Polydactylus bifurcus, a new species of threadfin from Lombok Island, Indonesia (Perciformes: Polynemidae)

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Abstract *Polydactylus bifurcus* sp. nov. is described on the basis of a single specimen collected from Lombok Island, Indonesia. The new species is distinguished from all other Indo-Pacific *Polydactylus* species by the following combination of characters: 15 pectoral fin rays, 5 pectoral filaments, 69 pored lateral line scales, 30 gill rakers, second spine of first dorsal fin very strong and lateral line bifurcated on caudal fin base, extending to posterior margins of upper and lower caudal fin lobes.

Key words Polynemidae · *Polydactylus bifurcus* sp. nov. · Indonesia

During a survey of the Indonesian fish fauna, a single example of an undescribed species of *Polydactylus* Lacepède, 1803 with five pectoral filaments was collected from Lombok Island, Indonesia in 1996. The genus *Polydactylus*, distributed from tropical to temperate areas worldwide, is defined by a simple tooth plate on the vomer, the tooth band on the upper and lower jaws wider than the space separating the tooth bands on the opposing premaxilla, the basisphenoid in contact with the prootic, the pectoral fin base (including the base of the pectoral filaments) being less than the upper jaw length and a simple swimbladder, not extending beyond the anal fin origin (Feltes, 1993; Motomura and Iwatsuki, 2001). The new species could be distinguished from all other Indo-Pacific *Polydactylus* species by the lateral line, which was bifurcated on the caudal fin base and extended to the posterior margins of the upper and lower caudal fin lobes, whereas other congeners in the area have an unbranched lateral line.

Efforts by the authors to collect further examples of the new species during subsequent surveys of the Indonesian fish fauna were unsuccessful. The new species is described herein, detailed comparisons being made with four related species, also characterized by five pectoral filaments.

Methods

Counts and measurements generally followed Hubbs and Lagler (1947) and Feltes (1991), with some modifications following Motomura et al. (2000). Standard length is abbreviated as SL. Terminology of the supraneural and epineural bones follows Mabee (1988) and Patterson and Johnson (1995), respectively, and the formula for configuration of the supraneural bones, anterior neural spines and anterior dorsal fin pterygiophores follows Ahlstrom et al. (1976). Osteological characters were confirmed from radiographs of the holotype, and the swimbladder condition was confirmed by dissection of the abdomen on the right side of the body. Institutional codes follow Eschmeyer (1998), with an additional institutional abbreviation as follows: Division of Fisheries Sciences, Miyazaki University, Japan (MUFS).

Polydactylus bifurcus sp. nov.

(New English name: slender fivefinger threadfin)
(Figs. 1, 2, 3A)

Holotype. NSMT-P 60494, 144 mm SL, Kuta beach, Lombok Island, Indonesia, 12 July 1996, beach seine net in 1.5 m, collected by S. Kimura and T. Peristiwady.

Diagnosis. A species of *Polydactylus* with the following combination of characters: 15 pectoral fin rays; 5

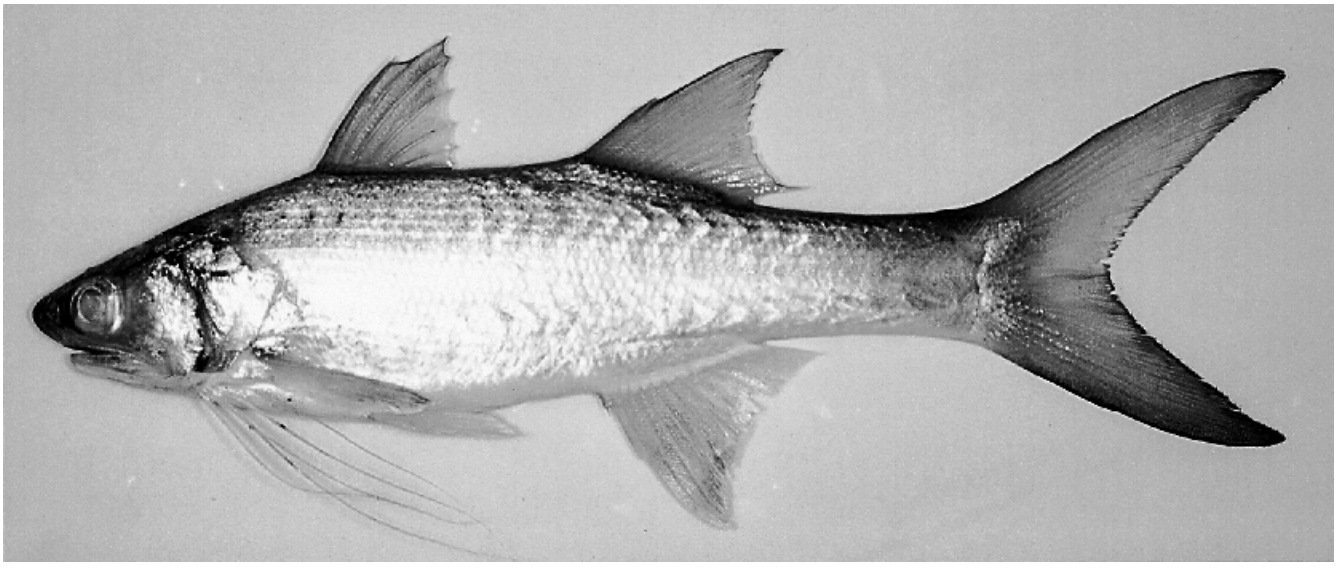

Fig. 1. Holotype of *Polydactylus bifurcus* sp. nov., NSMT-P 60494, 144 mm SL, Lombok Island, Indonesia

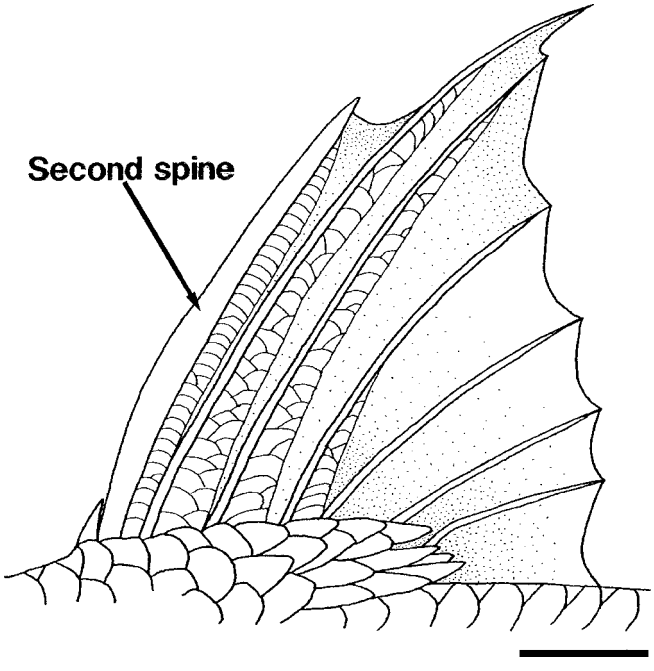

Fig. 2. First dorsal fin of *Polydactylus bifurcus* sp. nov. *Bar* 5 mm

pectoral filaments; 69 pored lateral line scales; 30 gill rakers; second spine of first dorsal fin very strong (2.5 times width of third spine; Fig. 2); lateral line bifurcated on caudal fin base, extending to posterior margins of upper and lower caudal fin lobes (Fig. 3).

Description. Proportional measurements of the holotype of *Polydactylus bifurcus* are given as percentages of SL. Characters given in the diagnosis are not repeated.

Dorsal fin rays VIII-I, 13; anal fin rays III, 11; pectoral fin rays 15; pectoral filaments 5; pelvic fin rays I, 5; pored lateral line scales 69; scales above and below lateral line 9/12; gill rakers 12 (upper) + 18 (lower) = 30 (total); standard length 144 mm; head length 28; body depth 27; second body depth 27; body width at pectoral fin base 13; snout length 5; dermal eye opening 6; orbit diameter 7; interorbital width 8; postorbital length 17; upper jaw length 14; pre-1st dorsal fin length 34; pre-2nd dorsal fin length 60; pre-anal fin length 60; 1st dorsal fin origin to anal fin origin 39; pelvic fin origin to anal fin origin 26; 2nd dorsal fin base length 16; anal fin base length 15; longest pectoral fin length 19; longest pectoral filament length (4th) 38; pectoral fin base length 9; longest pelvic fin ray length (1st) 17; longest 1st dorsal fin spine length (3rd) 20; 2nd dorsal fin spine length 10; longest 2nd dorsal fin ray length (2nd) 24; longest anal fin spine length (3rd) 9; longest anal fin ray length (2nd) 21; caudal peduncle length 27; caudal peduncle depth 13; upper caudal fin lobe length 38; lower caudal fin lobe length 37.

Body oblong, compressed; maxilla covered with scales; orbit diameter greater than snout length; lower lip well-developed; posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid; depth of posterior portion of maxilla shorter than dermal eye opening; teeth villiform, in broad bands on vomer, palatines and ectopterygoids; all pectoral fin rays unbranched; third pectoral filament longest, extending beyond posterior tips of caudal fin lobes; fourth pectoral filament longest, not reaching to anal fin origin; second dorsal fin base longer than anal fin base; distance between pelvic and anal fin origins less than head length;

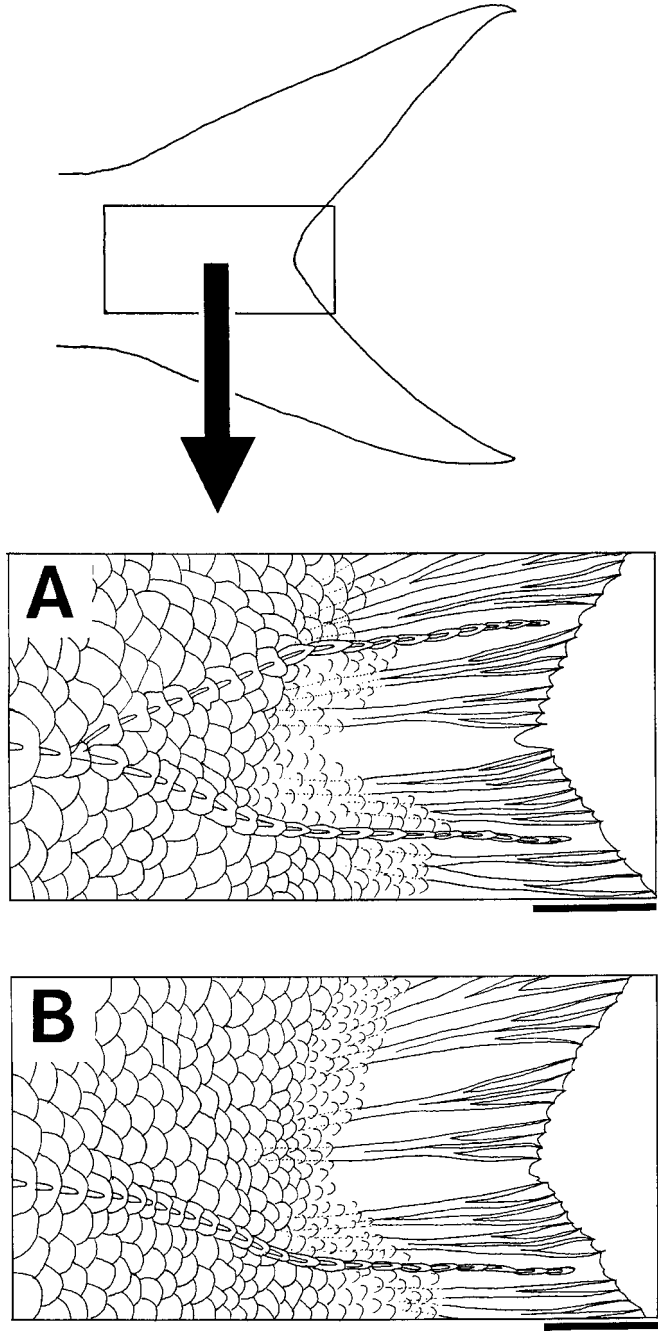

Fig. 3. Lateral line squamation on caudal fin membrane in (**A**) *Polydactylus bifurcus* sp. nov. (NSMT-P 60494, 144 mm SL) and (**B**) *Polydactylus plebeius* (MUFS 14125, 160 mm SL). *Bars* 5 mm

swimbladder well-developed; lower tip of seventh proximal pterygiophore of first dorsal fin directed forward; formula for configuration of supraneural bones, anterior neural spines and anterior dorsal pterygiophores 0/0/0+2/1+1/1/1/1+1/; vertebrae 10 + 14; 6 epineurals.

Fresh color notes.—Based on a color transparency of the holotype from Lombok Island, Indonesia: upper sides of head and trunk tinged silvery-green, becoming more silver on lower sides; first and second dorsal fins dark green; pectoral fin white, becoming dark green on posterior tip; pectoral filaments and pelvic fin white; anterior part of anal fin dark green, remainder of fin white; upper, lower and posterior margins of caudal fin black, remainder of fin dark green (lower lobe darkest).

Color of preserved specimens.—Head and body light brown dorsally, pale brown ventrally; tip of membrane between third and fifth spines of first dorsal fin dark brown; anterior and posterior margins of second dorsal fin dark brown, remainder of fin brown; pectoral fin brown, becoming blackish on posterior tip; pectoral filaments and pelvic fin brown; posterior part of anal fin dark brown, remainder of fin brown; upper, lower and posterior margins of caudal fin blackish-brown, other parts brown; eight faintly dark stripes along longitudinal scale rows above lateral line.

Distribution and habitat. *Polydactylus bifurcus* sp. nov. is currently known only from Lombok Island, Indonesia. Collection data for the only known specimen indicated that it was taken in shallow water (1.5 m) over a muddy bottom.

Etymology. The specific name *bifurcus* is derived from Latin, meaning *bifurcation*, in reference to the bifurcated lateral line on the caudal fin base, extending to the posterior margins of the upper and lower caudal fin lobes.

Remarks. *Polydactylus bifurcus* sp. nov. can be distinguished from all other Indo-Pacific *Polydactylus* species by having the lateral line bifurcated on the caudal fin base, extending to the posterior margins of the upper and lower caudal fin lobes (vs. an unbranched lateral line in the latter; Fig. 3). However, one of two East Pacific species, *P. approximans* (Lay and Bennett, 1839), and all of three Atlantic west coast species, *P. octonemus* (Girard, 1858), *P. oligodon* (Günther, 1860) and *P. virginicus* (Linnaeus, 1758), have a lateral line condition similar to *P. bifurcus*. *Polydactylus bifurcus* differs from these 4 species in having 5 pectoral filaments (vs. usually 6 in *P. approximans*, 8 in *P. octonemus* and 7 in *P. oligodon* and *P. virginicus*) (see Randall, 1978; Allen and Robertson, 1994). *Polydactylus approximans* rarely has 5 pectoral filaments, but the species is clearly distinguished from *P. bifurcus* by the numbers of the pored lateral line scales and anal fin soft rays (55–60 and 13 or 14 [Grove and Lavenberg, 1997] vs. 69 and 11, respectively, in the latter). The lateral lines of the other East Pacific species, *P. opercularis* (Gill, 1863), and one West African species, *P. quadrifilis* (Cuvier *in* Cuvier and Valenciennes, 1829), are unbranched and extend to the upper end of the lower caudal fin lobe (Fig. 3B).

Twelve nominal species with 5 pectoral filaments have been recorded from the Indo-Pacific (Motomura et al., 2000, 2001): *Polydactylus agonasi* Jordan and McGregor, 1906, *P. zophomus* Jordan and McGregor *in* Jordan and Seale, 1907, *Polynemus commersonii* Shaw, 1804, *P. emoi* Lacepède, 1803, *P. lineatus* Lacepède, 1803, *P. lydiae* Curtiss, 1938, *P. macrochir* Günther, 1867, *P. microstomus* Bleeker, 1851, *P. niloticus* Shaw, 1804, *P. plebeius* Broussonet, 1782, *P. sheridani* Macleay, 1884 and *P. taeniatus* Günther, 1860. Recently, *Polydactylus macrochir*, which is endemic to northern Australia and southern New Guinea, was redescribed as a senior synonym of *Polynemus sheridani* by Motomura et al. (2000). Furthermore, 7 of the remaining 10 nominal species, viz. *Polydactylus agonasi*, *Polynemus commersonii*, *P. emoi*, *P. lineatus*, *P. lydiae*, *P. niloticus* and *P. taeniatus* have been synonymized under *Polydactylus plebeius*, a widely distributed Indo-Pacific species, by Motomura et al. (2001). Of the remaining 2 nominal species, Weber and de Beaufort (1922) treated *Polydactylus zophomus* as a junior synonym of *P. microstomus* (action concurred with here), being recognized as a valid species (e.g., Munro, 1967; Shen, 1984).

Recently, Motomura et al. (2001) described *Polydactylus siamensis* with 5 pectoral filaments from Thailand. Accordingly, 5 species, viz. *P. bifurcus* sp. nov., *P. macrochir*, *P. microstomus*, *P. plebeius*, and *P. siamensis*, are now recognized as valid Indo-Pacific *Polydactylus* species with 5 pectoral filaments.

Further comparison of *P. bifurcus* with 4 other species with five pectoral filaments showed the former to have the lower tip of the seventh proximal pterygiophore of the first dorsal fin directed forward (vs. directed backward in the latter) and the configuration formula for the supraneural bones, anterior neural spines, and anterior dorsal pterygiophores as 0/0/0+2/1+1/1/1/1+1/ (vs. 0/0/0+2/1+1/1/1/1/1/) (Table 1). A similar anteriorly directed seventh proximal pterygiophore of the first dorsal fin has also been found in *Leptomelanosoma indicum* (Shaw, 1804) (see Motomura and Iwatsuki, 2001).

Polydactylus bifurcus further differs from *P. microstomus* in having higher counts of pored lateral line scales and scales above and below the lateral line (69 and 9/12, respectively, vs. 46–49 and 6 or 7/8–10, respectively, in the latter), unbranched pectoral fin rays (vs. almost branched), fourth pectoral filaments longest (vs. fifth longest), teeth present on the vomer (vs. absent) and a large black spot absent anteriorly on the lateral line (vs. present) (see Table 1).

Like *P. bifurcus*, *P. plebeius* and *P. siamensis*, are characterized by several dark stripes along the longitudinal scale rows above the lateral line. However, the new species is distinguished from the others by having higher counts of the pored lateral line scales (69 vs. 60–66, rarely 68 and 54–58 in *P. plebeius* and *P. siamensis*, respectively), fourth pectoral filaments longest (vs. fifth longest) and a very strong second spine of the first dorsal fin (more robust than other spines of first dorsal fin vs. similar to other spines) (see Table 1).

Polydactylus bifurcus is most similar to *P. macrochir* in having higher counts of pored lateral line scales and scales above and below the lateral line, unbranched pectoral fin rays, fourth pectoral filaments longest, teeth present on the vomer and a very strong second spine of the first dorsal fin (see Table 1). However, the former differs from the latter in having the posterior margin of the maxilla extending slightly beyond the level of the posterior margin of the adipose eyelid (vs. extending considerably beyond in the latter) and lower counts of gill rakers (30 vs. 32–35) (see Table 1).

Comparative material examined. *Polydactylus approximans*: BMNH 1863.12.16.30 (1 of 2 syntypes of *Polynemus approximans*), 108 mm SL, Panama; BMNH 1866.1.14.6 (1 of 2 syntypes of *P. approximans*), 215 mm SL, Panama. *Polydactylus microstomus*: AMS I. 10471, 158 mm SL, Manila, Luzon Island, Philippines; FMNH 40769, 121 mm SL, Iloilo, Panay Island, Philippines; FMNH 47393, 80 mm SL, Manila Bay, Luzon Island, Philippines; FMNH 47411 (2 specimens), 79–80 mm SL, Iloilo, Panay Island, Philippines; FMNH 90792 (2), 96–102 mm SL, 12.8 km offshore of Mandapam, Tamil Nadu, India; FMNH 91310, 84 mm SL, 12.8 km offshore of Mandapam, Tamil Nadu, India; FRLM 15773, 91 mm SL, Kuta, Lombok Island, Indonesia; FRLM 23518, 116 mm SL, Passo, Baguala Bay, Ambon, Indonesia; FRLM 23520, 101 mm SL, Passo, Baguala Bay, Ambon, Indonesia; FSKU-P 20101, 96 mm SL, Nuguria Island, Papua New Guinea; MUFS 14159, 154 mm SL, mouth of Ouenghi River, New Caledonia; MUFS 18543, 78 mm SL, Makassar (= Ujung Pandang), Sulawesi, Indonesia; NTM S. 14607-009, 140 mm SL, Pasar Oeba, Kupang, West Timor, Indonesia; PMBC uncatalogued, 81 mm SL, Bangrong, eastern Phuket Island, Thailand; RMNH 33552 (8), 76–132 mm SL, Bali, Sumbawa, Sulawesi, Ambon and Seram, Indonesia and New Guinea; USNM 113209, 148 mm SL, Manila, Luzon Island, Philippines; USNM 113210 (4), 78–148 mm SL, mouth of Santiago River, Pagapas Bay, Luzon Island, Philippines; USNM 278196, 148 mm SL, Kampung Loleba, Halmahera Island, Indonesia; USNM 278211 (10), 115–131 mm SL, Talemaninar, Gulf of Mannar, Sri Lanka; ZMH 13649, 128 mm SL, New Guinea; ZMH 13650, 88 mm SL, Manila Bay, Luzon Island, Philippines. *Polydactylus octonemus*: USNM 739 (2 of 2 syntypes of *Polynemus octonemus*), 62–79 mm SL, Brazos, Santiago, Texas, USA. *Polydactylus oligodon*: FMNH 92391, 92529 (2), 117–129 mm SL, Para, Brazil. *Polydactylus opercularis*: USNM 41054, 184 mm SL, Panama; USNM 119740, 138 mm SL, south Guaymas, Mexico. *Polydactylus quadrifilis*: ISH at ZMH 298-1959, 214 mm SL, Guinea, Africa. *Polydactylus virginicus*: FMNH 3249, 216 mm SL, Vieques, Puerto Rico; FMNH 89620, 175 mm SL, Surinam. Collection data for the specimens of *Leptomelanosoma indicum*, *Polydactylus macrochir*, and *P. plebeius* and *P. siamensis* were given by Motomura and

Table 1. Selected characters of five *Polydactylus* species with five pectoral filaments

	P. bifurcus sp. nov. *n* = 1 144 mm SL	*P. macrochir*[a] *n* = 36 58–442 mm SL	*P. microstomus* *n* = 42 76–158 mm SL	*P. plebeius*[b] *n* = 114 43–331 mm SL	*P. siamensis*[b] *n* = 8 144–274 mm SL
Pectoral fin rays	15, all unbranched	Mode 14 (range 14–15), all unbranched	13 (13–15), almost branched	17 (16–18, rarely 15, 1 of 100 specimens), all unbranched	15, all unbranched
Pored lateral line scales	69	72 (70–76)	47 (46–49)	63 (60–66, rarely 68, 1 of 96 specimens)	56 (54–58)
Scales above/below lateral line	9/12	9 (8–11)/12 (12–15)	6 (6–7)/10 (8–10)	8 (8–9)/12 (12–13)	7/11 (10–11)
Gill rakers	30	34 (32–35)	29 (24–33)	26 (24–32)	23 (22–24)
Posterior margin of maxilla	Extending slightly beyond level of posterior margin of adipose eyelid	Extending considerably beyond level of posterior margin of adipose eyelid	Reaching to (or slightly short of) level of posterior margin of adipose eyelid	Reaching to (or extending slightly beyond) level of posterior margin of adipose eyelid	Extending slightly beyond level of posterior margin of adipose eyelid
Teeth on vomer	Present	Present	Absent	Present	Present
Direction of lower tip of seventh proximal pterygiophore of first dorsal fin	Forward	Backward	Backward	Backward	Backward
Formula for configuration of supraneural bones, anterior neural spines and anterior dorsal pterygiophores	0/0/0+2/1+1/1/1/1+1/	0/0/0+2/1+1/1/1/1/	0/0/0+2/1+1/1/1/1/	0/0/0+2/1+1/1/1/1/	0/0/0+2/1+1/1/1/1/

Table 1. Continued

	P. bifurcus sp. nov. *n* = 1 144 mm SL	*P. macrochir*[a] *n* = 36 58–442 mm SL	*P. microstomus* *n* = 42 76–158 mm SL	*P. plebeius*[b] *n* = 114 43–331 mm SL	*P. siamensis*[b] *n* = 8 144–274 mm SL
Second spine of first dorsal fin	More robust than other spines of first dorsal fin	More robust than other spines of first dorsal fin	Slightly more robust than or similar to other spines of first dorsal fin	Similar to other spines of first dorsal fin	Similar to other spines of first dorsal fin
Lateral line squamation on caudal fin	Bifurcated, extending to posterior margins of upper and lower caudal fin lobes	Unbranched, extending to upper end of lower caudal fin lobe	Unbranched, extending to upper end of lower caudal fin lobe	Unbranched, extending to upper end of lower caudal fin lobe	Unbranched, extending to upper end of lower caudal fin lobe
Longest pectoral filaments length	Moderate, 38% of SL, 4th longest	Long, mean 46% (range 40–53%) of SL, 4th longest	Short, 26% (21–30%) of SL, 5th longest	Moderate, 32% (22–40%) of SL, 4th or 5th longest	Moderate, 36% (31–43%) of SL, 5th longest
Body color	Eight faint dark stripes along longitudinal scale rows above lateral line	No stripes or spots	A large black spot anteriorly on lateral line	Seven or 8 prominent dark stripes along longitudinal scale rows above lateral line, 7–9 faint stripes below	Seven or 8 prominent dark stripes along longitudinal scale rows above lateral line, 7–9 faint stripes below
Distribution	Lombok Island, Indonesia	Northern Australia and southern New Guinea	Eastern Indian Ocean and West Pacific (from east coast of India to New Caledonia)	Indo-Pacific (from South Africa to Tahiti)	Thailand (Gulf of Thailand and Andaman Sea)

[a] From Motomura et al. (2000)
[b] From Motomura et al. (2001)

Iwatsuki (2001), Motomura et al. (2000), and Motomura et al. (2001), respectively.

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