

A poorly known polynemid fish, *Polynemus astrolabi* Sauvage, 1881, a junior synonym of *Galeoides decadactylus* (Bloch, 1795)

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Abstract A poorly known polynemid fish, *Polynemus astrolabi* Sauvage, 1881, was originally described on the basis of a single specimen. Examination of the holotype of *P. astrolabi* showed it to correspond closely with the holotype and other specimens of *Galeoides decadactylus* (Bloch, 1795), a species endemic to the west coast of Africa. A redescription of the former is given here and its status as a junior synonym of *G. decadactylus* is confirmed. Furthermore, a lateral line squamation character and the supraneural bone number are described as newly recognized diagnostic characters for the species. It is also found that the number of gill rakers of the species tended to decrease with overall fish growth.

Key words Polynemidae · *Polynemus astrolabi* · *Galeoides decadactylus* · Synonymy

Polynemus astrolabi Sauvage, 1881, was originally described from a single specimen from Mauritius (probably erroneous; see Results and Discussion), Indian Ocean. However, since the original description and a subsequent report (Sauvage, 1891), there have been no further references made to that species, except for Fricke (1999). Fricke (1999) synonymized the species with *Polydactylus sextarius* (Bloch and Schneider, 1801), being widely distributed in the Indo-West Pacific. However, examination of the holotype of *Polynemus astrolabi* showed it to correspond closely with the holotype and other specimens of *Galeoides decadactylus* (Bloch, 1795), a species endemic to the west coast of Africa. Accordingly, a redescription of the former is given here and its status as a junior synonym of *G. decadactylus* confirmed. Furthermore, a lateral line squamation character and the supraneural bone number are described as newly recognized diagnostic characters for the species.

Materials and Methods

Counts and measurements generally follow Hubbs and Lagler (1958) and Feltes (1991), with some modifications following Motomura et al. (2000). Standard length is expressed as SL. Terminology of the supraneural bones

follows Mabee (1988), and the formula for configuration of the supraneural bones, anterior neural spines and anterior dorsal fin pterygiophores, Ahlstrom et al. (1976). The configuration of the supraneural bone, and vertebral and epineural (sensu Patterson and Johnson, 1995) counts were confirmed from X-ray photos taken of all specimens, except for the holotype of *Polynemus decadactylus*. Institutional codes follow Leviton et al. (1985), with additional institutional abbreviations as follows: Fisheries Science Course, Department of Animal Science, Miyazaki University, Japan (MUFS); Phuket Marine Biological Center, Thailand (PMBC). The following specimens of *Galeoides decadactylus* were examined ($n = 32$, 99–201 mm SL): CAS 98606, 126 mm SL, Mbode, Cameroon; CAS 98607, 123 mm SL, Cameroon; MNHN 9727 (holotype of *Polynemus astrolabi* Sauvage, 1881), 190 mm SL, Mauritius (probably erroneous; see Results and Discussion); MNHN 1975-46, 5 specimens, 99–181 mm SL, Mauritania; MNHN 1999-1054, 2 specimens, 160–165 mm SL, Mauritania; USNM 42196, 158 mm SL, Free Town, Sierra Leone; USNM 42213-42214, 2 specimens, 158–170 mm SL, Elmina, Ashantee, Ghana; USNM 49341, 153 mm SL, Canary Islands; USNM 278205, 2 specimens, 123–144 mm SL, Dahomey, Benin; USNM 278233, 4 specimens, 107–154 mm SL, Shama Bay, Ghana; USNM 278248, 136 mm SL, Winneba Bay, Ghana; USNM

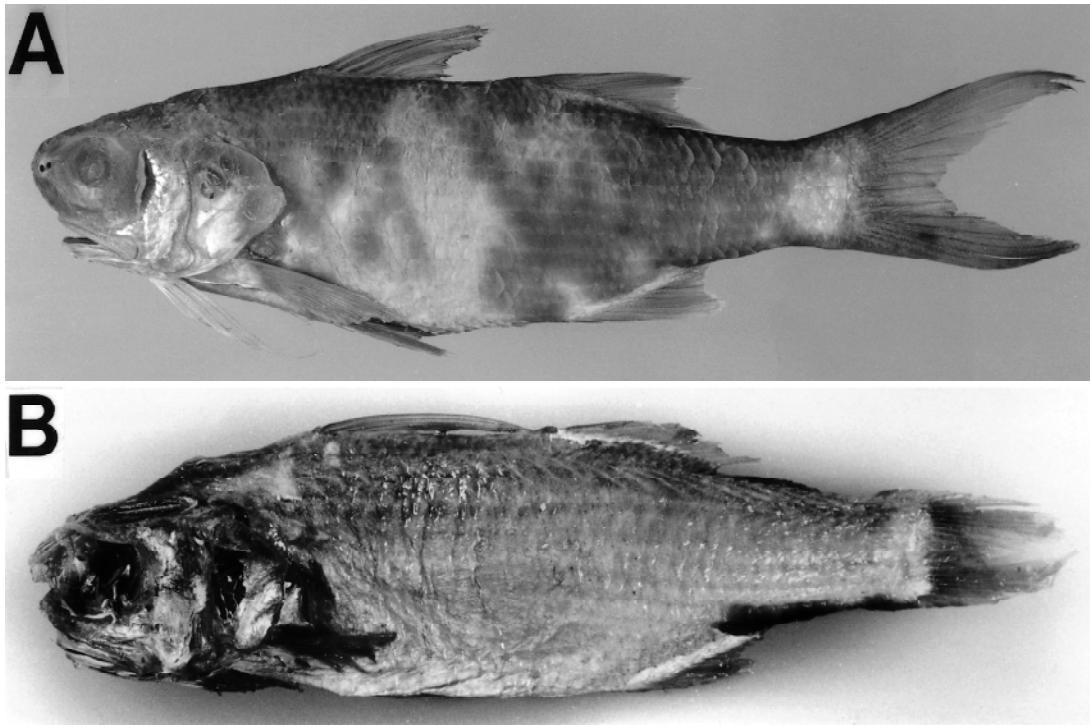


Fig. 1. Holotypes of **A** *Polynemus astrolabi* Sauvage, 1881 (MNHN 9727, 190 mm SL) and **B** *P. decadactylus* Bloch, 1795 (ZMB 569, 175 mm SL)

279573, 3 specimens, 177–201 mm SL, Banana Islands, Sierra Leone; USNM 348379, 7 specimens, 108–174 mm SL, Liberia; ZMB 569 (holotype of *Polynemus decadactylus* Bloch, 1795), 175 mm SL, Guinea.

Results and Discussion

The holotype of *Polynemus astrolabi* Sauvage, 1881 (Fig. 1A) has the following morphological characters (see Table 1 for counts and measurements): body oblong, compressed; orbit diameter greater than snout length and interorbital width; lower lip well developed; maxillary scales absent; dentary teeth restricted to dorsal surface of lower jaw; posterior margin of preopercle serrated; vomer covered with skin; teeth villiform in broad bands on palatines and ectopterygoids; tooth plates of palatine much longer than that of ectopterygoid; pectoral fin insertion well below lateral midline on body; all pectoral fin rays unbranched; tip of ninth pectoral filament (longest) reaching to base of pelvic fin; pectoral fin base including base of pectoral filaments longer than upper jaw; second dorsal fin base longer than anal fin base; distance between pelvic fin base and anal fin base less than head length; lateral line simple, extending from upper end of gill opening to lower end of upper caudal fin lobe; formula for configuration of supraneural bones, anterior neural

spines, and anterior dorsal pterygiophores 0//2/1 + 1/1/1/1/1/; vertebrae 10 + 14; 4 epineurals.

These characteristics were also recognized in the specimens of *Galeoides decadactylus*, including the holotype (Fig. 1B) (Günther, 1860; Feltes, 1993; this study). Although a black spot was present below the anterior part of the lateral line in the fresh specimens of *G. decadactylus*, it was no longer apparent in the long-preserved specimens, as in the holotype of *Polynemus astrolabi*, in which body color is badly faded, largely uniform brown. In addition, there are no clear differences between counts and proportional measurements of the holotype of *Polynemus astrolabi* and the specimens (including the holotype) of *G. decadactylus* (Table 1). Accordingly, the holotype of *Polynemus astrolabi* is considered to be identical to *G. decadactylus*, the latter having taxonomic priority. Additional junior synonyms of *G. decadactylus* include *Polynemus enneadactylus* Cuvier in Cuvier and Valenciennes, 1829 and *Polynemus polydactylus* Vahl, 1798, according to Daget and Njock (1986).

In the faunal work, Fricke (1999) synonymized *Polynemus astrolabi* with *Polydactylus sextarius* (Bloch and Schneider, 1801). However, the holotype of *Polynemus astrolabi* differs from the specimens including the holotype (see Comparative material examined) of *Polydactylus sextarius* in having nine pectoral filaments

Table 1. Counts and measurements of the holotype of *Polynemus astrolabi* and the holotype and nontype specimens of *Galeoides decadactylus*, expressed as percentages of standard length

	Holotype of <i>Polynemus astrolabi</i> MNHN 9727	Holotype of <i>Polynemus decadactylus</i> ZMB 569	Nontype specimens of <i>Galeoides decadactylus</i> (<i>n</i> = 30)
Standard length (mm)	190	175	99–201
Fork length (mm)	212	206	113–224
Counts (modes)			
Dorsal fin rays	VIII-I, 14	VIII-I, 13	VIII-I, 13–14 (13)
Anal fin rays	III, 11	III, 11	III, 10–11 (11)
Pectoral fin rays	15	15	12–15 (15)
Pectoral filaments	9	10	9–11 (9)
Pelvic fin rays	I, 5	I, 5	I, 5
Pored lateral line scales	47	—	45–50 (46)
Scales above/below lateral line	6/9	–/–	5–6 (5)/7–9 (8)
Gill rakers	9 + 16 = 25	11 + 21 = 32	9–14 + 15–23 = 24–36
Measurements (means)			
Head length	33	29	31–36 (33)
Body depth	29	29	29–35 (32)
Second body depth	30	29	29–36 (32)
Body width at pectoral fin base	12	9	12–17 (15)
Snout length	6	—	5–8 (6)
Dermal eye opening	9	8	7–10 (8)
Orbit diameter	10	10	9–12 (10)
Interorbital width	9	10	9–12 (10)
Postorbital length	19	15	17–20 (18)
Upper jaw length	13	13	12–14 (13)
Pre-1st dorsal fin length	37	33	33–39 (37)
Pre-2nd dorsal fin length	61	58	58–64 (62)
Pre-anal fin length	66	70	62–70 (66)
First dorsal fin base to anal fin base	43	47	42–48 (45)
Pelvic fin base to anal fin base	30	31	23–31 (27)
Second dorsal fin base length	17	20	17–20 (18)
Anal fin base length	15	15	14–17 (15)
Longest pectoral fin length	21	—	21–25 (23)
Longest pectoral filament length (uppermost)	27	21	21–33 (27)
Pectoral fin base length	13	13	13–15 (13)
Longest pelvic fin ray length (1st)	16	15	15–21 (19)
Longest 1st dorsal fin spine length (3rd)	22	25	22–26 (24)
Second dorsal fin spine length	6	9	7–9 (7)
Longest 2nd dorsal fin ray length (2nd)	19	—	19–23 (20)
Longest anal fin spine length (3rd)	8	11	7–10 (8)
Longest anal fin ray length (2nd)	18	—	18–21 (19)
Caudal peduncle length	26	22	22–28 (25)
Caudal peduncle depth	13	—	13–15 (14)
Upper caudal fin lobe length	33	—	31–43 (38)
Lower caudal fin lobe length	32	—	33–36 (34)

Modes or means in parentheses include data from types

(vs. six in the latter), unbranched pectoral fin rays (vs. almost branched) and one supraneural bone (vs. three), and in lateral line squamation on the caudal fin membrane (see following section; this study).

Although Sauvage (1881, 1891) reported *Polynemus astrolabi* (= *G. decadactylus*) from Mauritius, Indian Ocean (Fig. 2), the species is generally distributed from Morocco to Angola, west coast of Africa (Allen, 1981; Daget and Njock, 1986). In addition, the species has been

reported from Algeria, northern Africa (Allen, 1981; Daget and Njock, 1986) and Namibia, southern Africa (Penrith, 1982) (see Fig. 2). Because the Equatorial Current, which is the primary current influencing waters off Mauritius, flows from the equator to the Southwest Indian Ridge, it appears to be highly unlikely that the species can be transported from the west coast of Africa to Mauritius. Accordingly, the type locality (Mauritius) of *Polynemus astrolabi* is now considered to be erroneous.

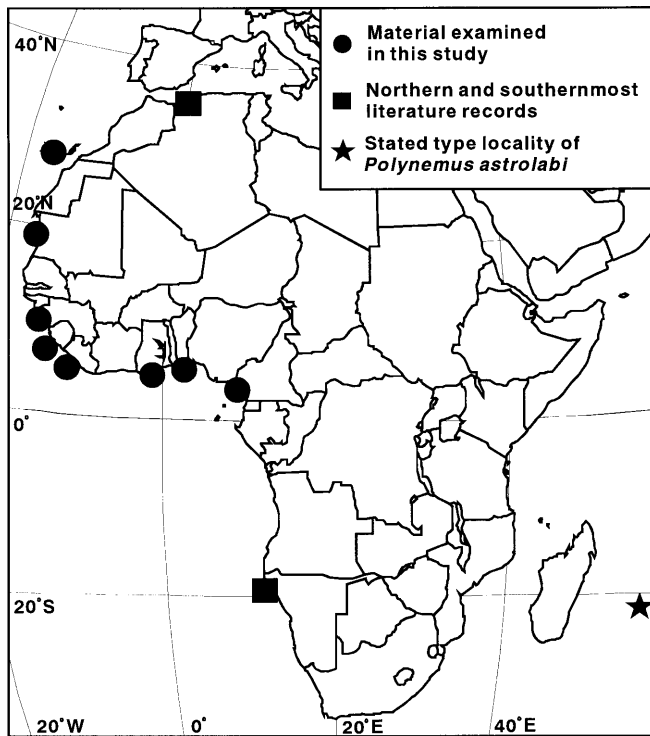


Fig. 2. Map showing distribution of *Galeoides decadactylus*

Two new diagnostic characters for *G. decadactylus* were found during this study. The lateral line of the species is unbranched on the caudal fin membrane, extending from the upper end of the gill opening to the lower end of the upper caudal fin lobe (Fig. 3), whereas it is either branched in other polynemid species (e.g., *Polydactylus approximans* and *Polydactylus virginicus*), or extends to the middistal margin of the caudal fin membrane (e.g., *Filimanus perplexa* and *F. similis*) or the upper end of the lower caudal fin lobe (e.g., *Polydactylus plebeius* and *Polydactylus sextarius*). Furthermore, *G. decadactylus* possesses only a single supraneural bone (0/2/; Fig. 4), compared with 2 or 3 in all other polynemid species. The foregoing characters were considered to be unique to *G. decadactylus*, following comparisons with 30 other polynemid species (see Comparative material examined). The characters were also recognized as generic characters of the genus *Galeoides*, being considered to be monotypic (this study). In addition to the characters, the genus was known to be characterized by the following diagnostic characters: pectoral fin base including pectoral filaments greater than or equal to upper jaw length, a black spot present below anterior part of lateral line in fresh specimens and swimbladder extending beyond anal fin origin (Feltes, 1993). It was also determined during this study that the number of gill rakers of *G. decadactylus* tended to decrease with overall fish growth (Fig. 5).

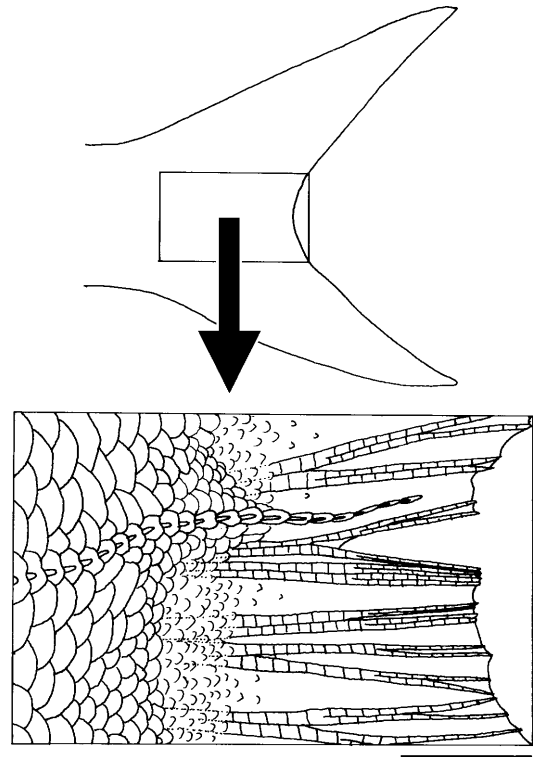


Fig. 3. Lateral line squamation on the caudal fin membrane in *Galeoides decadactylus* (USNM 42196, 158 mm SL). Arrow indicates enlargement. Bar 5 mm

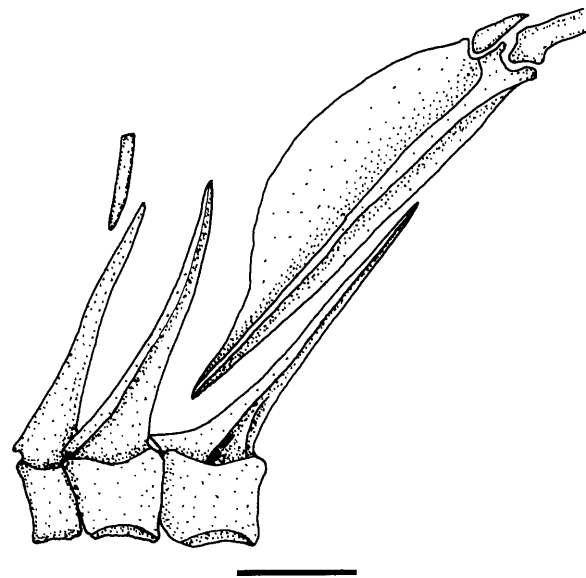


Fig. 4. Supraneural bone, anterior neural spines and first proximal pterygiophore of *Galeoides decadactylus* (MNHN 9727, 190 mm SL; holotype of *Polynemus astrolabi*). Bar 5 mm

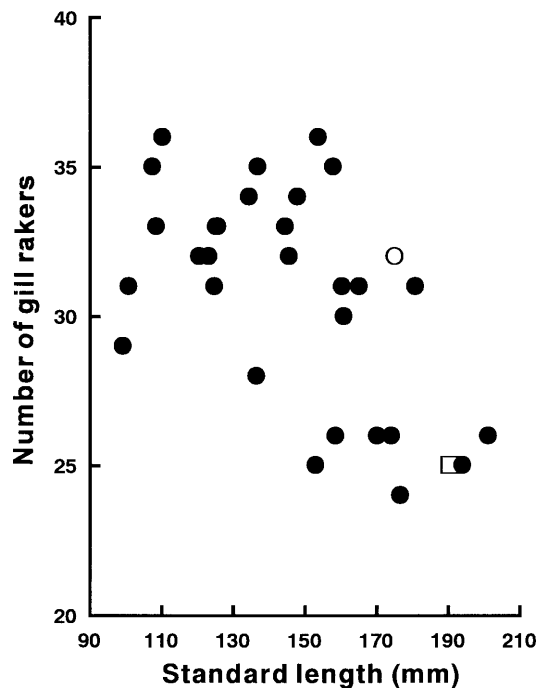


Fig. 5. Relationship between standard length and number of gill rakers in *Galeoides decadactylus*. Open square, open circle and closed circles symbols indicate holotype of *Polynemus astrolabi*, holotype of *P. decadactylus* and other specimens of *Galeoides decadactylus*, respectively

Comparative material examined. *Eleutheronema tetradactylum* (Shaw): FRLM 23412, 228 mm SL, Rumahtiga fish market, Poka, Ambon, Indonesia. *E. tridactylum* (Bleeker): USNM 72737, 180 mm SL, Jakarta, Java, Indonesia. *Filimanus heptadactyla* (Cuvier in Cuvier and Valenciennes): NTM S. 14784-007, 2 specimens, 112–113 mm SL, Gadong Ikan Pasar, Brunei. *F. hexanema* (Cuvier in Cuvier and Valenciennes): RMNH 443, 108 mm SL, Java, Indonesia. *F. perplexa* Feltes: PMBC 5913, 111 mm SL, Phuket Island, Thailand. *F. sealei* (Jordan and Richardson): USNM 57844 (holotype of *P. opercularis* Seale and Bean, 1907), 123 mm SL, Zamboanga, Philippines. *F. similis* Feltes: USNM 304495 (holotype), 99 mm SL, Beruwella, Sri Lanka. *F. xanthonema* (Valenciennes in Cuvier and Valenciennes): MNHN A. 3033 (lectotype and paralectotype), 2 specimens, 109–110 mm SL, Pondicherry, India. *Leptomelanosoma indicum* (Shaw): MUFS 17010, 215 mm SL, Chinatown market, Singapore. *Parapolynemus verekeri* (Saville-Kent): AMS I. 2770 and 2771 (lectotype and paralectotype), 2 specimens, 54–72 mm SL, Ord River, Cambridge Gulf, Northern Territory, Australia. *Pentanemus quinquarius* (Linnaeus): USNM 348378, 2 specimens, 94–110 mm SL, Shama Bay, Ghana, West Africa. *Polydactylus approximans* (Lay and Bennett): USNM 65621, 153 mm SL, Panama. *Polydactylus macrochir* (Günther): BMNH 1866.2.13.17 (holotype), 171 mm SL, New South Wales, Australia. *Polydactylus macrophthalmus* (Bleeker): MUFS 18293, 88 mm SL, locality unknown. *Polydactylus microstomus* (Bleeker): MUFS 14159, 154 mm SL, Ouenghi River, New Caledonia. *Polydactylus multiradiatus* (Günther): FRLM 23414, 130 mm SL, Rumahtiga fish market, Poka, Ambon, Indo-

nesia. *Polydactylus nigripinnis* Munro: FRLM 21472, 139 mm SL, Ambon, Indonesia. *Polydactylus octonemus* (Girard): USNM 739 (syntypes), 2 specimens, 62–79 mm SL, Brazos, Santiago. *Polydactylus oligodon* (Günther): NSMT-P 54096, 155 mm SL, off Surinam, eastern South America. *Polydactylus opercularis* (Gill): USNM 41054, 184 mm SL, Panama. *Polydactylus plebeius* (Broussonet): URM-P 24672, 132 mm SL, Nakagusuku fish market, Okinawa Island, Japan. *Polydactylus quadrifilis* (Cuvier in Cuvier and Valenciennes): ISH 298-1959, 214 mm SL, Guinea, West Africa. *Polydactylus sexfilis* (Valenciennes in Cuvier and Valenciennes): MNHN A. 3027, 9728, 9731 (syntypes of *Polynemus sexfilis*), 3 specimens, 92–265 mm SL, Mauritius. *Polydactylus sextarius* (Bloch and Schneider): AMS I 28114-009, 2 specimens, 102–104 mm SL, West of northwest Madagascar; ANSP 52870, 135 mm SL, Hong Kong, China; ANSP 54807, 59 mm SL, Durban, Natal, South Africa; ANSP 76415, 92 mm SL, Tai Po, China; ANSP 77390, 127 mm SL, Tugela River, Natal, South Africa; ANSP 86372, 2 specimens, 94–136 mm SL, Delagoa Bay, Mozambique; ANSP 163038, 89 mm SL, San-Tu, Fukien, China; FMNH 58981, 120 mm SL, Colombo, Sri Lanka; MUFS 15628-15630, 3 specimens, 128–145 mm SL, Oshima, Meitsu, Nango, Miyazaki, Japan; MUFS 16643-16647, 5 specimens, 151–168 mm SL, Kushima, Miyazaki, Japan; SFU 1669, 126 mm SL, Hainan Island, China; SFU 3833-3834, 2 specimens, 98–124 mm SL, Hong Kong, China; SFU 3835, 139 mm SL, Guangzhou, China; SFU 3871, 127 mm SL, Dongshan, Fukien, China; UMMZ 196223, 124 mm SL, Jakarta, Java, Indonesia; UMMZ 219965, 142 mm SL, Vietnam; YCM-P 6200, 104 mm SL, Taiwan; ZMB 565 (holotype of *Polynemus sextarius*), 125 mm SL, Tranquebar, India; ZMH 13665, 86 mm SL, Java, Indonesia; ZMH 13666, 2 specimens, 67–78 mm SL, China. *Polydactylus virginicus* (Linnaeus): USNM 133675, 225 mm SL, Port-au-Prince, Haiti. *Polynemus dubius* Bleeker: URM-P 13930, 138 mm SL, Samyan market, Bangkok, Thailand. *Polynemus hornadayi* Myers: USNM 100632 (holotype), 193 mm SL, Sadong River, Sarawak, Malaysia. *Polynemus melanochir* Valenciennes in Cuvier and Valenciennes: URM-P 29087, 147 mm SL, Samyan market, Bangkok, Thailand. *Polynemus multifilis* Schlegel in Temminck and Schlegel: NSMT-P 54112, 145 mm SL, upper stream of Chao Praya basin, Thailand. *Polynemus paradiseus* Linnaeus: URM-P 10847, 165 mm SL, Hooghly River, Calcutta, India.

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Literature Cited

- Ahlstrom EH, Butler JL, Sumida BY (1976) Pelagic stromateoid fishes (Pisces, Perciformes) of the eastern Pacific: kinds, distributions, and early life histories and observations on five of these from the Northwest Atlantic. *Bull Mar Sci* 26:285–402
- Allen GR (1981) Polynemidae. In: Fischer W, Bianchi G, Scott WB (eds) FAO species identification sheets for fishery purposes: eastern Central Atlantic. Fishing area 34 and 47 (in part), vol 3. FAO, Ottawa, pp 1–2 + POLYN Gal 1–POLYN Polyd 4
- Daget J, Njock JC (1986) Polynemidae. In: Daget J, Gosse J-P, Thys van den Audenaerde DFE (eds) Checklist of the freshwater fishes of Africa, vol 2. ISNB, MRAC and ORSTOM, Bruxelles, Tervuren and Paris, pp 352–354
- Feltes RM (1991) Revision of the polynemid fish genus *Filimanus*, with the description of two new species. *Copeia* 1991:302–322
- Feltes RM (1993) *Parapolynemus*, a new genus for the polynemid fish previously known as *Polynemus verekeri*. *Copeia* 1993:207–215
- Fricke R (1999) Fishes of the Mascarene Islands (Réunion, Mauritius, Rodriguez). An annotated checklist with descriptions of new species. Koeltz, Köenigstein
- Günther A (1860) Catalogue of the acanthopterygian fishes in the collection of the British Museum (Natural History), vol 2. Squamipinnes, Cirrhitidae, Triglidae, Trachinidae, Sciaenidae, Polynemidae, Sphyraenidae, Trichiuridae, Scombridae, Carangidae, Xiphiidae. British Museum, London
- Hubbs CL, Lagler KF (1958) Fishes of the Great Lakes region. *Bull Cranbrook Inst Sci* 26:1–213
- Leviton AE, Gibbs RH Jr, Heal E, Dawson CE (1985) Standards in herpetology and ichthyology: Part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia* 1985:802–832
- Mabee PM (1988) Supraneural and predorsal bones in fishes: development and homologies. *Copeia* 1988:827–838
- Motomura H, Iwatsuki Y, Kimura S, Yoshino T (2000) Redescription of *Polydactylus macrochir* (Günther, 1867), a senior synonym of *P. sheridani* (Macleay, 1884) (Perciformes: Polynemidae). *Ichthyol Res* 47:327–333
- Patterson C, Johnson GD (1995) The intermuscular bones and ligaments of teleostean fishes. *Smithson Contrib Zool* 559:1–83
- Penrith MJ (1982) Notes on marine fishes collected in the vicinity of Bosluisbaai. *Madoqua* 13:159–168
- Sauvage HE (1881) Description de quelques poissons d'espèces nouvelles de la collection du Muséum d'histoire naturelle. *Bull Soc Philomath Paris* 5:101–104
- Sauvage HE (1891) Histoire physique, naturelle et politique de Madagascar. Histoire naturelle des poissons. *Hist Nat Poiss Madagascar* 16:1–543