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## ***Unguitrema nigrum*, a new genus and species of clingfish (Teleostei: Gobiesocidae) from Madang, Papua New Guinea**

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### **Abstract**

The clingfish *Unguitrema nigrum* gen. nov. et sp. nov. is described on the basis of two specimens from Madang Lagoon, Papua New Guinea. The species is very small, apparently not exceeding 12 mm total length. It is characterized by 9 dorsal-fin rays, 7–8 anal-fin rays, 22–23 pectoral-fin rays, and 12 principal caudal-fin rays; plain black colour without white stripes; a short head with head length 4.7–4.9 in SL; a narrow head with head width 7.5–8.5 in SL; a posteriorly situated anus, with the disc-to-anus distance 3.2–3.5 in SL; three rows of papillae distally on disc region B; and two central papillae clusters on disc region B with only two papillae each. The new genus is distinctive for unusual central short claw-like appendages within some papillae.

**Key words:** fishes, new species, crinoids, taxonomy, systematics, identification keys.

### **Introduction**

The clingfishes of the family Gobiesocidae are distributed worldwide in tropical and temperate seas, some also living in freshwater streams of the tropics. They occur on hard substrata, usually on rocky bottom or in coral reefs, mostly in shallow waters. Clingfishes are characterized by possessing an adhesive disc formed by the pelvic fins, the head depressed, the skin naked, a single dorsal and anal fin, and several specialized osteological characters. The family was revised by Briggs (1955).

The clingfish genus *Discotrema* was first described by Briggs (1976) with *Discotrema crinophilum* Briggs 1976 as the type species. Craig & Randall (2008) described two additional species, *Discotrema monogrammum* from the western Pacific Ocean and *D. zonatum* from Fiji.

In a checklist of the fishes of Madang District, Papua New Guinea, Fricke *et al.* (2014) recorded a total of 1336 native species in 128 families from the region, including three species of gobiesocids, including *Discotrema crinophilum* and *D. monogrammum*. After the checklist was finished, specimens of another, previously undescribed genus and species became available, similar to but different from *Discotrema*, which is described in the present paper.

## Materials and Methods

Methods follow Briggs (1955) and Hofrichter & Patzner (1997). The abbreviation ‘SL’ refers to the standard length (measured from the tip of the snout to the middle of the caudal fin base), ‘HL’ to the head length. The adhesive disc is divided into three different areas: region A is the anterior portion, region B the posterior portion, and region C the centre of the disc (as illustrated by Briggs 1955). In the description, data for the holotype are given first, followed by data for the paratype in parentheses. Fin rays are counted using the method of Fricke (1983), where spines are expressed as Roman numerals, unbranched soft rays are expressed as lower case Roman numerals and branched rays as Arabic numerals. Classification follows Eschmeyer (2014), references follow Fricke (2014), repositories follow Fricke & Eschmeyer (2014).

### *Unguitrema*, n. gen.

**Type species.** *Unguitrema nigrum*, n. sp.

**Gender.** Neuter.

**Diagnosis.** A monotypic genus of gobiesocid fish with a posteriorly situated anus, disc-to-anus distance 3.2–3.5 in SL; three rows of papillae distally on disc region B; two central papillae clusters on disc region B with only two papillae each; and distinctive for unusual central short claw-like appendages within some papillae.

**Description.** Dorsal-fin rays ix; anal-fin rays vii; pectoral-fin rays xxii–xxiii; caudal-fin rays (iv),12,(v). Gill rakers on second arch 6.

A single row of teeth in each jaw; very narrow incisors with rounded tips. Head relatively slender, slightly depressed. Snout short, broadly rounded (Fig. 1a & b). Anus situated closer to anal-fin origin than to disc; a short urogenital papilla present; distance between disc and anus 24.0 (33.9)% SL.

Disc with one row of ten specialised, elevated papillae, each bearing a little claw, in region A; two clusters of papillae on each side in region C (the lower cluster with a central, naked area); and region B with two small central clusters consisting of only two clawed papillae each (Fig. 2), small papillae in the intermediate space, one row of five clawed papillae, and three distal rows of small papillae (Fig. 1c). Central disc depression/cavity relatively shallow.

**Species.** The only known species is *Unguitrema nigrum* n. sp. from Madang District, Papua New Guinea.

**Etymology.** The name of the new genus, *Unguitrema*, consists of the Latin *unguis*, meaning claw, and *trema* as an allusion to the similar genus *Discotrema*.

**Comparisons.** Like the similar *Discotrema*, the new genus is associated with crinoids. It is, however, distinguished from *Discotrema* by the unusually specialised pelvic disc with a shallower central depression, six patches of papillae (Fig. 1c), an outer ring of papillae each bearing a short claw-like appendage (Fig. 2), three rows of papillae distally on disc region B (vs. one row), two central papillae clusters on disc region B with only two papillae each (vs. five papillae), and the naked patch centrally on the distal papillae clusters in disc region C. It is further distinguished by the plain black colour without white stripes, a shorter head with head length 4.7–4.9 in SL (3.0–4.3 in species of *Discotrema*); a narrower head, head width 7.5–8.5 in SL (vs. 4.1–5.8); a more posteriorly situated anus, with the disc-to-anus distance 3.2–3.5 in SL (vs. 2.1–2.7). Counts and proportions of the new genus and *Discotrema* are compared in Table 1; the frequency of pectoral-fin ray counts is compared in Table 2.

**Remarks.** This new genus, by its possession of three gills, gill membranes that are attached to the isthmus, and a single disc, belongs to the subfamily Diademichthyinae. The genus *Discotrema* is most similar in general appearance, the structure of the disc, and the commensal relationship with crinoids.

*Unguitrema nigrum*, n. sp.

Black Crinoid Clingfish

Figures 1–2, Tables 1–2.

**Holotype.** NTUM 10603, 10.8 mm SL, 12 mm TL, Papua New Guinea, Madang Province, Madang District, Madang Lagoon, St. PR36, NIUGINI 2012 team, 15 Nov. 2012.

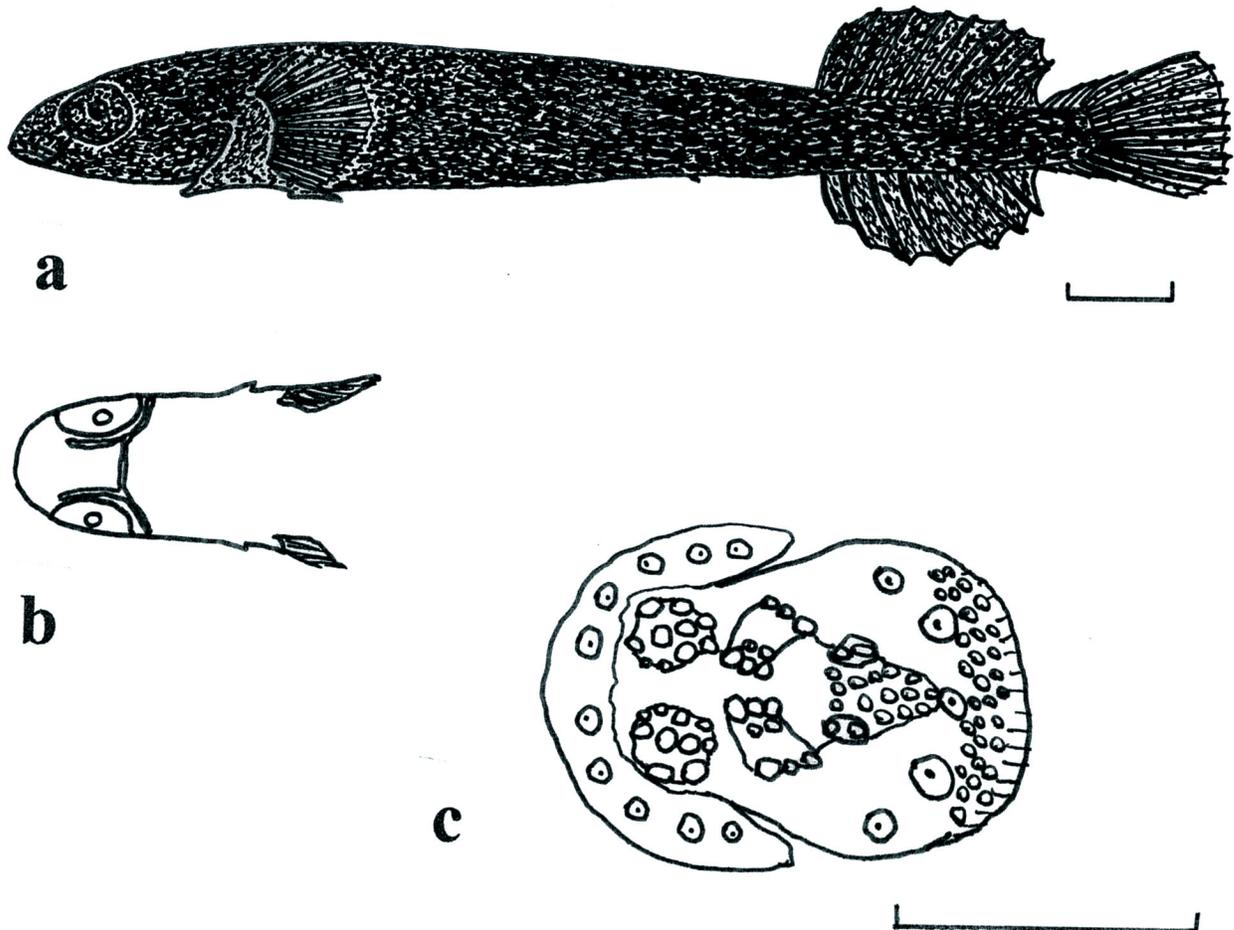
**Paratype.** MNHN 2014-0000, 1 specimen, 10.3 mm SL; collection data as for holotype.

**Diagnosis.** A small species of *Unguitrema* with 9 dorsal-fin rays, 7–8 anal-fin rays, 22–23 pectoral-fin rays, and 12 principal caudal-fin rays; plain black colour without white stripes; a short head with head length 4.7–4.9 in SL; a narrow head, head width 7.5–8.5 in SL; a posteriorly situated anus, with disc-to-anus distance 3.2–3.5 in SL; three rows of papillae distally on disc region B; and two central papillae clusters on disc region B with only two papillae each.

**Description.** Dorsal-fin rays ix (ix); anal-fin rays vii (viii); pectoral-fin rays xxii–xxiii (xxiii); caudal-fin rays (iv), 12, (v) [(v), 12, (v)]. Gill rakers on second arch 6 (6).

A single row of teeth in each jaw; very narrow incisors with rounded tips.

Head relatively slender, slightly depressed. Head length 20.4 (21.4)% SL, 4.9 (4.7) in SL. Maximum body depth 12.0 (10.7)% SL, 8.3 (9.4) in SL. Maximum head width 13.4 (11.6)% SL, 7.4 (8.6) in SL. Maximum (horizontal)



**Figure 1.** *Unguitrema nigrum*, NTUM 10603, holotype, 10.8 mm SL, Papua New Guinea, Madang Lagoon. a: Lateral view; b: Dorsal view of head showing lateral-line system; c: Disc (scale bars each indicate 1 mm).

orbit diameter 6.5 (4.9)% SL 3.1 (4.4) in head length. Snout short, broadly rounded (Fig. 1b). Preorbital length 4.6 (2.4)% SL, 4.4 (8.8) in head length. Interorbital distance 7.4 (4.9)% SL, 2.8 (4.4) in head length. Upper jaw length 6.5 (5.8)% SL. Lower jaw length 4.2 (3.4)% SL. Anus situated closer to anal-fin origin than to disc; a short urogenital papilla present; distance between disc and anus 24.0 (33.9)% SL. Preanus length 64.8 (61.2)% SL, 1.5 (1.6) in SL. Caudal-peduncle length 6.5 (6.8)% SL, 15.4 (14.7) in SL. Caudal-peduncle depth 4.2 (5.3)% SL, 24.0 (18.7) in SL.

Predorsal-fin length 75.0 (72.8)% SL, 1.3 (1.4) in SL. Preanal-fin length 76.8 (77.7)% SL, 1.3 (1.3) in SL. Prepectoral-fin length 24.1 (23.3)% SL, 4.2 (4.3) in SL. Predisc length 16.7 (16.0)% SL, 6.0 (6.2) in SL. Disc length 13.4 (17.0)% SL, 7.4 (5.9) in SL. Disc membrane inserting at base of 19th (20th) pectoral-fin ray. Disc with one row of ten specialised papillae each bearing a little claw in region A, two clusters of papillae on each side in region C (the posterior cluster with a central, naked area), and region B with two small central clusters consisting of only two clawed papillae each (Fig. 2), small papillae in the intermediate space, one row of five clawed papillae, and three distal rows of small papillae (Fig. 1c). Caudal-fin length 17.5 (14.6)% SL, 7.7 (6.9) in SL.

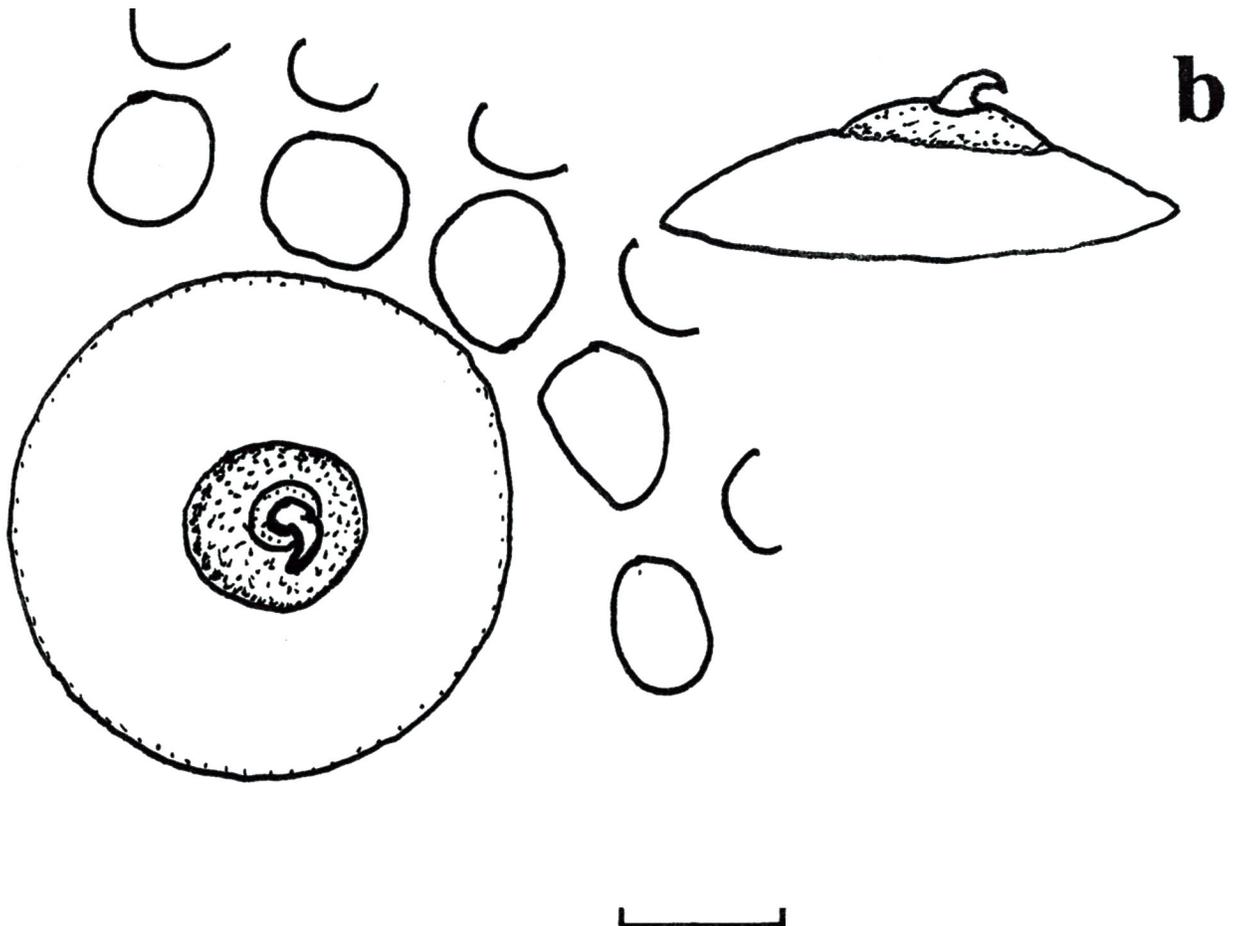
**Colour in life** (Fig. 1). Head, eyes, body, belly, and fins jet black, without any markings, and without white stripes.

**Colour in alcohol.** Head, body, and fins dark grey.

**Distribution.** Papua New Guinea (Madang Lagoon). This new species is known only from the type series. The exact locality and depth of collection is unknown due to confusion of station data; however, it was probably collected in a pass leading out of the lagoon, with a depth between 5 and 20 m. The new species was collected on a crinoid, *Oxycomanthus bennetti* (Müller, 1841), black colour phase with green tentacles (family Comasteridae).

**Etymology.** The name of the new species, *nigrum*, means black; it refers to the black colour.

**Comparisons.** The new species is distinguished from other gobiesocids by the characters of the new genus, especially the unusually specialised pelvic disc with six patches of papillae and an outer ring of papillae each



**Figure 2.** *Unguitrema nigrum*, NTUM 10603, holotype, 10.8 mm SL, Papua New Guinea, Madang Lagoon. Detail of region B of disc showing papilla with central claw-like appendage. a: Ventral view; b: Lateral view (scale bar indicates 0.03 mm).

TABLE 1

Comparison of counts and proportions of the species  
of *Unguitrema* n. gen. and *Discotrema*

	<i>U. nigrum</i>	<i>D. crinophilum</i>	<i>D. monogrammum</i>	<i>D. zonatum</i>
Maximum TL (mm)	12	30	26	24
Dorsal-fin rays	9	8–9	8–9	9
Anal-fin rays	7–8	7–8	6–7	7
Pectoral-fin rays	22–23	25–27	23–25	22
Principal caudal-fin rays	12	12–15	12–15	13
Disc length in SL	5.9–7.4	4.2–4.9	4.4–5.2	6.2
Head length in SL	4.7–4.9	3.0–3.5	3.3–4.3	3.7
Head width in SL	7.5–8.5	4.3–5.3	4.7–5.8	4.1
Head width in head length	1.5–1.8	1.4–1.5	1.4–1.5	1.1
Anal-fin length in distance between anus and anal-fin origin	0.6–0.7	0.7–0.8	0.7–0.9	0.9
Distance between anus and anal-fin origin in distance disc-anus	3.2–3.5	2.1–2.4	2.5–2.7	2.5
White stripes on body	–	+	+	+
Disc region B, distal papillae, number of rows	3	1	1	1
Disc region B, central papillae cluster, number of papillae each side	2	5	5	5

TABLE 2

Frequency of pectoral-fin rays for  
*Unguitrema nigrum* and *Discotrema* spp.

	22	23	24	25	26	27	28
<i>Unguitrema nigrum</i>	1	3					
<i>D. crinophilum</i>				1	4	2	1
<i>D. monogrammum</i>		4	6	1			
<i>D. zonatum</i>	1						

bearing a short claw-like appendage. From species of the genus *Discotrema*, the new species is distinguished by the plain black colour without white stripes; a shorter head with the head length 4.7–4.9 in SL (3.0–4.3 in other species of *Discotrema*); a narrower head, head width 7.5–8.5 in SL (vs. 4.1–5.8); the more posteriorly situated anus, with the disc-to-anus distance 3.2–3.5 in SL (vs. 2.1–2.7); the presence of three rows of papillae distally on disc region B (vs. one row); two central papillae clusters on disc region B with only two papillae each (vs. five papillae); and the naked patch centrally on the distal papillae clusters in disc region C. The new species further differs from *D. crinophilum* in having 22–23 pectoral-fin rays (vs. 25–27 in *D. crinophilum*), and in the smaller disc, disc length 5.9–7.4 in SL (vs. 4.2–4.9 in SL); it is distinguished from *D. monogrammum* in having a smaller disc, disc length 5.9–7.4 in SL (vs. 4.4–5.2 in SL in *D. monogrammum*); and from *D. zonatum* in having 12 principal caudal-fin rays (vs. 13 in *D. zonatum*), the head width in head length 1.4–1.8 (vs. 1.1), and the anal-fin length in distance between anus and anal-fin origin 0.6–0.7 (vs. 0.9). Counts and proportions of the new species and *Discotrema* species are compared in Table 1; the frequency of pectoral-fin ray counts is compared in Table 2.

**Discussion.** This species has been classified in a new genus separate from *Discotrema*, following the advice of John C. Briggs. He suggested that the highly specialised disc with papillae bearing small claws, and a shallower cavity in the centre of the disc, justify distinction on the generic level.

The new species is most similar to species of *Discotrema*, which also live commensally on crinoids. The claws on the papillae of the specialised disc probably help to attach to crinoid arms. The black colouration perfectly matches with the arms of the crinoid host, samples of which have been preserved along with the type series.

### Checklist of the Species of *Discotrema* and *Unguitrema* n. gen.

*Discotrema crinophilum* Briggs 1976

*Discotrema crinophilum* Briggs 1976: 340, figs. 1–4 (Benga, Fiji; commensal on crinoid; holotype: USNM 215328).

Distribution: eastern Indonesia east to Philippines and Society Islands (new record, see below), north to Ryukyu Islands, south to New Caledonia.

*Discotrema monogrammum* Craig & Randall 2008

*Discotrema monogrammum* Craig & Randall 2008: 70, fig. 1 (New Britain, Papua New Guinea, commensal on crinoid; holotype: BPBM 39040).

Distribution: Christmas Island (eastern Indian Ocean) east to Philippines and New Guinea, south to Queensland (Australia).

*Discotrema zonatum* Craig & Randall 2008

*Discotrema zonatum* Craig & Randall 2008: 71, fig. 4 (Charybdis Reef, Fiji; commensal on crinoid; holotype: BPBM 38972).

Distribution. Fiji.

*Unguitrema nigrum* n. gen., n. sp. (Madang, Papua New Guinea; commensal on crinoid).

Distribution. Madang (Papua New Guinea).

### Key to the Species of *Discotrema* and *Unguitrema* n. gen.

- 1a. Body plain black, without white lines; head length 4.7–4.9 in SL; disc-to-anus distance 3.2–3.5 in SL; disc with specialised papillae bearing a central claw-like appendage; disc region B distally with 3 rows of papillae; two central papillae clusters on disc region B with only two papillae each; caudal papillae cluster on disc region C with central naked area.....*Unguitrema nigrum* n. gen, n. sp.
- 1b. Body variously coloured, with white lines; head length 3.0–4.3 in SL; disc-to-anus distance 2.1–2.7 in SL; disc without specialised papillae bearing a central claw-like appendage; disc region B distally with one row of papillae; two central papillae clusters on disc region B with five papillae each; caudal papillae cluster on disc region C without central naked area.....2

- 2a. Pectoral-fin rays 22; disc length 6.2 in HL; preorbital length 3.7 in HL; body with irregular dark bars, a wedge of pigment at base of pectoral fin and dark stripes along head and body..... *Discotrema zonatum*
- 2b. Pectoral-fin rays 23–28; disc length 4.2–5.3 in HL; preorbital length 2.8–3.5 in HL; body without irregular dark bars, no wedge of pigment at base of pectoral fin, a pale stripe(s) present on body and/or head.....3
- 3a. Pectoral-fin rays 23–25; vertebrae 33–34; one white or pale yellow stripe on side of head and body.....  
.....*Discotrema monogrammum*
- 3b. Pectoral-fin rays 25–28; vertebrae 35; a mid-dorsal white or pale yellow stripe in addition to a lateral stripe on head and body.....*Discotrema crinophilum*

### Comparative material:

*Diademichthys lineatus*: SMNS 18156 (2), Fiji, Viti Levu; SMNS 21975 (3), New Caledonia, Récif Goëland; SMNS 21977 (1), New Caledonia, Nouméa; SMNS 21979 (2), New Caledonia, Baie Maá; SMNS 21980 (2), New Caledonia, Bancs Nord; SMNS 22995 (1), New Caledonia, Baie de Pritzbuë; SMNS 23522 (1), New Caledonia, Nouméa; SMNS 23997 (1), New Caledonia, Nouméa; SMNS 25414 (1), New Caledonia, Nouméa; SMNS 26545 (1), New Caledonia, Baie de Goro. *Discotrema crinophilum*: SMNS 16677 (1), Philippines, Balicasag Island; SMNS 16678 (1), Philippines, Balicasag Island; SMNS 17896 (1), Society Islands, Moorea (**new record**); SMNS 21981 (1), New Caledonia, Nouméa. *D. monogrammum*: BPBM 39040 (holotype), Papua New Guinea, New Britain; BPBM 36504 (2), Indonesia, Flores. *D. zonatum*: BPBM 38972 (holotype), Fiji, Charybdis Reef. *Lepadichthys caritus*: BPBM 34140 (1), Indonesia, Flores. *L. coccinotaenia*: BPBM 21711 (1), South Africa, KwaZulu-Natal. *L. erythraeus*: SMNS 22550 (1), Red Sea, Gulf of Aqaba, Egypt, 14 km north of Nuweiba. *L. frenatus*: SMNS 21978 (1), New Caledonia, off Nouméa. *L. lineatus*: SMNS 22573 (4), Red Sea, Gulf of Aqaba, Egypt, 14 km north of Nuweiba. *L. minor*: SMNS 15130 (1), Fiji, Viti Levu; SMNS 17822 (2), Cook Islands, Aitutaki; SMNS 20909 (2), La Réunion, Les Filaos; SMNS 21020 (2), La Réunion, Les Filaos; SMNS 21161 (1), La Réunion, Les Filaos; SMNS 21178 (2), La Réunion, Saint-Leu; SMNS 22980 (1), Loyalty Islands, Lifou; SMNS 26966 (3), New Caledonia, Nouméa. *Lepadichthys* sp.: SMNS 21976 (1), New Caledonia, Baie Maá; SMNS 23962 (15), New Caledonia, Ile Nou; SMNS 26967 (4), New Caledonia, Nouméa; SMNS 26968 (1), New Caledonia, Nouméa.

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