Callionymus aagilis Fricke, redescription and new record from Mauritius (Teleostei: Callionymidae)

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Abstract

The rare dragonet *Callionymus aagilis* Fricke, 1999, is redescribed on the basis of a female specimen from Mauritius, Mascarene Islands. Female characters, sexual dimorphism, and habitat of the species are described and discussed. *Callionymus aagilis* is compared with related species. A key to callionymid fish species of the western Indian Ocean and the Red Sea is presented.

Keywords: Fishes, Dragonets, Callionymidae, Mascarene Islands, Mauritius, new record, redescription, identification key.

Zusammenfassung

Die seltene Leierfischart *Callionymus aagilis* Fricke, 1999 wird auf der Grundlage eines weiblichen Exemplars von den Maskarenen (Mauritius) wieder beschrieben. Insbesondere werden weibliche Merkmale, Sexualdimorphismus und das Habitat der Art beschrieben und diskutiert. *Callionymus aagilis* wird mit verwandten Arten verglichen. Ein Bestimmungsschlüssel der Callionymidae des westlichen Indischen Ozeans und des Roten Meeres wird aufgestellt.

Contents

1 Introduction

Dragonets of the family Callionymidae are a group of benthic living fishes occurring in the upper 900 metres of all temperate, subtropical and tropical oceans of the world, and a few species found in estuarine and freshwater habitats. The Indo-Pacific species were revised by Fricke (1983a), who distinguished 126 valid species from the area, including three species from the Mascarenes. Fricke (2002), in a checklist of the callionymid fishes of the world, listed a total of 182 valid species in 10 genera. Subsequently, three additional species (*Callionymus kanakorum* and *Protogrammus antipodum* from New Caledonia, *Tonlesapia tsukawakii* from Cambodia) were described by Fricke (2006) and Motomura & Mukai (2006), and *Eleutherochir mccaddeni* Fowler, 1941 was removed from the synonymy of *E. opercularis* by Yoshigou et al. (2006), bringing the worldwide total to 186 species in the family.

Fricke (1999) provided a checklist of Mascarene fishes. He distinguished a total of four callionymid fish species, and described *Callionymus aagilis* Fricke, 1999, on the basis of a single male specimen from La Réunion.

A second specimen of this extremely rare species was recently discovered in the collection of the BMNH. It turned out to be the first female recorded, and the first record of the species from Mauritius. The species is redescribed in the present paper.

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2 Methods and Materials

Methods follow Fricke (1983a); fin-ray counts follow Fricke (1983b). The starting point for length measurements is the mid of the upper lip. The predorsal (1) length is measured from the mid of the upper lip to the base of the first spine of the first dorsal fin; the predorsal (2) length correspondingly to the base of the first ray of the second dorsal fin. The last ray of the second dorsal and anal fins is always divided at its base; counts in the key include this divided ray as one. Data for the holotype are given first, followed by data for the second specimen, in parentheses.

Species are classified based on Fricke (2002). In an alternative classification by Nakabo (1982), *Callionymus aagilis* would be a member of the genus *Calliurichthys*.

Materials used for this paper are deposited in The Natural History Museum, London (BMNH), and in the Muséum National d'Histoire Naturelle, Paris (MNHN).

3 Taxonomy

Callionymus aagilis Fricke, 1999
(Figs. 1–2)

Callionymus persicus (non Regan, 1908): Fricke 1983a: 417 (Réunion).
Callionymus aagilis Fricke, 1999: Fricke 1999: 491–493, fig. 9 (Réunion; holotype: MNHN 1966-0833). Fricke 2002: 10 (Réunion).
Callionymus angilis: Letourneur et al. 2004: 214 (Réunion; in checklist; spelling error).

Holotype. La Réunion: MNHN 1966-0833, 1 male, 106.6 mm SL, coll. P. Guézé.

Other material. Mauritius: BMNH 2002.6.30.1302, 1 female, 12.5 mm SL, west coast, Baie de la Petite Rivière, 20°12'30"S 57°23'20"E, sand adjacent to coral heads and rocks, 30 m depth, P.C. Heemstra et al., St. PCH 95-M36, 26 May 1995.

Diagnosis

A *Callionymus* of the *Callionymus persicus*-group with 9 rays in the second dorsal fin, 8 rays in the anal fin, a strong antrorse spine at the base and 3–6 small antrorse serrae on the dorsal margin of the preopercular spine, the middle 4 rays of the caudal fin extremely elongate in the male, caudal fin only slightly elongate in the female, the male's throat with a black blotch surrounded by wavy lines which reach onto the membrane connecting the fifth ray of the pelvic fin with the pectoral fin base, throat in the female with several dusky pigment spots, the first dorsal fin grey, with narrow pale lines in the male, plain blackish in the female, first spine in the male with a long filament, in the female without elongate filaments.

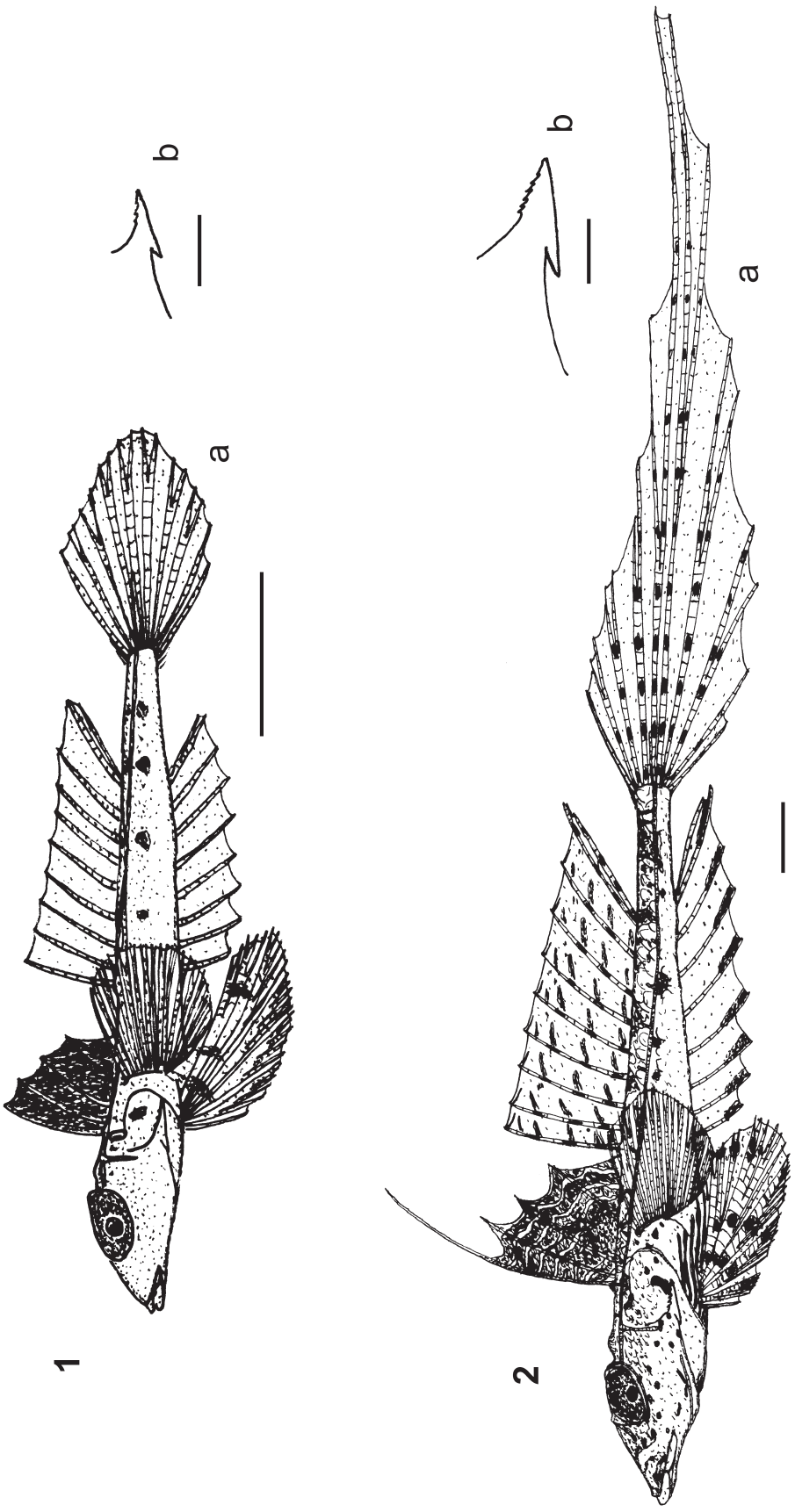
Redescription

D IV + viii,1; A vii,1; P_1 ii,16,iii (total 21) (ii,15,iii, total 20); P_2 I,5; C (iii),i,7,ii,(iii) [(ii),i,7,ii,(ii)].

Body elongate and slightly depressed. Head slightly depressed, triangular when seen from above, 3.8 (3.2) in SL. Eye 2.9 (2.6) in head. Preorbital length in male 2.4 in head, in female 3.8 in head. Interorbital distance 23.4 (11.0) in head. Upper jaw length 2.6 (2.4) in head. Preopercular spine with straight main tip, straight, smooth ventral margin, strong antrorse spine at base, and 5–6 (3–4) small antrorse serrae on dorsal margin, no points on ventral margin or base, formula 1 $\frac{5–6}{}$ 1 (1 $\frac{3–4}{}$ 1). Cephalic lateral-line system with preorbital branch, suborbital branch, short preopercular branch, separate mandibular branch, and supraoccipital commissure connecting lines of opposite sides. Occipital region with two strong bony protuberances, and one small protuberance posteriorly in between. Body depth 10.2 (9.6) in SL. Body width 5.8 (5.2) in SL. Body lateral-line system with 6–10 short dorsal branches, and two commissures dorsally on caudal peduncle connecting lateral lines of opposite sides; lateral line reaching onto caudal peduncle a short way along the fourth branched ray for about a quarter of its length. Urogenital papilla length 14 in head in male holotype (not visible in female). Caudal peduncle length 6.2 (5.9) in SL. Caudal peduncle depth 21 (31) in SL.

First dorsal fin relatively high in male, only first spine in male with long filament; length of first spine in male 2.2 in SL, second spine 4.7 in SL, third spine 5.9 in SL, fourth spine 7.9 in SL. First dorsal fin lower in female, without filaments; first spine in female 5.9 in SL, second spine 6.5 in SL, third spine 7.0 in SL, fourth spine 9.0 in SL. Predorsal (1) length 3.3 (3.7) in SL. Second dorsal fin distally straight, last ray slightly elongate in male. First ray of second dorsal fin in male 6.1 in SL, fifth ray 6.3 in SL, last ray 5.2 in SL; first ray in female 7.4 in SL, fifth ray 7.8 in SL, last ray 7.8 in SL. Predorsal (2) length 2.0 (2.1) in SL. Anal fin beginning on vertical through first membrane of second dorsal fin. Anal fin rays unbranched, last divided at base. First ray of anal fin 12.1 (13.9) in SL, fifth ray 7.6 (9.5), last ray 6.0 (7.8) in SL. Preanal fin length 1.9 (1.9) in SL. Pectoral fin reaching to base of third anal fin ray when adpressed, pectoral fin length 5.6 (4.0) in SL. Prepectoral fin length 2.5 (2.9) in SL. Pelvic fin reaching to base of second (third) anal fin ray when adpressed; pelvic fin spine 19.4 (9.5) in SL, pelvic fin length 3.6 (3.0) in SL. Membrane connecting fifth pelvic fin ray with pectoral fin base ending opposite ninth pectoral fin ray (counted from above). Prepelvic fin length 3.6 (3.9) in SL. Caudal fin in male with median four rays distally extremely elongate, only slightly elongate in female; caudal fin length in male 0.9 in SL, in female 3.0 in SL.

Colour in alcohol. Head and body light brown, ventrally white; dorsal half dark brown, sides of head in the male with small dark grey blotches. Snout in the male dorsolaterally with a curved whitish band. Eye dark grey. Opercle with a dark brown blotch above the preopercular spine. Throat of male with a large triangular black blotch surrounded by wavy white lines, in female with few dark pigment spots. Sides of body with a row of dark brown blotches below the lateral line. Back with a number of indistinct dark brown saddles corresponding with the lateral blotches, and numerous small whitish and brownish blotches (colouration less distinct in female than in male). First dorsal fin in the male dark grey with several narrow, wavy white lines. Tip of third spine with a small black blotch. Filament of first spine yellowish. First dorsal fin plain black in female. Second dorsal fin translucent, in male with small oblique blackish streak near the distal tip of each ray; each ray also with 3–4 brown spots, followed by a brownish grey oblique streak. Anal fin translucent, tip of each ray dark grey in male. Caudal fin pale, anterior three-fourths in male with 11 median, vertical dark brown lines formed by dark brown spots on the fin rays. Pelvic fin whitish, with three rows of dark brown blotches. Pectoral fin whitish.



Figs. 1–2. *Callionymus aagilis*, lateral view (a), left preopercular spine (b). – **1**. BMNH 2002.6.30.1302, female, 12.5 mm SL. **2**. MNHN 1966-0833, male, holotype, 106.6 mm SL, La Réunion (from FRICKE 1999: fig. 9). – Scales: 10 mm (2a), 3 mm (1a, 2b), 1 mm (1b).

Sexual dimorphism. The male differs from the female in having a higher first dorsal fin with the first spine filamentous (without filaments in the female), a slightly higher second dorsal fin, a much longer caudal fin, and a dark blotch surrounded by wavy lines on the throat.

Distribution

The male holotype was known from La Réunion, Mascarene Islands, western Indian Ocean; the female specimen was recently collected at Mauritius, also Mascarene Islands. This is a new record for Mauritius. The species is probably endemic to the western Mascarenes.

Habitat

The Mauritius specimen was collected with rotenone on a sand bottom adjacent to rocks and coral heads, at a depth of 30 m. Larger specimens of the species may occur deeper.

The habitat of the La Réunion holotype is not known. However, deeper sand bottoms only occur off northwestern La Réunion in Le Port area, so it can be assumed that the fish was collected there.

In general, this species is expected to occur on soft bottoms on the upper insular slope of the western Mascarenes. As this habitat is very scarce, and as *Callionymus aagilis* is expected to have a patchy distribution pattern like most of its congeners, with a group of fishes (harem system) living in a home range of a few square metres while the remaining sand bottom is uninhabited, this species is expected to be very rare. Rarity, however, is frequently observed in tropical marine fish species, and is only partly due to low collecting effort in appropriate habitats. It may be a strategy used to reduce or avoid parasite infections, as parasite species usually specialise on common species as hosts.

Affinities

The new specimen of *Callionymus aagilis* (BMNH 2002.6.30.1302) shows typical female characters including a low first dorsal fin without filaments, the urogenital papilla lacking, and a short caudal fin. It agrees with the male specimen of *C. aagilis* in the shape of the preopercular spine and the body colouration (including a series of black blotches along the sides of the body). Both the male and the female specimens of that species share typical characters of the genus *Callionymus* [unnamed subgenus 6 of Fricke (2002), former *Callionymus persicus* species-group; a detailed paper on the classification of callionymid fishes is in preparation by the author], according to Fricke (2002: 100–101). Subgenus 6 is characterised by a combination of 9 rays in the second dorsal fin, 8 rays in the anal fin, very small antrorse serrae dorsally on the preopercular spine, and only the median caudal fin rays elongate in the male, while the caudal fin is only slightly elongate in the female. Other species of this group are *Callionymus izuensis* Fricke & Zaiser Brownell, 1993 (Fricke & Zaiser Brownell 1993: 4–7, fig. 2; Miyake-jima, Japan), *Callionymus luridus* Fricke, 1981 (Fricke 1981: 390–393, figs. 2–3; Macclesfield Bank, South China Sea), *Callionymus neptunius* (Seale, 1910) (Seale 1910: 539–540; Balayan Bay, Philippines, *Calliurichthys neptunia*), *Callionymus persicus* Regan, 1905 (Regan 1905: 325–326, pl. 3, fig. 1; Persian Gulf; Mekran coast/Iran; Muscat/Oman), *Callionymus sereti* Fricke, 1998 (Fricke 1998: 6–9, fig. 2; Futuna Island Shelf, Wallis and Futuna), *Callionymus superbus* Fricke, 1983 (Fricke 1983a: 442–448, fig. 131; Indonesia), *Callionymus tethys* Fricke, 1993 (Fricke 1993: 369–371, fig. 2; SSE of Nouméa, Grande Terre, New Caledonia), and *Callionymus zythros* Fricke, 2000 (Fricke 2000: 62–66, fig. 30; Papua New Guinea, Madang).

Callionymus aagilis is distinguished from other species of subgenus 6 by several characters:

– first dorsal fin of the male grey, with few oblique wavy white lines (*C. izuensis* light, with many narrow angular black streak and an elongate black spot distally on second membrane; *C. luridus* pale grey, with large white blotches and a large black blotch dorsally on the third spine; *C. neptunius* light, with irregular vertical dark lines and blotches; *C. persicus* dark brown, with many oblique whitish lines; *C. sereti* light, with a few narrow dusky streaks, and a dark spot distally on the third spine; *C. superbus* brown, distally with broad irregular whitish streaks; *C. tethys* male whitish, with numerous thin oblique dark stripes and a dark spot distally on second membrane; *C. zythros* pale, on first and second membranes of spinous dorsal fin with 8 narrow oblique brown lines, and on third and fourth membranes with irregular brown blotches and lines);

– only the first spine of the first dorsal fin of the male with a long filament (*C. izuensis* without filaments; *C. luridus* with a short filament on the first spine only; *C. neptunius* with long filaments on the first to third spines; C. persicus without filaments at all; *C. superbus* with long filaments on the first to third spines; *C. tethys* with the first to third spines filamentous, filaments on second and third spines longest; *C. zythros* without filaments at all);

– anal fin of the male translucent, with only the tip of each ray dark grey, without any markings in the female (*C. izuensis* with a broad distal blackish band in both sexes; *C. luridus* with a narrow distal dark streak; *C. neptunius* with a broad submarginal dark streak across the fin; *C. persicus* with a broad submarginal dark streak across the fin in both sexes; *C. superbus* with distal three-fourths black, only tips of fin rays white; *C. tethys* with a broad submarginal dark band in both sexes; *C. zythros* with distal half of fin brown, leaving tips of fin rays whitish);

– 3–6 antrorse serrae on the dorsal margin of the preo-

percular spine (*C. sereti* 6–8, *C. superbus* 8–10, and *C. tethys* 5–9).

A revised key to callionymid fish species of the Red Sea and western Indian Ocean is presented below to distinguish *Callionymus aagilis* from potentially co-occurring species.

4 Key to species of Callionymidae of the Red Sea and western Indian Ocean

1 Opercle with a free flap of skin. **2**
– Opercle without a free flap of skin. **7**
2 Body with lateral fold of skin below LL; lower lip without fleshy papillae; A rays unbranched. . . . . (*Diplogrammus*) **3**
– Body without lateral fold of skin below LL; dorsal margin of lower lip with a row of erect fleshy papillae; A rays branched. . . . . (*Draculo*) **6**
3 Second spine of first dorsal fin longer than first spine of second dorsal fin. **4**
– Second spine of first dorsal fin as long as or shorter than first spine of second dorsal fin. **5**
4 Body depth 12–13 % of standard length; pectoral fin rays 1. . . . . ***Diplogrammus gruveli*** Smith, 1963
– Body depth 17–18 % of standard length; pectoral fin rays 20. . . . . ***Diplogrammus pygmaeus*** Fricke, 1981
5 First spine of first dorsal fin with long filament in male; main tip of preopercular spine upcurved; anal fin without distal black margin. . ***Diplogrammus infulatus*** Smith, 1963
– First spine of first dorsal fin without filament in male; main tip of preopercular spine straight; anal fin with narrow distal black margin. . . . . ***Diplogrammus randalli*** Fricke, 1983
6 First dorsal fin with a single spine; second dorsal fin with 11 rays (the last divided at its base); anal fin with 12 branched rays (the last divided at its base). . . . . ***Draculo celetus*** (Smith, 1963)
– First dorsal fin with 4 spines; second dorsal fin with 9–10 rays (the last divided at its base); anal fin with 10 branched rays (the last divided at its base). . . . . ***Draculo maugei*** (Smith, 1966)
7 Lateral line with numerous long branches above and below; preopercular spine simple, without accessory spines. . . . . ***Paracallionymus costatus*** (Boulenger, 1898)
– Lateral line mostly unbranched; preopercular spine with one or more accessory spines. **8**
8 Snout shorter than eye diameter; soft D rays branched (in specimens longer than 3 cm); gill opening sublateral; no antrorse spine present at preopercular spine base. . . . . (*Synchiropus*) **9**
– Snout equal to, or longer than, eye diameter; soft D rays unbranched; gill opening dorsal; antrorse spine at base of preopercular spine. . . . . (*Callionymus*) **14**
9 Preopercular spine with 1 dorsal point additional to main tip. **10**
– Preopercular spine with 2–5 dorsal points additional to main tip. **11**
10 Caudal fin pale or with 1 distal dark bar; caudal fin length 33–40 % of standard length; second dorsal fin pale or with distal dark bar. . . . ***Synchiropus monacanthus*** Smith, 1935
– Caudal fin with 2 dark bars; caudal fin length 27–32 % of standard length; second dorsal fin spotted. . . . . ***Synchiropus stellatus*** Smith, 1963
11 Preopercular spine with 2 dorsal points additional to main tip. **12**
– Preopercular spine with 3–5 dorsal points additional to main tip. **13**
12 Main tip of preopercular spine straight; preopercular spine always without small antrorse spines at base; first dorsal fin dark, striped. . . . . ***Synchiropus marmoratus*** (Peters, 1855)
– Main tip of preopercular spine upcurved; preopercular spine usually with 1–2 small antrorse points at base; first dorsal fin light, with dark blotches. . . . . ***Synchiropus sechellensis*** Regan, 1908
13 Dorsal spines filamentous in male; lower pectoral fin base without black spots. . . . ***Synchiropus postulus*** Smith, 1963
– Dorsal spines not filamentous in male; lower pectoral fin base with black spot. . ***Synchiropus minutulus*** Fricke, 1981
14 Both dorsal and ventral margins of preopercular spine with antrorse spines or serrae. **15**
– Only dorsal margin of preopercular spine with curved points or antrorse serrae (1–2 antrorse spines may be present at base of preopercular spine). **17**
15 Snout densely covered with numerous spines. . . . . ***Callionymus spiniceps*** Regan, 1908
– Snout without spines (occasionally except for a small preorbital spine). **16**
16 Overeye tentacle present; lower margin of preopercular spine with 1–3 curved points additional to antrorse spine at base. . . . . ***Callionymus muscatensis*** Regan, 1905
– Overeye tentacle absent; lower margin of preopercular spine with 4–9 curved points additional to antrorse spine at base. . . . . ***Callionymus oxycephalus*** Fricke, 1980
17 Upper margin of preopercular spine with small antrorse serrae. **18**
– Upper margin of preopercular spine with large curved points (occasionally with one additional antrorse serra). **27**
18 Second dorsal fin with 8 rays (the last divided at its base). **19**
– Second dorsal fin with 9 rays (the last divided at its base). **22**
19 Anal fin with 7 rays (the last divided at base). **20**
– Anal fin with 8 rays (the last divided at base). **21**
20 Main tip of preopercular spine upcurved; dorsal margin of preopercular spine with 5–6 small antrorse serrae. . . . . ***Callionymus flavus*** Fricke, 1983
– Main tip of preopercular spine straight; dorsal margin of preopercular spine with 8–15 small antrorse serrae. . . . . ***Callionymus delicatulus*** Smith, 1963
21 First spine of first dorsal fin filamentous; anal fin distally black. . . . . ***Callionymus margaretae*** Regan, 1905
– First dorsal fin without filaments; anal fin pale. . . . . ***Callionymus tenuis*** Fricke, 1981
22 Anal fin with 9 rays (the last divided at its base); first spine of first dorsal fin in male separate from second spine. . . . . ***Callionymus filamentosus*** Valenciennes in Cuvier & Valenciennes, 1837
– Anal fin with 8 rays (the last divided at its base); first spine of first dorsal fin in male connected with second spine. . **23**
23 First spine of first dorsal fin with a long filament. **24**
– First spine of first dorsal fin without a filament. **26**
24 Lower margin of caudal fin pale. . . . . ***Callionymus aagilis*** Fricke, 1999
– Lower margin of caudal fin black. **25**
25 Third spine of first dorsal fin distally with black blotch; dorsal margin of preopercular spine with 6–12 small antrorse serrae. . . . ***Callionymus gardineri*** Regan, 1908, male
– Third spine of first dorsal fin without distal black blotch; dorsal margin of preopercular spine with 3–6 small antrorse serrae. . . . . ***Callionymus margaretae*** Regan, 1905
26 Anal fin with a distal black bar. . . . . ***Callionymus persicus*** Regan, 1905
– Anal fin pale. . . . . ***Callionymus gardineri*** Regan, 1908, female

27 First dorsal fin with 3 spines; jaws extremely protractile, forming a broad tube when protracted. . . . . ***Callionymus hindsii*** Richardson, 1844
– First dorsal fin with 4 spines; jaws moderately protractile, narrow when protracted. **28**
28 Anal fin with 7 rays (the last divided at base). . . . . ***Callionymus stigmatopareius*** Fricke, 1981
– Anal fin with 8 or 9 rays (the last divided at base). **29**
29 Upper margin of preopercular spine with a small antrorse barb near main tip, and with 1–2 large curved points. . . . **30**
– Upper margin of preopercular spine without a small antrorse barb near main tip, but with one or more large curved points. **34**
30 Caudal fin distally convex or slightly pointed, with 1–2 filaments. **31**
– Caudal fin distally convex, without filaments. **32**
31 Second dorsal fin with vertical black streaks. . . . . ***Callionymus bentuviai*** Fricke, 1981
– Second dorsal fin with horizontal rows with white and/or dark blotches. . . . . ***Callionymus africanus*** (Kotthaus, 1977), male
32 Black blotch on first dorsal fin on first or second to third membranes; cheeks pale. . . . . ***Callionymus kotthausi*** Fricke, 1981
– Black blotch on first dorsal fin only on third membrane; cheeks with spots or suborbital dark streak. **33**
33 Suborbital dark streak present; second half of anal fin black. . . . ***Callionymus africanus*** (Kotthaus, 1977), female
– No suborbital dark streak, but many brown blotches encircled with darker brown on cheeks; anal fin pale, distal margin dusky. . . . . ***Callionymus regani*** Nakabo, 1979
34 Dorsal margin of preopercular spine with 1–2 curved points. **35**
– Dorsal margin of preopercular spine with 3–7 curved points. **36**
35 Main tip of preopercular spine long, curved; preopercular spine not upcurved at base. . . . . ***Callionymus carebares*** Alcock, 1890
– Main tip of preopercular spine short, straight; preopercular spine upcurved at base. . . . . ***Callionymus mascarenus*** Fricke, 1983
36 Caudal fin elongate, with 2 long median filaments. . . . . ***Callionymus cooperi*** Regan, 1908
– Caudal fin distally convex, without filaments. **37**
37 Second spine of first dorsal fin longer than first (may both be filamentous in males). . . . . ***Callionymus erythraeus*** Ninni, 1934
– Second spine of first dorsal fin shorter than first. **38**
38 Preopercular spine strongly upcurved at base; male with black blotch surrounded by white posteriorly on first dorsal fin. . . . . ***Callionymus mascarenus*** Fricke, 1983
– Preopercular spine only slightly upcurved at base; male without black blotch posteriorly on first dorsal fin. . . . . ***Callionymus marleyi*** Regan, 1919

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