (1964) have been found in Lac Mai-Ndombe and he suggested that flooding of the low-lying swamps provided corridors of faunal exchange between these water-bodies. The claroteids of Lac Tumba are widespread species and typical of the Middle Congo (Boyoma Falls to Pool Malebo).

Bleeker (1858) described *Chrysichthys* on the basis of four pairs of barbels and vomerine toothplates being arranged in oblong patches. Revisionary treatments that include species of *Chrysichthys* and related genera (*Amarginops*, *Bathybagrus*, *Clarotes*, *Chrysobagrus* [= "*Chrysichthys*"], *Gephyroglanis*, *Gnathobagrus* [= "*Chrysichthys*"], *Lophiobagrus*, *Melanodactylus* [= "*Chrysichthys*"], *Octonematichthys* [= "*Clarotes*"], *Pardiglanis*, *Phyllonemus* and *Rheoglanis*) include Boulenger (1911) and Poll (1957). Boulenger (1911) added the number of

branched rays in the dorsal and pelvic fins, a free orbital margin and a large unencapsulated swim bladder as diagnostic features of *Chrysichthys*. In his key to genera, Poll (1957) echoed Boulenger's diagnosis and suggested a terminal or subterminal mouth and an unossified adipose fin as characteristics of the genus.

Mo (1991) completed the first phylogenetic treatment of *Chrysichthys* and related genera in his broader study of the Bagridae. Mo found evidence for several clades in a non-monophyletic assemblage of catfishes then classified as *Chrysichthys*. On this basis, Mo narrowly restricted *Chrysichthys* to species with a deep head, compressed orbitosphenoid region, deeply sloped posterolateral lamina of the lateral ethmoid, accessory toothplates, edentate metapterygoid, greatly thickened and hooked horizontal ramus of the Müllerian process, and a prominent lamina between the dorsomedian limb and the ossified Baudelot's ligament of the posttemporal (Mo, 1991: 147-148). Although no synapomorphies were found that uniquely diagnosed members of *Chrysichthys* as distinct from *Gephyroglanis*, Mo maintained both as valid genera but suggested the latter nested within the former, making *Chrysichthys* paraphyletic.

Unfortunately, several problems have been found in the taxonomic conclusions of Mo (1991) and the material on which they were based (De Pinna & Ferraris, 1992; Ng, 2004; Hardman, 2008a). As such, the veracity of Mo's diagnosis of *Chrysichthys* and its constitution requires confirmation following a comprehensive review of the group. In its place, the classification of Ferraris (2007) and the diagnoses of Boulenger (1911) and Poll (1957) offer a conservative operational solution to current systematists of claroteids.

In 2007, personnel from the American Museum of Natural History sampled fishes in Lac Mai-Ndombe. In addition to *C. punctatus*, *C. ornatus* and *C. cranchii*, large series of an undescribed sexually dimorphic *Chrysichthys* were obtained. Herein, we describe these specimens as a new species.

Material and methods

Characters found to be useful in the differentiation of *Chrysichthys* species include the ornamentation of the skull roof, the form and location of toothbands on the jaw and accessory vomerine tooth-

plates, and the form and size of the supraoccipital and postcleithral processes (Bailey & Stewart, 1984; Risch, 1985, 1988, 1992a-b, 2003; Hardman, 2008a-b). In addition to these qualitative data, counts and linear interlandmark distances were collected with hand-held calipers (DigitCal SL, TESA, Switzerland) and the aid of a stereo-zoom microscope following Hardman (2008a).

Shape differences among species were compared by calculating the proportional values of distances within either standard length (SL) or head length (HL) as appropriate. A two-tailed heteroscedastic Student's *t*-test was used to identify statistically distinguishable differences among distribution means. Significantly different ($p < 0.05$) means with non-overlapping standard deviations were used to determine the morphological distinction of the new species among congeners. Material examined is listed in Hardman (2008b) with additional specimens below.

Chrysichthys praecox, new species
(Figs. 2-3)

Holotype. AMNH 246513 (ex-AMNH 242588), 54.4 mm SL, male; Democratic Republic of the Congo: Bandundu: Lac Ilungu, Mai-Ndombe, 1°33'44"S 18°38'33"E; R. C. Schelly, J. H. Lowenstein & N. Zanga, 3 Aug 2007.

Paratypes. AMNH 246514 (ex-AMNH 242588), 3, 47.0-57.0 mm SL; MRAC 2008-14-P-1-4, 4, 41.6-51.4 mm SL; MNHN 2008-1671, 4, 33.5-49.0 mm SL; CU 94241, 4, 39.6-60.6 mm SL; BMNH 2008.7.29.1-4, 4, 36.7-54.7 mm SL; ZSM 37318, 4, 34.0-58.9 mm SL; same data as holotype. – AMNH 246515 (ex-AMNH 242588), 27, 31.7-62.5 mm SL; Democratic Republic of the Congo: Bandundu: Lac Nkolentulu, Mai-Ndombe; 1°33'39"S 18°42'43"E; R. C. Schelly, J. H. Lowenstein & N. Zanga, 4 Aug 2007.

Diagnosis. *Chrysichthys praecox* is a small sexually dimorphic species distinguished from other *Chrysichthys* by having vomerine accessory toothplates forming a smooth arc, narrowly separated in midline and broadening posteriorly in adult males (vs. two rounded and well-separated patches in *C. helicophagus* and *C. wagenari*, confluent and distinctly angled in *C. brachynema*, *C. delhezi* and *C. levequei*, narrowly separated and tapering posteriorly in *C. cranchii*, *C. aluuensis*, *C. polli*

and *C. sharpii*, widely separated with distinct patches of uniform width in *C. ansorgii*, widely separated and tapering sharply in *C. bocagii* and *C. thysi*), narrow and sharply pointed supraoccipital process (vs. broad and bell shaped in *C. duttoni*, *C. brevibarbis*, *C. dageti*, *C. laticeps* and *C. thonneri*), upper jaw extending beyond lower (vs. prognathous in *C. habereri*), strong postcleithral process (vs. weak or absent in *C. acsiorum*, *C. grandis*, *C. graueri*, *C. platycephalus*, *C. sianenna* and *C. stappersii*), maxillary barbel length 2.7-4.8 times in SL, mean 3.4 ± 0.5 (vs. 1.1-1.5, 1.3 ± 0.1 in *C. longibarbis* and 5.7 times in *C. persimilis*), nasal barbel reaching the orbit (vs. well short in *C. auratus*, *C. johmsi*, *C. longidorsalis*, *C. maurus*, *C. nigrodigitatus* and *C. teugelsi*), uniformly dark pigmentation (vs. marbled in *C. ornatus*, distinctly patterned in *C. okae*, scattered small spots in *C. punctatus*), 14-19 (15.7 ± 1.1) gill rakers on the first gill arch (vs. 26 in *C. furcatus*, 19-21 in *C. filamentosus*, 18-26 in *C. walkeri*). *Chrysichthys praecox* also differs from *C. filamentosus* in that the latter species typically exhibits an extension of the first branched rays of the dorsal fin reaching well beyond the adipose-fin origin, and from *C. walkeri* in having 7 (vs. 9) branched rays in the pectoral fin.

Table 1. Selected measurements and proportions (indented) for holotype and 35 paratypes *Chrysichthys praecox*. Values of holotype are included in range. H, holotype.

	H	mean±SD	range
Standard length (SL; mm)	54.4	46.2±8.7	31.7-62.5
Head length (HL; mm)	19.3	16.0±3.1	10.8-21.3
Number of times in SL			
Predorsal length	2.5	2.5±0.1	2.3-2.7
Head length	2.8	2.9±0.1	2.7-3.1
Adipose-hypural distance	5.3	5.4±0.4	4.3-6.2
Anal-hypural distance	5.9	5.4±0.4	4.4-6.1
Anal-fin base	6.0	7.6±0.7	6.0-9.0
Pelvic-anal distance	5.7	5.1±0.3	4.6-5.9
Pectoral-pelvic distance	4.2	3.9±0.3	3.4-4.4
Pectoral-snout distance	3.4	3.8±0.3	3.3-4.5
Maxillary barbel length	3.0	3.4±0.5	2.7-4.8
Pectoral-pectoral distance	5.4	5.8±0.4	4.9-6.5
Pectoral-dorsal distance	3.9	4.3±0.2	3.9-4.8
Number of times in HL			
Snout length	2.8	3.2±0.3	2.8-3.9
Horizontal eye diameter	4.2	3.8±0.4	3.0-4.6
Interorbital width	3.8	4.0±0.3	3.3-4.8
Internares width	4.5	5.1±0.6	4.0-6.5

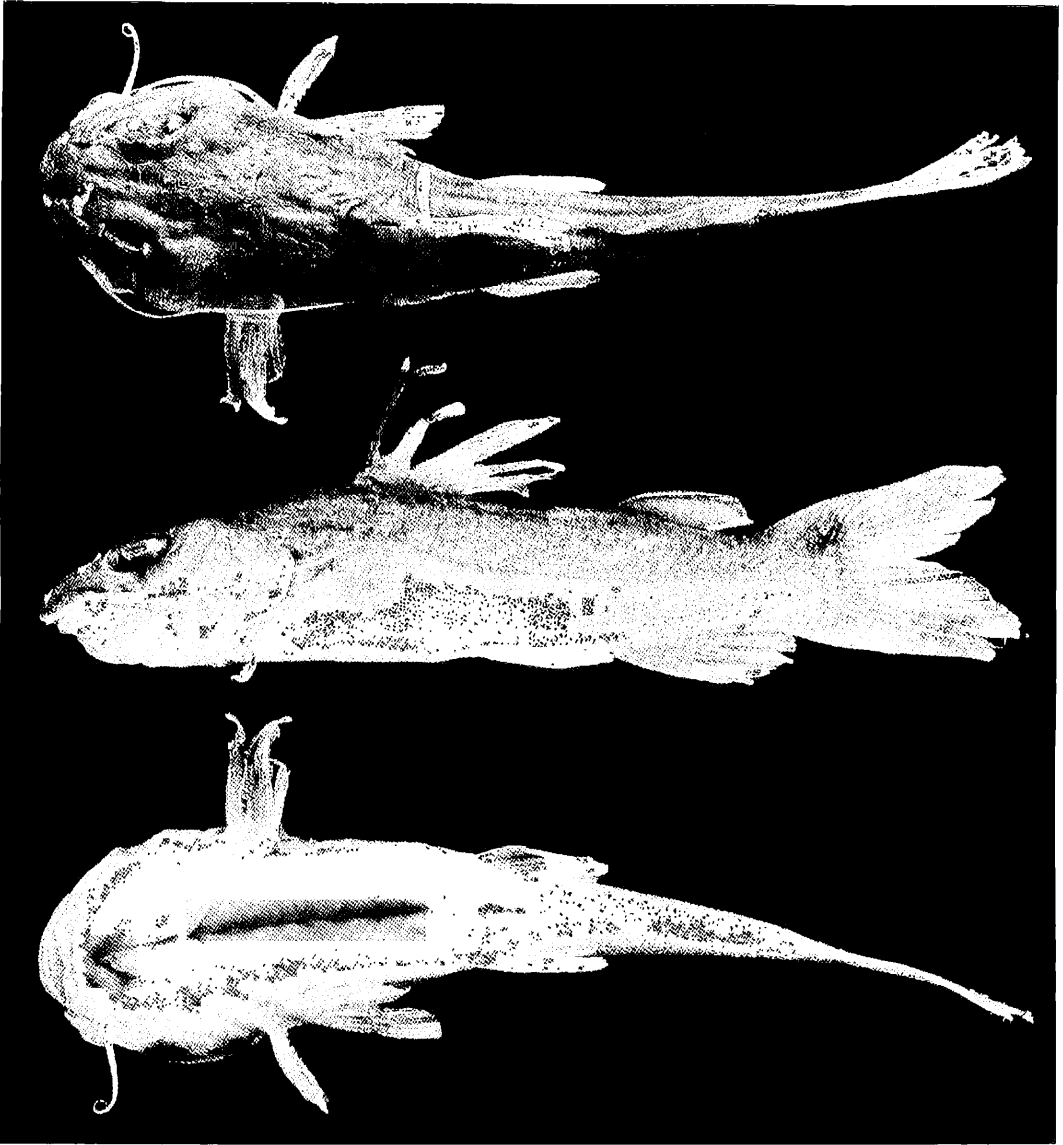


Fig. 2. *Chrysichthys praecox*, AMNH 246513, holotype, 54.4 mm SL, reproductive male; Democratic Republic of the Congo: Mai-Ndombe, Lac Ilungu.

Description. Morphometric data provided in Table 1. Body fusiform, anterior third dorsoventrally depressed in adult males, posterior two-thirds laterally compressed, deepest at vertical through dorsal-fin-spine origin and widest across pectoral girdle. In lateral view, dorsal profile of head variably interrupted by eyes and soft margins of skin surrounding free orbits, otherwise sloping (adult males) or arching (females/juve-

niles) smoothly from rounded snout to base of dorsal-fin spine. Dorsal profile between dorsal-fin-spine origin and anterior limit of adipose fin nearly straight, sloping gently through adipose fin to procurrent rays of upper caudal-fin lobe. Procurrent rays of lower caudal-fin lobe arching upwards to join ventral profile anterior of posterior limit of adpressed anal fin. Ventral profile between posterior limit of anal fin and anterior

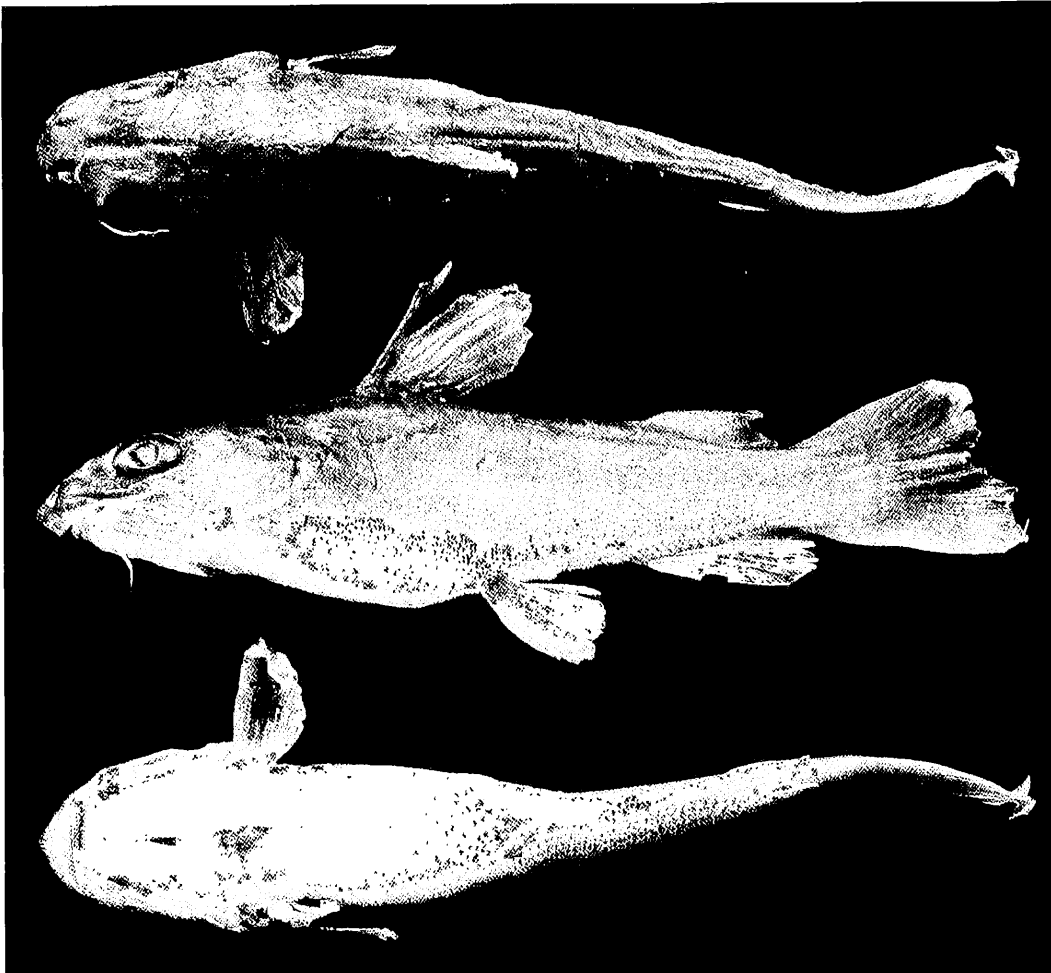


Fig. 3. *Chrysichthys praecox*, AMNH 246514, paratype, 45.8 mm SL, female with ripe ova visible through belly skin; right side, reversed; Democratic Republic of the Congo: Mai-Ndombe, Lac Ilungu.

limit of pelvic girdle straight (males and juveniles) or sloping gently downwards (mature females). Breast and gular region straight to slightly concave in lateral view.

Head broad and with hypertrophied cheek muscles in reproductive males, bluntly pointed in females and juveniles. Dorsum of head covered with skin beneath which skull roof variably ornamented with radiating ridges and lines of small rugosities converging posteromedially. Narrow, sharply pointed supraoccipital covered with anastomosing ridges and narrowly contacting nuchal plate. Anterior nares placed just behind upper lip and in line with posterior nares. Orbit with free margin. Narrow and fusiform anterior

cranial fontanelle extending from point behind posterior nares to just posterior of midway through orbit. Posterior fontanelle separated from anterior by epiphyseal bar and continuing to pointed posterior limit in line with dorsomedial corner of opercle.

Inner mandibular barbels broadly separated and originating anterior to and spaced ca. 0.85 distance between outer pair. Outer pair of mandibular barbels ca. 1.75 times longer than inner and reaching ca. 0.8 distance to pectoral-fin origin. Upper lip extending anteriorly and laterally well beyond lower. Corner of mouth with thick rictal skin-fold (expanded in reproductive males) forming base of narrow, flattened maxillary barbel

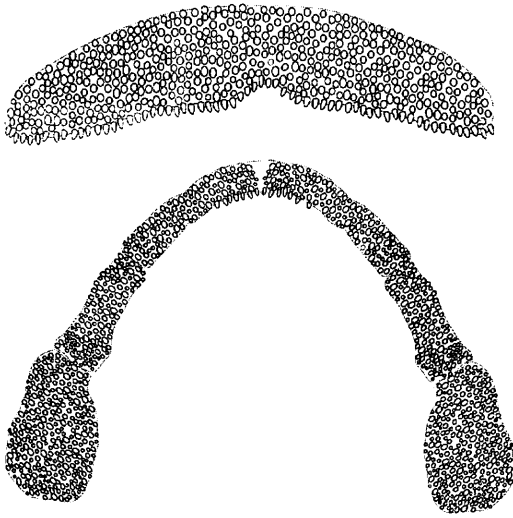


Fig. 4. Premaxillary toothpads and accessory toothplates of *Chrysichthys praecox*. Note that accessory toothplates of the palate can also be confluent in the midline.

that reaches to or just beyond posterior limit of postcleithral process. Posterior nare with simple barbel reaching anterior limit of orbit when reflected.

Premaxillary toothbands with small teeth of uniform size deeply embedded in matrix, each band broadest medially with posteromedial notch narrowing gradually to lateral limits, following snout profile before terminating just short of mouth corner (Fig. 4). Mandibular toothbands separated by symphyseal septum, with small teeth of uniform size and density following anterior profile of lower jaw, narrowing distally, terminating short of mouth corner. Accessory vomerine toothplates arching smoothly and expanding posteriorly, teeth of uniform size and density (Fig. 4).

Opercle triangular (broadly equilateral), straight to slightly concave posterior margin with broad skin flap covering most of exposed cleithrum. Cleithrum covered with anastomosing striae running lengthways, with stout postcleithral process. Anterolateral surface of first gill arch with 14-19 (mean 15.7 ± 1.1) short, simple rakers.

Dorsal-fin spine bearing several retrorse, narrowly separated serrae on posterodistal half. Dorsal-fin base slightly more than half spine length, with 6 branched rays of gradually decreas-

ing length reaching almost half-way to adipose-fin origin when adducted. Adipose fin approximately twice as long as tall with blunt posterior lobe. Caudal fin in adult males with shallow notch and broadly rounded lobes; deeply notched, narrow and bluntly pointed lobes in females/juveniles. Seven branched rays in upper caudal-fin lobe, 8 in lower; longest ray (usually upper) $1.2-2.8$ (1.79 ± 0.30) times longer than shortest. Anal fin mirrors shape of smaller adipose fin, 10-11 (ii-iii, 8) rays. Anal-fin origin at or just beyond posterior limit of adducted pelvic fin, directly beneath to slightly preceding adipose-fin origin. Spatulate (adult males) or flame-shaped (females/juveniles) pelvic fins (i, 5) with narrow bases contained approximately 5 times in pelvic fin length. Broad, pointed pectoral fin (I, 7) led by stout, gently curved spine bearing 10-12 retrorse serrae on posterior margin (adult males). Longest branched pectoral-fin rays ca. two times longer than shortest, with posterior limit ca. 0.8 distance to pelvic-fin origin when adducted.

Coloration in alcohol. Head, flanks, adipose and caudal fins uniformly pigmented with densely scattered chromatophores. Abdomen, breast and mandibular barbels without pigment. Gular region with lightly scattered chromatophores increasing in density on skin covering lower jaw. Chromatophores of dorsal and anal fins mainly confined to branched rays and increasing in density distally. Dorsal surface of pectoral fin, maxillary barbel and nasal barbel light below and dark above. Pelvic fin with lightly scattered chromatophores.

Sexual dimorphism. Adult males (Fig. 2) exhibit expanded cheek muscles, mouths, accessory toothplates and rectal skin folds in comparison to adult females (Fig. 3) and juveniles. While ranges overlap, *t*-tests of morphometric proportions (Table 2) detected significantly shorter mean maxillary barbel lengths (3.6 ± 0.5 vs. 3.0 ± 0.3 , $p = 0.002$) and significantly broader mouths (1.8 ± 0.2 vs. 2.2 ± 0.2 , $p = 0.004$) in adult males compared to adult females. Broadening of the mouth and oral region of mature males was also found between adult males and juveniles (5.9 ± 0.7 vs. 7.3 ± 1.7 , $p = 0.010$). Adult females do not appear to develop secondary sexual characters as only mean snout length as a proportion of head length discriminate them from individuals classed as juvenile (3.1 ± 0.1 vs. 3.4 ± 0.3 , $p = 0.015$), although

the range of the former was contained in the latter (3.0-3.3 vs. 2.9-3.9).

Biology. Adult females contained ca. 25-35 mature ova of ca. 2.2 mm diameter, similar to that reported for *C. nigrodigitatus* (2.1±0.4 mm), *C. auratus* (2.0±0.3 mm) and *C. walkeri* (2.1 mm) (Ikusemiju, 1975; Inyeng & Ezenwaji, 2004) but somewhat smaller than the largest ova of the Tanganyikan mouthbrooders *Lophiobagrus aquilus* (3.7±0.2) and *L. cyclurus* (3.3±0.1) (Ochi et al., 2002).

Distribution. Known only from Lac Mai-Ndombe, Democratic Republic of the Congo (Fig. 1).

Remarks. Marked secondary sexual dimorphism is also known to occur in taxa comprising the *C. auratus* species complex (Agnèse, 1991; Risch, 1986, 1992a, 2003; Hardman, 2008b), though they are much larger as adults (Risch, 1986, 2003).

Etymology. From the Latin *praecox*, meaning early ripening or precocious, in reference to the small size at which this species matures. An adjective.

Discussion

Quite commonly in catfishes, provision of parental care in the form of uni- or bi-parental nest defence co-occurs with secondary sexual dimorphism (Amblycipitidae: Watanabe, 1994; Auchenipteridae: Ferraris, 1988; Ictaluridae: Burr & Stoekel, 1999; Loricariidae: Rapp Py-Daniel & Cox-Fernandez, 2005; and Callichthyinae: Hostache & Mol, 1998). Within *Chrysichthys*, Abe (1997) reported bi-parental nest defence of eggs and yolk-sac larvae in *C. grandis* (630 mm TL) and Ochi et al. (2002) observed a male *C. graueri* (360 mm TL) guarding juveniles of at least 25 mm TL. Neither of these Tanganyikan species is known to exhibit sexual dimorphism suggesting that, at least in Lake Tanganyika, selective forces operating on the expression of sexual dimorphism are relaxed. Also in Lake Tanganyika, species of *Lophiobagrus* and *Phyllonemus* are known to practice oral incubation of eggs and juveniles (Ochi et al., 2000, 2001, 2002) but none of them show secondary sexual differences. *Chrysichthys praecox* is a small and sexually dimorphic species with ova compa-

Table 2. Significant *t*-test results describing the differences between adult male, adult female and juvenile specimens of *Chrysichthys praecox*.

	p-value	mean ± std.dev.	range
Females vs. Juveniles			
Snout length in HL	0.015	3.1±0.1 vs. 3.4±0.3	3.0-3.3 vs. 2.9-3.9
Males vs. Juveniles			
Snout length in HL	0.003	3.1±0.2 vs. 3.4±0.3	2.8-3.4 vs. 2.9-3.9
Horizontal eye diameter in HL	0.013	3.9±0.3 vs. 3.6±0.3	3.4-4.5 vs. 3.0-4.3
Dorsal-fin base in dorsal spine length	0.047	1.7±0.3 vs. 1.9±0.3	1.3-2.1 vs. 1.2-2.1
Least in greatest in caudal fin length	0.041	1.7±0.2 vs. 1.9±0.2	1.3-2.1 vs. 1.5-2.1
Pectoral-snout distance in SL	0.002	3.6±0.2 vs. 3.9±0.2	3.3-4.0 vs. 3.5-4.5
Maxillary barbel length in SL	0.026	3.6±0.5 vs. 3.4±0.5	2.8-4.8 vs. 2.7-4.2
Intermaxillary barbel distance in HL	0.001	1.8±0.2 vs. 2.1±0.4	1.5-2.2 vs. 1.6-2.9
Inner intermandibular distance in HL	0.010	5.9±0.7 vs. 7.3±1.7	4.3-7.0 vs. 5.2-10.6
Pectoral-pectoral distance in SL	0.014	5.6±0.4 vs. 5.9±0.4	4.9-6.4 vs. 5.2-6.4
Males vs. Females			
Maxillary barbel length in SL	0.002	3.6±0.5 vs. 3.0±0.3	2.8-4.8 vs. 2.7-3.2
Intermaxillary barbel distance in HL	0.004	1.8±0.2 vs. 2.2±0.2	1.5-2.2 vs. 1.9-2.6
Males vs. Females + Juveniles			
Snout length in HL	0.008	3.1±0.2 vs. 3.3±0.3	2.8-3.4 vs. 2.9-3.9
Horizontal eye diameter in HL	0.025	3.9±0.3 vs. 3.7±0.3	3.4-4.5 vs. 3.0-4.3
Interorbital distance in HL	0.047	4.0±0.3 vs. 4.1±0.4	3.3-4.6 vs. 3.6-4.8
Least in greatest caudal fin length	0.044	1.7±0.2 vs. 1.9±0.3	1.3-2.1 vs. 1.3-2.8
Pectoral-snout distance in SL	0.006	3.6±0.2 vs. 3.9±0.3	3.3-4.0 vs. 3.4-4.5
Intermaxillary barbel distance in HL	0.013	1.8±0.2 vs. 2.1±0.3	1.5-2.2 vs. 1.6-2.9
Inner intermandibular distance in HL	0.015	5.9±0.7 vs. 7.0±1.5	4.3-7.0 vs. 5.2-10.6
Pectoral-pectoral distance in SL	0.048	5.6±0.4 vs. 5.9±0.4	4.9-6.4 vs. 5.2-6.5

rable in size to other nesting species in the genus (Ikusemiju, 1976; Inyeng & Ezanwaji, 2004). Given these observations, it seems probable that *C. praecox* owes its origin to a progenetic event that accelerated the onset of maturity in a larger ancestral form. Developmental series of this and its sister species might help to determine the extent of any juvenile or larval traits expressed by *C. praecox*.

Presently, *C. praecox* is known only from Lac Mai-Ndombe. While Lac Mai-Ndombe is not directly connected to the similarly shallow and blackwater Lac Tumba (Fig. 1), flooding of intervening swamps has provided channels for faunal interchange during pluvial periods (Matthes, 1964). Many of the species reported for Lac Tumba have also been found in Lac Mai-Ndombe, but at least three cichlids (*Hemichromis cerasogster*, *Nanochromis transvestitus* and *N. wickleri*) and an amphiliid (*Amphilius opisthophthalmus*) are endemic to the latter and suggest that Lac Mai-Ndombe has provided sufficient isolation for in-situ diversification of these species as well as *C. praecox*. Under a vicariance model, their diversification presumably took place since the lakes' late-Pliocene origin (Beadle, 1974). It is interesting to note that [in addition to the endemic diversity in Lake Tanganyika (Poll, 1953; Bailey & Stewart, 1984)] Lakes Chad (*C. auratus tillhoi*), Turkana (*C. turkana*) and now Mai-Ndombe (*C. praecox*) all contain endemic *Chrysichthys*. This suggests that African lakes and their formation have played a role in the diversification of claroteids generally.

Material examined. *C. acutirostris*: NMW 47139, 1, 191.0 mm SL; Angola: Bengo River. *C. ansorgii*: NMW 47140, 2, 113.4-216.0 mm SL; Angola: Dondo, Quanza River. *C. auratus*: NMW 47111, 3, 110.6-147.1 mm SL; Egypt: Suez Canal. – ZMUC 18, 1, 148.7 mm SL; ZMUC 19, 2, 86.5-122.1 mm SL; ZMUC 32, 1, 150.5 mm SL; Egypt: Lake Menzaleh. – ZMUC 28564-7, 4, 79.8-92.3 mm SL; Nigeria: between Kano and Jos. *C. auratus longifilis*: ZMUC 1, holotype, 219.0 mm SL; Mali: Kabara, Niger River. *C. borresoni*: NRM 9942, holotype, 211.0 mm SL; Democratic Republic of the Congo: Lubosi [probably Lubuzi] River. *C. brachynema*: NMW 12648, 1, 194.0 mm SL; Zambia: Sumbu Bay at Sumbu, Lake Tanganyika. *C. filamentosus*: NMW 47117, 4, 61.1-211.0 mm SL; Cabinda: Chiloango, Chiloango River. – NMW 47144, 2, 105.6-136.1 mm SL; Democratic Republic of the Congo: Kuka Muno, Lubuzi River. *C. graueri*: NMW 47107, 1 syntype, 305.0 mm SL; Tanganyika. *C. habereri*: NMW 47108, holotype, 255.0 mm SL; Cameroon: Dscha [Dja] River. *C. johuensi*: NRM 13899,

1 syntype, 136.9 mm SL; Gambia: MacCarthy Island, probably Bansang area, Gambia River. – NRM 38525, 1, 264.0 mm SL; The Gambia: MacCarthy Island, Gambia River. – NMW 47119, 1, 115.4 mm SL; NMW 47121, 1, 228.0 mm SL; Geba River. *C. mabusi*: NRM 12472, 2, 177.0-234.0 mm SL; Zambia: Lake Mweru-Wantipa at Chisela. – NRM 12556, 2, 93.7-97.5 mm SL; Zambia: Lake Bangweulu market and fish landing. – NRM 12577, 6, 184.0-218.0 mm SL; Zambia: Isokwe Island, Lake Mweru. – NRM 12742, 3, 94.4-146.9 mm SL; Zambia: Lake Mweru-Wantipa at Chisela. *C. maurus*: NRM 31078, 2, 135.2-146.7 mm SL; Ivory Coast: Bandama River between Niakaramandougo and Tortika. *C. nigrodigitatus*: NRM 23057, 2, 102.0-108.0 mm SL; Sierra Leone: Kiffa River near Mussaia. – NRM 24476, 2, 108.5-135.6 mm SL; Ivory Coast: Lake Ono, Grand Bassam area. – NRM 24527, 3, 143.4-163.0 mm SL; Cameroon: Douala, Wouri River. – NRM 38798, 3, 87.3-97.7 mm SL; Gambia: MacCarthy Island, Gambia River. – ZMUC P28570-73, 4, 122.1-170.0 mm SL; Nigeria: Lagos. – ZMUC P28574-76, 3, 119.2-159.2 mm SL; Nigeria: Lagos Lagoon. – ZMUC P28577-81, 5, 62.9-173.0 mm SL; Nigeria: Isheri, north of Lagos. *C. ornatus*: NMW 47126, 3, 59.9-73.1 mm SL; Democratic Republic of the Congo: Libenge, Ubangui River. *C. platycephalus*: NRM 12743, 1, 125.8 mm SL; Zambia: Sumbu Bay at Nsumbe, Lake Tanganyika. – NRM 12744, 5, 107.4-134.6 mm SL; Zambia: Sumbu Bay at Nsumbe, Lake Tanganyika. *C. thonneri*: NMW 10643, 1 syntype, 104.7 mm SL; Congo. NMW 10645, 1, 174.0 mm SL; Cameroon: Dscha [Dja] River. *C. walkeri*: NMW 47118, 1, 193.0 mm SL; NMW 47120, 1, 216.0 mm SL; NMW 47122, 3, 176.0-264.0 mm SL; NMW 47123, 1, 231.0 mm SL; NMW 47124, 2, 262.0-282.0 mm SL; NMW 47125, 1, 166.0 mm SL; NMW 47147, 3, 108.6-139.6 mm SL; NMW 47154, 1, 209.0 mm SL; NMW 47158, 1, 201.0 mm SL; Gabon: Rembo Nkomi. – NRM 24466, 1, 102.9 mm SL; Border of Guinea and Ivory Coast. – NRM 24468, 4, 100-122.9 mm SL; Ivory Coast: Nounon, Cavally River. – ZMUC P2851, 1, 224.0 mm SL; Gambia: MacCarthy Island, Gambia River.

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