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## Three new species of the genus *Chlopsis* (Anguilliformes: Chlopsidae) from the Indo-Pacific

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### Abstract

Three new species of false moray eels belonging to the genus *Chlopsis*, family Chlopsidae, are described and illustrated. *Chlopsis sagmacollaris*, from Western Australia, is characterized by its distinct color pattern with a unique dark saddle on the nape and paler body pigmentation than all other congeners. *Chlopsis nanhaiensis*, from Taiwan, has a bicolored body with its dorsal-fin origin behind a vertical through posterior margin of gill opening. These characters are shared with *C. apterus*, *C. bicolor*, *C. bidentatus* and *C. orientalis* sp. nov., but *C. nanhaiensis* has fewer total vertebrae than other bicolored species (ca. 120 in *C. nanhaiensis* vs. 125–140 in other four species). *Chlopsis orientalis*, from Vietnam, is distinguished from all other congeners except *C. bicolor* by its simple bicolored body, head length (ca. 10 % of total length), position of dorsal-fin origin (distinctly behind a vertical through posterior margin of gill opening), and counts of preanal and total vertebrae (35 and 135). Although *C. orientalis* resembles *C. bicolor* in meristics and morphometrics, it differs in its pigmentation and possession of stouter intermuscular bones. These new species represent the first records of the genus *Chlopsis* from the northwestern Pacific Ocean and the eastern Indian Ocean.

**Key words:** taxonomy, Pisces, *Chlopsis*, *nanhaiensis*, *orientalis*, *sagmacollaris*

### Introduction

The family Chlopsidae (false morays) is a small group of eels, including eight genera and 22 species (Eschmeyer 2014). Although several species are very common (e.g. *Kaupichthys hyoprroides* in the Atlantic Ocean), most species are rarely collected because they live in cryptic habitats and their body sizes are small (Smith 1989; Smith 1999). The genus *Chlopsis* is one of the most diverse genera in the family with a total of eight valid species. The genus is characterized by the following characters: intermaxillary teeth in a round to oval patch; vomerine teeth in two longitudinal series, close-set anteriorly, diverging by mid-row and then converging posteriorly, one row or two rows anteriorly and one row posteriorly on each side; no flange along lower lip; one lateral-line pore; dorsal-fin origin anterior to mid-trunk; no pectoral fins (Smith 1999). The most recent reviews of the genus *Chlopsis* were by Lavenberg (1988), Smith (1989), and Tighe & McCosker (2003). Lavenberg (1988) recognized four species from the eastern Pacific: *C. apterus* (Beebe & Tee-Van, 1938), *C. bicollaris* (Myers & Wade, 1941), *C. kazuko* Lavenberg, 1988 and *C. longidens* (Garman, 1899). *Chlopsis longidens* is based on a leptocephalus and is probably the larva of one of the other eastern Pacific species. However, Lavenberg (1988) did not conclusively identify this species with an adult, but indicated that it was likely the larva of *C. bicollaris*. For this reason, we do not recognize

*C. longidens* as a valid species distinct from the other three eastern Pacific species. Smith (1989) recognized six species: *C. apterus*, *C. bicollaris* and *C. kazuko* (from the eastern tropical Pacific), *C. olokun* (Robins & Robins, 1966) (from the eastern tropical Atlantic), *C. bicolor* Rafinesque (1810) (from the Mediterranean and Atlantic) and *C. dentatus* (Seale, 1917) (from the tropical western Atlantic and western Indian Oceans). Tighe & McCosker (2003) described two new species, *C. bidentatus* and *C. slusserorum*, from the southwestern Pacific Ocean bringing the total number of currently recognized species to eight. However, no species have been reported in the eastern Indian Ocean or the northwestern Pacific Ocean (Smith 1999; Tighe 2000; Tighe & McCosker 2003). More recent collecting in the Indian Ocean near Ashmore and Cartier Islands off Western Australia yielded a specimen of an undescribed species of this genus. Three additional specimens representing two more undescribed species were obtained from by-catch of commercial trawlers and purchased at the fish markets in Dong-gang, Pingtung, Taiwan by David G. Smith and Hsuan-Ching Ho, and Nha Trang, Vietnam by Quan Van Nguyen.

## Materials and methods

General methods for morphometric and meristic data for this study are given in Böhlke (1989). Measurements were made with a 450 mm ruler to the nearest 1 mm for total, predorsal and preanal lengths, and a digital caliper to the nearest 0.1 mm for all other measurements. All measurements are given as a proportion of the total length (TL) except for subunits of the head which are presented as proportions of the head length (HL). Vertebral and fin ray counts were taken from radiographs. Total vertebral counts are of all elements including the hypural plate. Preanal and predorsal vertebral counts were taken using the definitions of Böhlke (1982). Precaudal vertebral counts include all elements up to the first vertebra with a distinct, posteriorly directed haemal spine. The number of dorsal rays anterior to the anal origin are counted back to a vertical through the first anal ray base. Cyanine blue was used for staining cephalic sensory pores (Saruwatari *et al.*, 1997). Meristic and morphometric data for the type series of *Chlopsis nanhaiensis* are presented with the values of the holotype first and values of the paratype given in brackets. The specimens are deposited at the National Museum of Victoria, Melbourne, Australia (NMV); the National Museum of Natural History, Washington, DC, USA (USNM); the Institute of Marine Environment and Resources, Hanoi, Vietnam (IMER); and the Fish Collection of National Museum of Marine Biology & Aquarium, Pingtung, Taiwan (NMMB-P). Comparative material of *Chlopsis bicolor* is from the Instituto de Ciencias del Mar, Barcelona, Spain (IIPB).

### *Chlopsis sagmacollaris* Pogonoski & Tighe, sp. nov.

Figs. 1, 2, 3

**Holotype:** NMV A 29730-023 (228 mm total length); Australia: Western Australia: Northwestern Australia, Station 189, Ashmore L30 Transect (12° 28' 53" S, 123° 25' 04" E to 12° 29' 58" S, 123° 25' 00" E), depth 397–405 m; captured with beam trawl; RV Southern Surveyor; 06 July 2007.

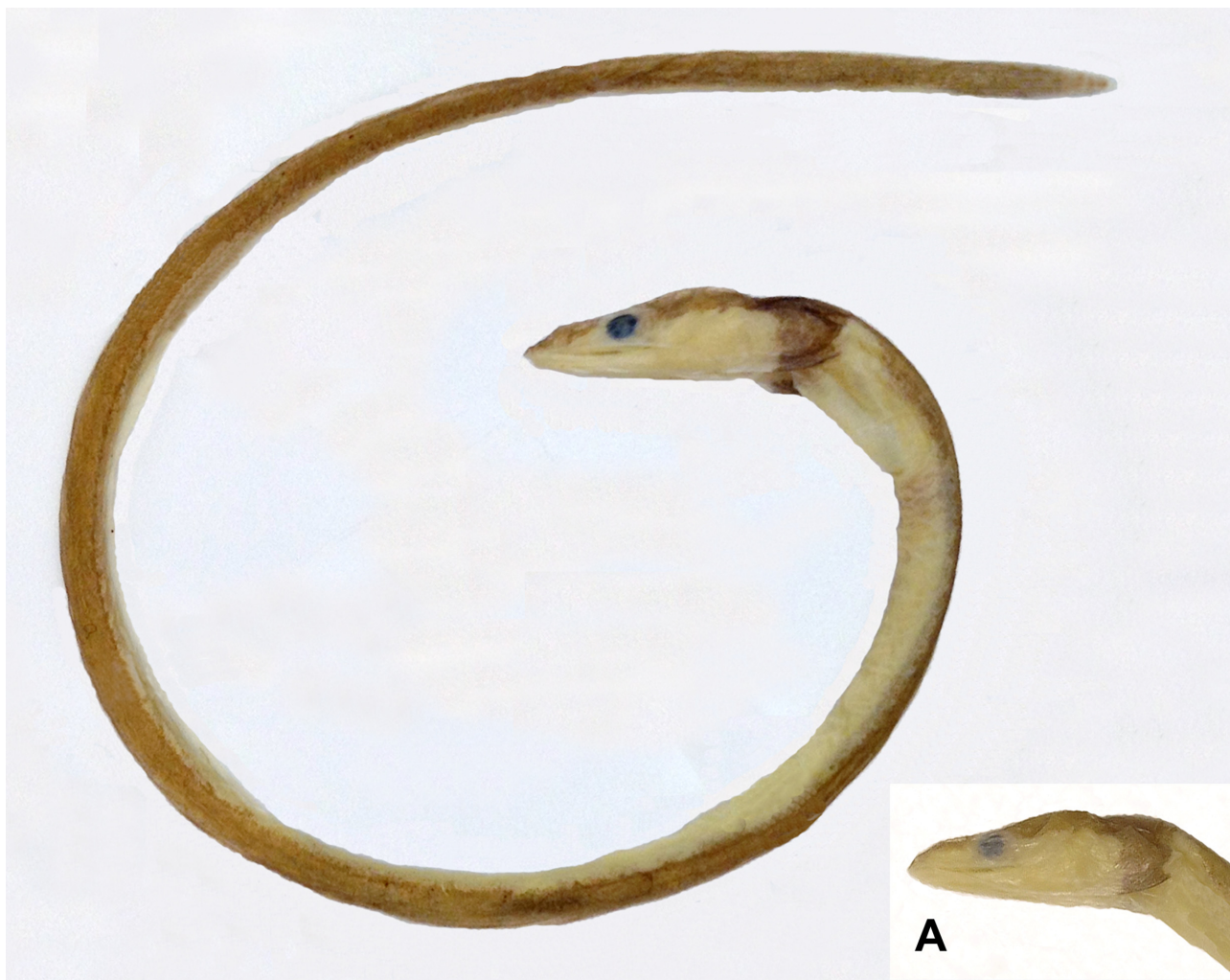
**Diagnosis.** The high vertebral count combined with the distinctive saddle-shaped pigmentation on the nape of the neck differentiates this species from all others in the genus *Chlopsis*.

**Description.** Total vertebrae 142, predorsal vertebrae 12, preanal vertebrae 42, precaudal vertebrae 58, dorsal rays 385, anal rays 357, dorsal rays anterior to anal fin origin 93. Proportions as percent of total length: predorsal length 12.3, preanal length 35.1, head length 10.1, depth at gill opening 2.9, depth at anus 1.5. Proportions as percent of head length: eye diameter 12.2, interorbital width 13.0, snout length 25.2, tip of snout to rictus 41.7, tip of lower jaw to rictus 39.6.

Body moderately elongate, nearly cylindrical (Fig. 1). Dorsal-fin origin approximately two eye diameters posterior to gill opening (Fig. 2). Head moderate in length, relatively deep. Snout relatively broad. Gape moderate, rictus behind posterior margin of eye. Anterior nostril tubular, slightly behind tip of snout, directed anterolaterally. Posterior nostril a postero-ventrally directed low tubular opening (not covered by a flap) on lip in front of eye.

Lateral line on body absent except for one pore in branchial region, dorsal and anterior to gill opening, within dark, dorsal pigment patch (Fig. 2). Supraorbital pores three: first (ethmoidal) at anteroventral tip of snout, second anteromedial to base of anterior nostril, and last above and behind anterior nostril. Infraorbital pores four: first just posterior to anterior nostril, second midway between anterior and posterior nostrils, third just behind posterior

nostril, and last below posterior edge of eye. Preoperculomandibular pores five, first near tip of lower jaw and last just behind posterior edge of eye, anterior to rictus.



**FIGURE 1.** Holotype of *Chlopsis sagmacollaris*, NMV A 29730-023, 228 mm TL; Ashmore L30 Transect, Station 189, Northwestern Australia. A. Detail of head showing dorsal patch of pigment.

Maxillary teeth (Fig. 3) conical, slightly recurved, in 2–3 irregular rows with third outer row very irregular; inner row larger than outer, a total of 37–38 teeth in inner row. Mandibular teeth like those of maxilla, except in 2–3 irregular rows anteriorly, reducing to 2 rows posteriorly, with 30–31 teeth in inner row. Intermaxillary teeth conical, slightly recurved, with approximately 25 teeth in a round patch; median and posterior teeth somewhat enlarged. Vomerine teeth similar in shape and size to enlarged inner rows of maxillary and mandibular teeth; in two longitudinal series, relatively close-set anteriorly, diverging near middle of vomerine tooth rows and then converging near end of tooth rows; total of 27 or 28 teeth in each longitudinal row.

Color of body tan above and distinctly lighter ventrally; ventral light area strongly demarcated from darker dorsum of the snout, starting in front of unpigmented anterior nostril, continuing back above posterior nostril to margin of eye (Fig. 2); posterior to eye, dorsal edge of ventral light area becomes more irregular, but extends back to a distinctly darker, saddle-shaped pigment patch dorsal to gill opening (Fig. 1A); ventral light area then tapers to base of anal fin slightly behind anus, but continues along base of anal fin for approximately 2/3 of body length; anal fin remains unpigmented to near tip of tail.

**Etymology.** The name is derived from the Latin *sagma*, saddle and *collaris*, necked, in reference to the distinctive dark pigment patch of the nape of the neck.

**Distribution.** Known only from the holotype taken off northern Western Australia, between Ashmore Reef and Cartier Island; presumably more widespread in the eastern Indian Ocean and Timor Sea.

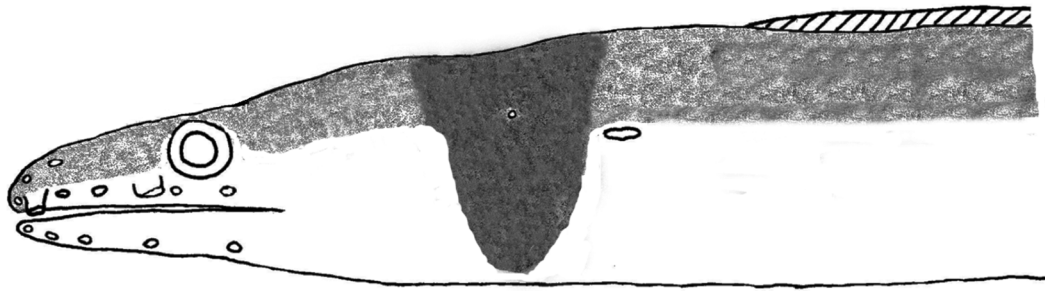


FIGURE 2. Head of holotype of *Chloopsis sagmacollaris*, NMV A 29730-023.

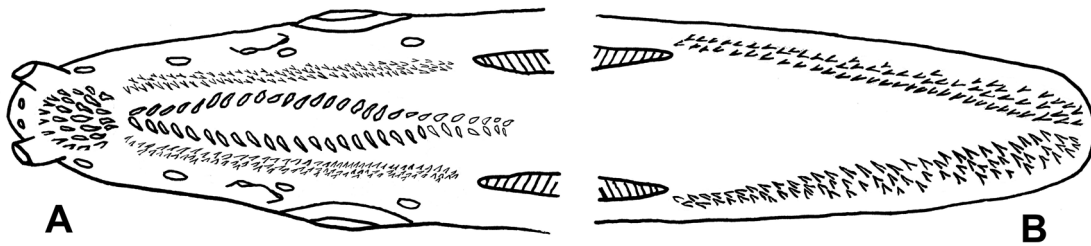


FIGURE 3. Upper (A) and lower (B) jaws of holotype of *Chloopsis sagmacollaris*, NMV A 29730-023.

**Remarks.** *Chloopsis sagmacollaris* has the bicolor pigmentation that is typical of many of the species of *Chloopsis*. However, it varies from the rest of these species in the following three critical ways. First, *C. sagmacollaris* has a distinctive, darker pigment patch on the nape of the neck. Second, the overall coloration of *C. sagmacollaris* is much lighter than the other species with the dorsal pigmentation being light brown to tan rather than the dark brown to grayish brown that is typical of other bicolor species of *Chloopsis*. Third, the ventral tip of the tail of *C. sagmacollaris* is relatively unpigmented rather than dark brown to black found in the other bicolor species of *Chloopsis*.

***Chloopsis nanhaiensis* Tighe, Ho, Pogonoski & Hibino, sp. nov.**

Figs. 4, 5, 6, 7

**Holotype:** USNM 408189 (228 mm total length); Dong-gang fish market, Pingtung, Taiwan, collected by D. G. Smith, Nov 2009.

**Paratype:** NMMB-P 22369 (270+ mm total length); Dong-gang fish market, Pingtung, Taiwan, collected by H. Ho, 26 Apr 2015.

**Diagnosis.** Distinguished from all other members of the genus *Chloopsis* by the combination of the following characters: pigmentation bicolored, dorsal origin approximately one eye-diameter behind gill opening, and low vertebral number (120 and 118+ in only known specimens).

**Description.** Total vertebrae 120 (118+, incomplete, tail regenerated), predorsal vertebrae 12 (11), preanal vertebrae 35 (33), precaudal vertebrae 54 (52), dorsal rays 353 (incomplete), anal rays 316 (incomplete), dorsal rays anterior to anal-fin origin 67 (78). Proportions as percent of total length: predorsal length 14.5 (incomplete), preanal length 33.8 (incomplete), head length 12.3 (incomplete), depth at anus 3.3 (incomplete). Proportions as percent of head length: eye diameter 10.7 (9.1), interorbital width 16.1 (15.2), snout length 16.8 (20.6), tip of snout to rictus 32.1 (30.6), tip of lower jaw to rictus 28.6 (27.9).

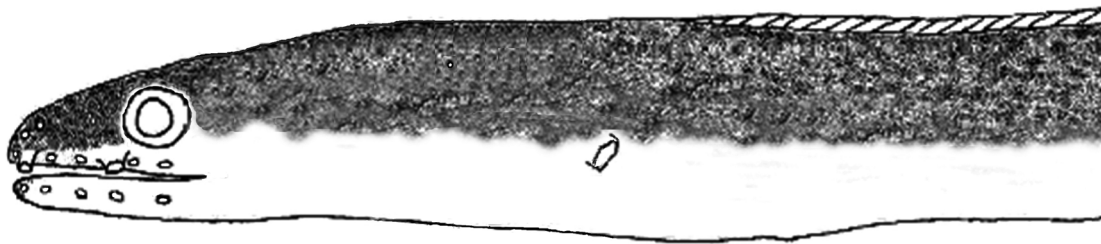
Body moderately elongate, slightly compressed, body depth nearly constant, gradually tapering over last 20% of total length to tip of tail (Fig. 4). Dorsal-fin origin slightly more than one eye diameter posterior to gill opening (Fig. 5). Head moderate in length, relatively deep. Snout relatively broad. Gape short, rictus at posterior margin of eye. Anterior nostril tubular, slightly behind tip of snout, directed anterolaterally. Posterior nostril a posteroventrally directed low tubular opening (covered by a flap) on lip in front of eye.





**FIGURE 4.** Holotype of *Chlopsis nanhaiensis*, USNM 408189, 228 mm TL; Dong-gang fish market, Pingtung, Taiwan.

Lateral line on body absent except for one pore in branchial region, dorsal and anterior to gill opening (Fig. 5). Supraorbital pores three: first (ethmoidal) at anteroventral tip of snout, second anteromedial to base of anterior nostril, and last above and slightly behind anterior nostril. Infraorbital pores four: first just behind anterior nostril, second midway between anterior and posterior nostrils, third just behind and slightly below posterior nostril, and last below middle of eye. Preoperculomandibular pores five, first near tip of lower jaw and last just behind middle of eye, anterior to rictus.



**FIGURE 5.** Head of holotype of *Chlopsis nanhaiensis*, USNM 408189.

Maxillary teeth (Fig. 6) conical, slightly recurved, in 2 irregular rows, increasing in size from outer to inner, a total of 22 teeth in inner row. Mandibular teeth like those of maxilla, in 2 rows with 21–22 teeth in the slightly enlarged, inner row; 8–9 of the anterior teeth enlarged compared to the rest of the mandibular teeth posteriorly. Intermaxillary teeth conical, slightly recurved, with approximately 18 teeth in patch; 9 small teeth around outside of patch and 9 enlarged teeth arranged in 3 rows of 3 teeth arranged longitudinally in center of intermaxillary tooth

patch. Vomerine dentition shorter and stouter, slightly compressed, in two longitudinal series of 12–14 teeth anteriorly and reduced to a single median row of 5 teeth posteriorly. Description of teeth based on holotype, but dentition of paratype very similar.

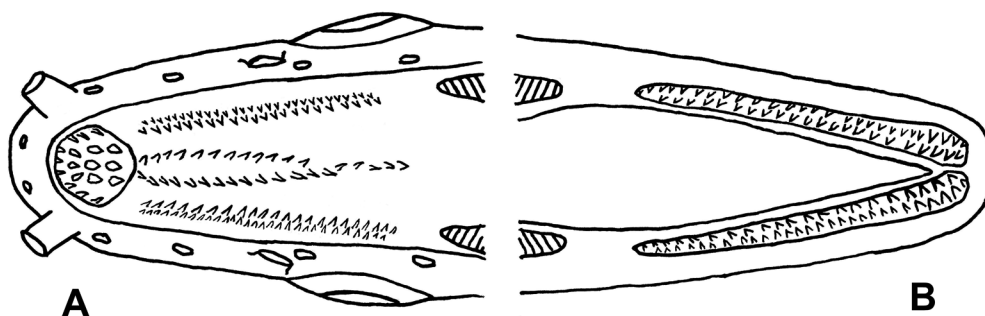


FIGURE 6. Upper (A) and lower (B) jaws of holotype of *Chlopsis nanhaiensis*, USNM 408189.

Color of body dark grayish brown above and distinctly lighter ventrally; ventral light area starts on snout, in front of unpigmented anterior nostril and continuing back above posterior nostril to anterior margin of eye; tip of lower jaw also pigmented (Fig. 5); posterior to eye, dorsal edge of ventral light area becomes more irregular, but extends dorsally to gill opening; ventral light area then tapers to base of anal fin slightly behind anus, but continues along base of anal fin for approximately 2/3 of body length; anal fin remains unpigmented to near tip of tail; ventral base of caudal fin and posterior portion of anal fin base much darker than rest of body.

**Etymology.** The name *nanhaiensis* is from Nan Hai, the Chinese name for the South China Sea where the holotype apparently was captured by commercial fishermen, and the Latin adjective *ensis*, meaning “originating in.”



FIGURE 7. Paratype of *Chlopsis nanhaiensis*, NMMB-P 22369, 270+ mm TL; Dong-gang fish market, Pingtung, Taiwan.



**Distribution.** Known from the holotype and paratype (Fig. 7) collected by fishermen off the southwest coast of Taiwan; presumably more widespread in the South China Sea.

*Chlopsis nanhaiensis* is similar in overall appearance to several other members of the genus *Chlopsis*. *Chlopsis apterus*, *C. bicollaris* and *C. kazuko*, all from the eastern Pacific Ocean, are all also bicolored, as is *C. bicolor* from the Atlantic Ocean, *C. bidentatus* from the southwestern Pacific Ocean, and *C. orientalis* (described herein). The posterior origin of the dorsal fin (at least one eye diameter behind the gill opening) separates *C. nanhaiensis* from *C. bicollaris* and *C. kazuko*. *Chlopsis apterus*, *C. bicolor*, *C. bidentatus* and *C. orientalis*, which also have the dorsal origin behind the gill opening, have more vertebrae (120 in *C. nanhaiensis* versus 134–140 in *C. apterus*, 127–134 in *C. bicolor*, 125–128 in *C. bidentatus* and 135 in *C. orientalis*). All other species in the genus *Chlopsis* can be distinguished from *C. nanhaiensis* by coloration. *Chlopsis sagmacollaris* also has bicolor pigmentation, but is much lighter in overall coloration and has the distinctive, darker pigment patch on the nape of the neck. *Chlopsis olokun*, from the eastern Atlantic, is a fairly uniform tan or gray color, while *C. dentatus* (from the Atlantic and Indian Oceans) and *C. slusserorum* (from the southwestern Pacific) have banded, blotched or mottled coloration.

***Chlopsis orientalis* Tighe, Hibino & Nguyen, sp. nov.**

Figs. 8, 9, 10, 11, 12

**Holotype.** IMER 16495 (269 mm total length, male), Cua Be trawl fish landing port, Nha Trang, Vietnam, South China Sea, collected by Q. V. Nguyen, 23 April 2014.

**Diagnosis.** A species of the genus *Chlopsis* with the following combination of characters: head length short (ca. 10 % of total length), predorsal vertebrae 11, preanal 35, and total 135; body bicolored with no white stripes on head; intermuscular bones very stout.

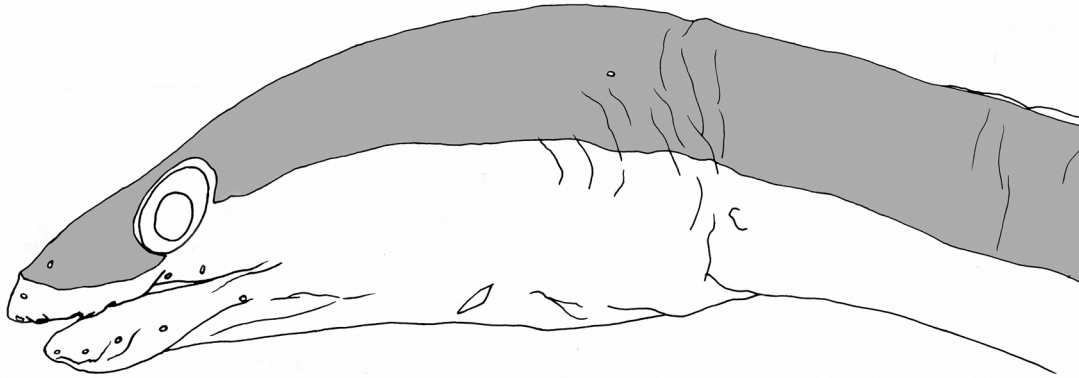
**Description.** Total vertebrae 135, predorsal vertebrae 11, preanal vertebrae 35, precaudal vertebrae 49, dorsal rays 432, anal rays 436, dorsal rays anterior to anal-fin origin 88. Proportions as percent of total length: predorsal length 12.4, preanal length 29.0, head length 9.9, body depth at gill opening 3.2, body depth at anus 3.5. Proportions as percent of head length: eye diameter 13.6, interorbital width 15.1, snout length 24.5, tip of snout to rictus 34.0, tip of lower jaw to rictus 30.6.



**FIGURE 8.** Holotype of *Chlopsis orientalis*, IMER 16495, 269 mm TL; Nha Trang fish market, Vietnam.

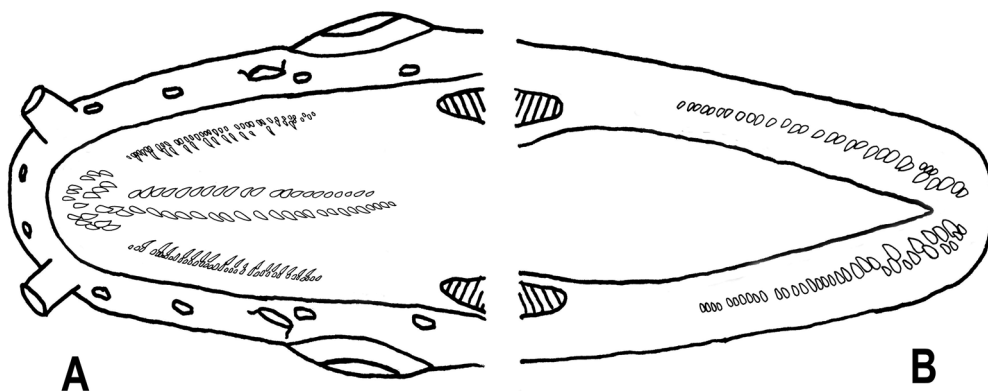
Body elongate, relatively stout; trunk cylindrical, and tail compressed strongly, depth almost constant, distinctly tapering in last 10% of total length to tip of tail (Fig.8). Dorsal-fin origin well behind gill opening,

horizontal distance from a vertical through posterior margin of gill opening to origin almost equal to snout length. Head relatively small; dorsal profile of head convex at a level of middle of eye; interorbital region convex with mid-dorsal groove. Snout moderate in length, broad. Gape short, rictus of mouth reaching to posterior margin of eye. Anterior nostril tubular, slightly behind tip of snout, directed anterolaterally. Posterior nostril oblong, a posteroventrally directed low tubular opening (completely concealed by a thick dermal flap) on lip in front of eye. Eyes large, elliptic and slightly oblique.



**FIGURE 9.** Head of holotype of *Chlopsis orientalis*, IMER 16495.

Lateral line on body absent except for one pore in branchial region, anterior to gill opening (Fig. 9). Supraorbital pores three: first (ethmoidal) at anteroventral tip of snout, second anteromedial to base of anterior nostril, and last above and behind anterior nostril. Infraorbital pores four: first just posterior to anterior nostril, second midway between anterior and posterior nostrils, third just behind posterior nostril, and last below posterior edge of eye. Preoperculomandibular pores five, first near tip of lower jaw and last just before posterior edge of eye, anterior to rictus.



**FIGURE 10.** Upper (A) and lower (B) jaws of holotype of *Chlopsis orientalis*, IMER 16495.

Maxillary teeth (Fig. 10) slender, and recurved posteriorly, arranged in two rows; inner row larger than outer, ca. 18 in inner row and ca. 35 in outer. Mandibular teeth conical and broad, arranged in two irregular rows anteriorly and a single row posteriorly, ca. 32–37 teeth total on each side of jaw; anterior and inner teeth slightly enlarged. Intermaxillary teeth conical and broad, with ca. 18 arranged in scattered tooth patch with 1 additional tooth connecting to vomerine teeth. Vomerine teeth relatively large, in two longitudinal series of 21–22 teeth in each row, relatively close-set anteriorly, diverging slightly near middle of vomerine tooth rows and then converging near the end of tooth rows.

Color (fresh specimen) of body distinctly bicolored, dark grayish-brown dorsally and light cream ventrally, the border through about middle of body before anus, falling gradually toward tip of tail, and ending about half of head

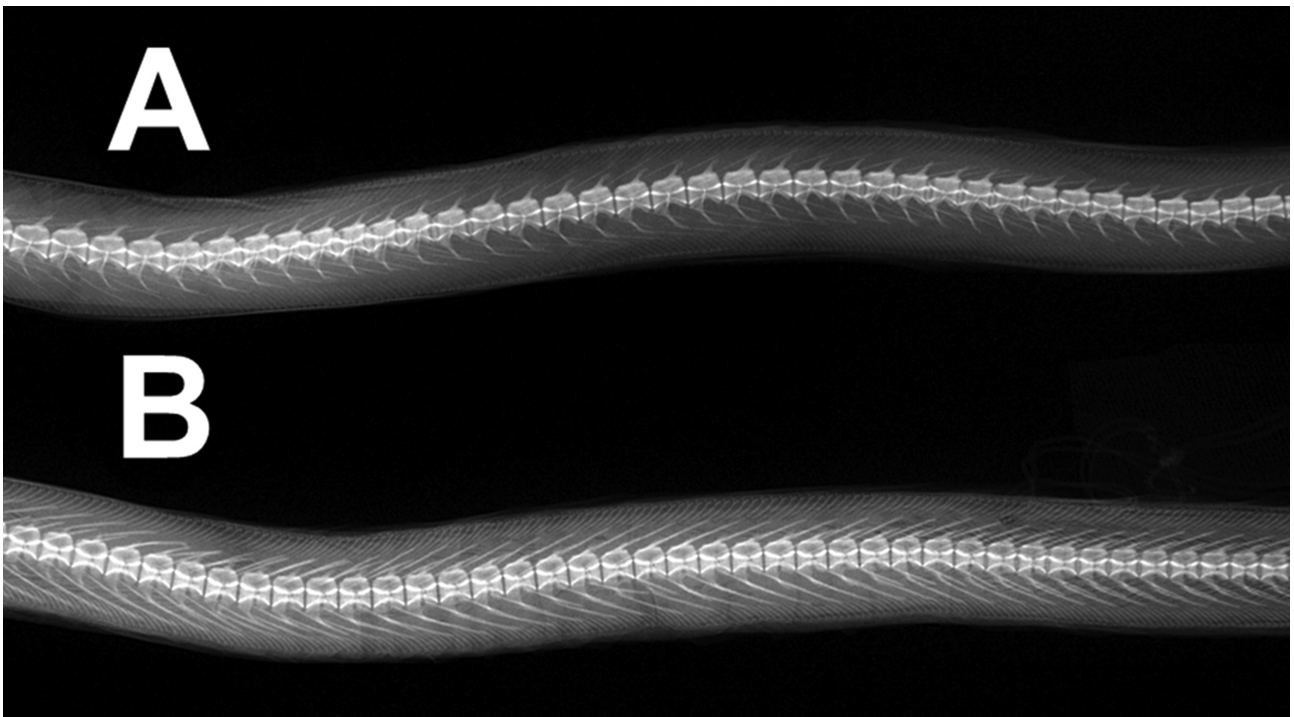


length before tip of tail. Dorsal and caudal fins dark grayish-brown, anal fin light cream mostly, dark brown in tip of tail.

**Etymology.** The name is derived from the Latin *orientalis*, “of the east” and refers to the type locality in the Far East.



**FIGURE 11.** Comparison of anterior pigmentation of two species of *Chloopsis*. A. *Chloopsis bicolor*, IIPB 105/2006. B. *Chloopsis orientalis*, IMER 16495.



**FIGURE 12.** Comparison of mid-body vertebral column and intermuscular bones of two species of *Chloopsis*. A. *Chloopsis bicolor*, IIPB 105/2006. B. *Chloopsis orientalis*, IMER 16495.

**Distribution.** Known only from the holotype collected by fishermen apparently working in the Thuy Trieu coastal lagoon near Nha Trang, Vietnam; presumably more widespread along the coast of Vietnam.

**Remarks.** *Chlopsis orientalis* is similar in overall appearance to several other members of the genus *Chlopsis* that are bicolored including the following five species: *Chlopsis apterus* (Beebe & Tee-Van, 1938); *Chlopsis bicollaris* (Myers & Wade, 1941); *Chlopsis bicolor* Rafinesque, 1810; *Chlopsis bidentatus* McCosker & Tighe 2003; *Chlopsis kazuko* Lavenberg 1988; *Chlopsis nanhaiensis* (described herein). *Chlopsis orientalis* differs from *C. bidentatus* in having two rows of teeth on the vomer (vs. four rows anteriorly) and 135 total vertebrae (vs. 125–128). *Chlopsis orientalis* can be distinguished from *C. apterus*, *C. bicollaris*, and *C. kazuko* by its shorter head (ca. 10 % TL vs. 11–16 %), from *C. apterus* and *C. bicollaris* by its fewer preanal vertebrae (35 vs. 39–43), from *C. bicollaris* and *C. kazuko* by the position of the dorsal-fin origin (distinctly behind a vertical through posterior margin of the gill opening vs. before or slightly behind), and from *C. apterus* and *C. bicollaris* by the presence of white stripes on the head (no white stripes on the head vs. white stripes on the snout or dorsal side of the gill basket). *Chlopsis orientalis* can be distinguished from *C. sagmacollaris* by the distinct coloration of the latter species (lightly bicolored with darker patch on nape) and lower vertebral number (135 vs. 142). *Chlopsis orientalis* is most similar to *C. bicolor* in body coloration, meristics and morphometrics, but can be distinguished from the latter species by several characters. First, although similar in coloration pattern, the distinction between dorsal and ventral pigmentation is greater in *C. bicolor* with the dorsal being dark brown and the ventral very white while *C. orientalis* is dark grayish brown with a light cream colored ventral (Fig. 11). Also, *C. orientalis* has fewer preanal vertebrae than *C. bicolor* (35 vs. 39–42). Third, there is a distinct difference in the size of the intermuscular bones in *C. orientalis*. Figure 12 shows a comparison of the trunk vertebrae of *C. bicolor* and *C. orientalis*. As can be seen, the intermuscular bones of *C. bicolor* are thin and needle-like while those of *C. orientalis* are much heavier and stouter. Other species in the genus *Chlopsis* can be distinguished from *C. orientalis* by coloration. *Chlopsis olokun*, from the eastern Atlantic, is a fairly uniform tan or gray color, while *C. dentatus* (from the Atlantic and Indian Oceans) and *C. slusserorum* (from the southwestern Pacific) have banded, blotched or mottled coloration.

## Discussion

With the description of these three species, the geographical range of the genus *Chlopsis* has been extended to nearly world-wide. *Chlopsis bicolor*, the first species in the genus, was described from the Mediterranean Sea (Rafinesque 1810), and later reported from the western North Atlantic by Robins & Robins (1967) and from the South Atlantic off Brazil by Menezes & Benvegnú (1976). *Chlopsis dentatus*, the second species in the genus, was described from a specimen taken off Barbados by Seale (1917) and has since been reported throughout the tropical western North Atlantic (Smith 1989) and from the western Indian Ocean (Böhlke and Smith 1968). *Chlopsis olokun*, the third species known from the Atlantic, was described from the Gulf of Guinea by Robins & Robins (1966), and has since been reported from several localities off West Africa from Senegal to Angola (Blache 1972, Tweedle & Anderson 2008). There are three species from the eastern Pacific Ocean. *Chlopsis bicollaris*, endemic to the Galapagos Islands, was described by Myers & Wade (1941). *Chlopsis apterus*, found along the Pacific coast of Central and South America from Mexico to Colombia, was described by Beebe & Tee-Van (1938). *Chlopsis kazuko*, apparently endemic to the Gulf of California, was described by Lavenberg (1988). Two species known from the southwestern Pacific, *Chlopsis bidentatus* and *Chlopsis slusserorum*, were described by Tighe & McCosker (2003). No doubt other undescribed species of the rare and cryptic genus remain to be discovered with further sampling of relatively unexplored regions of the world's oceans.

## Acknowledgments

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## References

- Beebe, W. & Tee-Van, J. (1938) Eastern Pacific expeditions of the New York Zoological Society, XV. Seven new marine fishes from Lower California. *Zoologica: Scientific Contributions of the New York Zoological Society*, 23, 299–312.
- Blache, J. (1972) Larves leptocéphales des poissons Anguilliformes dans le Golfe de Guinée (zone sud). 2e note: Les espèces adultes de Xenocongridae et leurs larves. *Cahiers ORSTOM Série Océanographie*, 10 (3), 219–241.
- Böhlke, E.B. (1982) Vertebral formulae for type specimens of eels (Pisces: Anguilliformes). *Proceedings of the Academy of Natural Sciences, Philadelphia*, 134, 31–49.
- Böhlke, E.B. (1989) Methods and terminology. In: Böhlke, E.B. (Ed.), Fishes of the Western North Atlantic. *Memoir of the Sears Foundation for Marine Research*, No. 1 (Part 9), pp. 1–7.
- Böhlke, J.E. & Smith, D.G. (1968) A new xenocongrid eel from the Bahamas, with notes on other species in the family. *Proceedings of the Academy of Natural Sciences, Philadelphia*, 120 (2), 25–43.
- Eschmeyer, W.N. (2014) Catalog of Fishes. Electronic version. Available from: <http://researcharchive.calacademy.org/research/Ichthyology/catalog/fishcatmain.asp> (accessed 27 May 2014)
- Garman, S. (1899) Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands ... by the U. S. Fish Commission steamer "Albatross," during 1891 ... No. XXVI. The Fishes. *Memoirs of the Museum of Comparative Zoology*, 24, 1–431.
- Lavenberg, R.J. (1988) Chlopsid eels of the eastern Pacific with a new species and descriptions of larval forms. *Bulletin of Marine Science*, 42, 253–264.
- Menezes, N.A. & Benvegnú, D. de Q. (1976) New records of marine fishes from the western south Atlantic. *Papéis Avulsos de Zoologia (Sao Paulo)*, 29 (27), 269–280.
- Myers, G.S. & Wade, C.B. (1941) Four new genera and ten new species of eels from the Pacific coast of tropical America. *Allan Hancock Pacific Expeditions*, 9 (4), 65–111.
- Rafinesque, C.S. (1810) *Indice d'ittiologia siciliana; ossia, catalogo metodico dei nomi latini, italiani, e siciliani dei pesci, che si rimengono in Sicilia disposti secondo un metodo naturale e seguito da un appendice che contiene la descrizione de alcuni nuovi pesci siciliani*. G. del Nobolo, Messina, 70 pp.
- Robins, C.R. & Robins, C.H. (1966) *Xenoconger olokun*, a new xenocongrid eel from the Gulf of Guinea. *Studies in Tropical Oceanography, Miami*, 4 (1), 117–124.
- Robins, C.H. & Robins, C.R. (1967) The xenocongrid eel *Chlopsis bicolor* in the western North Atlantic. *Bulletin of Marine Science*, 17 (1), 232–248.
- Saruwatari, T., López, J.A. & Pietsch, T.W. (1997) Cyanine Blue: A versatile and harmless stain for specimen observation. *Copeia*, 1997 (4), 840–841.  
<http://dx.doi.org/10.2307/1447302>
- Seale, A. (1917) New species of apodal fishes. *Bulletin of the Museum of Comparative Zoology*, 61 (4), 79–94.
- Smith, D.G. (1989) Family Chlopsidae. In: Böhlke, E.B., (Ed.), Fishes of the Western North Atlantic. *Memoir of the Sears Foundation for Marine Research*, No. 1 (Part 9), pp. 72–97.
- Smith, D.G. (1999) Family Chlopsidae. In: Carpenter, K.E. & Niem, V.H. (Eds.), *FAO species identification guide for fisheries purposes. The living marine resources of the western central Pacific. Batoid fishes, chimeras and bony fishes part 1 (Elopidae to Linophrynidae)*. FAO, Rome, pp. 1639–1640.
- Tighe, K.A. (2000) Family Chlopsidae. In: Randall, J.E. & Lim, K.K.P. (Eds.), A checklist of the fishes of the South China Sea. *Raffles Bulletin of Zoology Supplement*, 8, pp. 584.
- Tighe, K.A. & McCosker, J.E. (2003) Two new species of the genus *Chlopsis* (Teleostei: Anguilliformes: Chlopsidae) from the southwestern Pacific. *Zootaxa*, 236, 1–8.
- Tweedle, D. & Anderson, M.E. (2008) A collection of marine fishes from Angola, with notes on new distribution records. *Smithiana Bulletin*, 8, 3–24.