

# *Polynemus kapuasensis*, a new threadfin (Perciformes: Polynemidae) from western Kalimantan, Indonesia, and a redescription of *P. multifilis* Temminck & Schlegel, 1843

H. Motomura & M.J.P. van Oijen

Motomura, H. & M.J.P. van Oijen. *Polynemus kapuasensis*, a new threadfin (Perciformes: Polynemidae) from western Kalimantan, Indonesia, and a redescription of *P. multifilis* Temminck & Schlegel, 1843.

Zool. Med. Leiden 77 (22), 30.xii.2003: 393-407, figs 1-5.— ISSN 0024-0672.

H. Motomura, Ichthyology, Australian Museum, 6 College Street, Sydney, New South Wales 2010, Australia (e-mail: motomurah@austmus.gov.au).

M.J.P. van Oijen, National Museum of Natural History, P. O. Box 9517, 2300 RA Leiden, Netherlands (e-mail: oijen@naturalis.nnm.nl).

Key words: Polynemidae; *Polynemus*; new species; redescription; Kalimantan.

*Polynemus multifilis* Temminck & Schlegel, 1843, is redescribed and its synonymy, authorship, type material status and distribution are discussed. In addition, a new species, *P. kapuasensis*, previously identified as *P. multifilis*, is described from the Kapuas River, western Kalimantan, Indonesia on the basis of 12 specimens. *Polynemus kapuasensis* differs from *P. multifilis* in having higher counts of pectoral filaments (usually 15 on each side of body vs. 14 in the latter), pored lateral line scales [mode 103 (range 100-110) vs. 86 (83-99)], scale rows above lateral line [10 (9-11) vs. 8 (7 or 8)] and caudal peduncle scales [38 (35-40) vs. 32 (28-37)], and a shorter pectoral fin [mean 31% (range 29-33%) of standard length], its posterior tip not extending beyond level of anal fin origin in adults [vs. 36% (33-38%), its posterior tip reaching or extending beyond level of anal fin origin throughout life]. The former is currently known only from the Kapuas River system, whereas the latter is known from Thailand (the Chao Phraya River system) and Indonesia (Sumatra and southern Kalimantan). A key to the *Polynemus* species occurring in Kalimantan is provided.

## Introduction

The Southeast Asian freshwater threadfin, *Polynemus multifilis*, originally described from near Banjarmasin, southern Kalimantan (= Borneo), Indonesia on the basis of a single specimen by Temminck & Schlegel (1843), has been recognized as a valid species (e.g., Rainboth, 1996; Randall & Lim, 2000; Feltes, 2001). The species is diagnosed by having 13 or more pectoral filaments, whereas other congeners have seven filaments (Motomura & Sabaj, 2002; Motomura et al., 2002b; Motomura, 2003).

During examination of a large number of specimens of *P. multifilis* from a wide geographical range in Southeast Asia, we recognized that specimens collected from the Kapuas River, western Kalimantan and previously identified as *P. multifilis* (e.g., Myers, 1936; Roberts, 1989), clearly differ from specimens, including the type, of *P. multifilis* collected from other localities in several aspects, including pectoral filament counts, lateral line scale counts, scale rows above the lateral line, caudal peduncle scale counts, gill raker counts and pectoral fin ray length. Thus, the population of the Kapuas River and *P. multifilis* are considered to represent distinct species.

This paper includes a description of the new species (as *P. kapuasensis*) and a redescription of *P. multifilis*. Synonymy, authorship, type material status and distribution of *P. multifilis* are also discussed. In addition, a key to the *Polynemus* species occurring in Kalimantan is provided.

## Methods

Counts and measurements follow Motomura et al. (2002a). Pectoral fin ray counts include only those interconnected by a membrane, the lower free rays are considered separately; counts of pectoral filaments begin with the anterior element. Caudal peduncle scale counts are the number of the circumference scale rows crossing a line around the part of the peduncle where the count is lowest. Counts are given as the range with the mode in parentheses. Measurements are expressed as percentages of standard length (expressed as SL) with the mean in parentheses. Counts and measurements for the holotype of each species are in brackets. Terminology of supraneural bones follows Mabee (1988), and the formula for configuration of supraneural bones, anterior neural spines and anterior dorsal fin pterygiophores follow Ahlstrom et al. (1976). Osteological characters were confirmed from X-ray photos taken of all specimens. Descriptions of *Polynemus* species in the key are based on the publications of Motomura & Sabaj (2002), Motomura et al. (2002b) and Motomura (2003). Institutional codes follow Leviton et al. (1985), with an additional institutional abbreviation as follows: Raffles Museum of Biodiversity Research, Department of Biological Sciences, National University of Singapore (ZRC, formerly NMS).

## Systematics

*Polynemus kapuasensis* spec. nov.

(new name: Kapuas elegant paradise fish; figs. 1, 3a, 6)

Material.— Holotype, CAS 47198, 151 mm SL, Kapuas River Basin, fish market at Sintang, Kalimantan, Indonesia, 19.vii.-1.viii.1976, T.R. Roberts & S. Woerjoatmodjo. Paratypes (11 specimens, 33-172 mm SL), CAS 217348, 3 specimens, 133-172 mm SL, same data as holotype; CAS 49454, 5 specimens, 33-76 mm SL, Kapuas River opposite Sliat (0°20'30"N, 111°47'E), Kalimantan, Indonesia, 17.viii.1976, T. R. Roberts & S. Woerjoatmodjo; CAS 217161, 3 specimens, 83-108 mm SL, Danau Mawan, near Kampong Nibung (0°39'N, 112°10'30"E), ca. 100 km northeast of Sintang and 7 km northeast of Selimbau, Kapuas River Basin, Kalimantan, Indonesia, 5.vii.1976, T.R. Roberts & S. Woerjoatmodjo.

Diagnosis.— A species of *Polynemus* with the following combination of characters: 8 first dorsal fin spines; 15 or 16 (mode 15) second dorsal fin soft rays; 3 anal fin spines; 11 or 12 (12) anal fin soft rays; 15-17 (15) pectoral fin rays; 15 (rarely asymmetrically 15 and 16, or 16 on each side of body) pectoral filaments, 13th probably longest; 100-110 (103) pored lateral line scales; 9-11 (10) scale rows above lateral line, 17-20 (18) below; 35-40 (38) caudal peduncle scales; 9-11 (11) gill rakers in upper series, 16-18 (16 or 18) in lower, 25-29 (28) total; vomer with villiform teeth; head length relatively small [mean 23% (range 22-23%) of SL] in adults (over ca. 130 mm SL); anal fin base length relatively small [14% (12-14%) of SL]; pectoral fin length relatively small [31% (29-33%) of SL], posterior tip of pectoral fin not extending beyond level of anal fin origin in adults (over ca. 70 mm SL); pectoral fin not black.

Description.— First dorsal fin with 8 spines; second dorsal fin with 1 spine and 15 or 16 (mode 15) [15 in holotype] soft rays; anal fin with 3 spines and 11 or 12 (12) [11] soft rays; pectoral fin rays 15-17 (15) [15]; pectoral filaments 15 on each side of body, rarely 16 on each side or asymmetrically 15 and 16 (15 on each side) [15 on each side]; pelvic

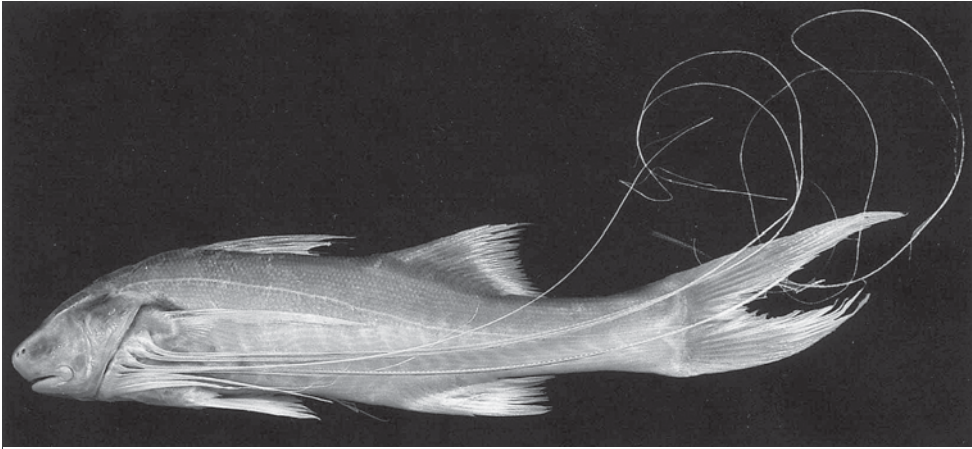


Fig. 1. *Polynemus kapuasensis*, holotype, CAS 47198, 151 mm SL, Kapuas River Basin, fish market at Sintang, Kalimantan, Indonesia.

fin with 1 spine and 5 soft rays; pored lateral line scales 100-110 (103) [103]; scales above lateral line 9-11 (10) [10]; scales below lateral line 17-20 (18) [18]; caudal peduncle scales 35-40 (38) [39]; upper limb gill rakers 9-11 (11) [10], lower limb 16-18 (16 and 18) [17], total 25-29 (28) [27]; head length 22-23% of SL (mean 23%) [23% in holotype] in adult (over ca. 130 mm SL), 24-29 (27) in juveniles (less than ca. 110 mm SL); body depth at first dorsal fin origin 23-25 (24) [25]; body depth at second dorsal fin origin 21-25 (23) [24]; body width at pectoral fin base 12-13 (12) [12]; snout length 5-6 (5) [5]; eye diameter 2-3 (3) [3]; orbit diameter 3-4 (3) [3]; interorbital width 7-8 (7) [7]; postorbital length 15-17 (16) [15]; upper jaw length 10-11 (10) [10]; depth at posterior margin of maxilla 2 (2) [2]; pre-first dorsal fin length 32-33 (32) [33]; pre-second dorsal fin length 57-60 (59) [60]; pre-anal fin length 56-61 (59) [59]; pelvic fin origin to anal fin origin 28-32 (30) [31]; second dorsal fin base length 16-19 (18) [18]; anal fin base length 12-14 (14) [14]; longest pectoral fin length 29-33 (31) [32]; longest pectoral filament (probably 13th) length 332-397, based only on 2 specimens (365) [332]; pectoral fin base including pectoral filaments base 15-16 (15) [15]; longest pelvic fin (2nd) length 19-20 (19) [19]; longest first dorsal fin spine (3rd) length 22-23 (22) [23]; second dorsal fin spine length 7-10 (9) [9]; longest second dorsal fin ray length 20-21 (21) [slightly broken]; longest anal fin spine (3rd) length 9-12 (10) [10]; longest anal fin ray length 19-23 (21) [21]; caudal peduncle length 27-29 (28) [29]; caudal peduncle depth 10-11 (11) [11]; upper caudal fin lobe length 41-51 (46) [42]; lower caudal fin lobe length 35-50 (40) [35].

Body oblong, compressed; occipital profile nearly straight or slightly protruding (including holotype) throughout life; upper jaw lip poorly developed; lower jaw lip well developed, dentary teeth restricted to dorsal surface; maxilla covered with small scales; posterior margin of preopercle serrated; posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid; adipose eyelid poorly-developed; teeth villiform in broad bands on vomer, palatines and ectopterygoids; ectopterygoids very small, length less than half that of palatines; all first dorsal fin spine bases of similar thickness; first spine of first dorsal fin very small; third spine of first dorsal fin

longest; first spine of anal fin very small, sometimes buried under the subcutaneous tissue (including holotype); third spine of anal fin longest; all pectoral fin rays unbranched, inserted near midline of body; posterior tip of pectoral fin not extending beyond level of anal fin origin in adults (over ca. 70 mm SL, including holotype) or extending beyond level of anal fin origin in juveniles (less than ca. 50 mm SL); first pectoral filament shortest, extending beyond level of pelvic fin origin; second to seventh pectoral filaments not reaching to level of posterior tip of pelvic fin; eighth and ninth pectoral filaments extending beyond level of posterior tip of pelvic fin, but not reaching to level of anal fin origin; tenth pectoral filament extending slightly beyond level of anal fin origin; eleventh pectoral filament extending slightly beyond level of posterior end of anal fin base; twelfth pectoral filament extending beyond level of posterior margin of central caudal fin, but not reaching to level of posterior tips of caudal fin lobes; thirteenth to fifteenth (or sixteenth if present) pectoral filaments longer than total length (filaments tips easily damaged, including holotype); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal fin membrane; formula for configuration of supraneural bones, anterior neural spines and anterior dorsal pterygiophores /0/0+2/1+1/1/1/1+1/ in holotype and /0/0+2/1+1/1/1/1/1/ in paratypes; 10 + 15 vertebrae. swimbladder present.

Colouration.— Live colours, based on colour figure of Kottelat et al. (1993: pl. 62; 127 mm SL, Kapuas River, as *Polistonemus multifilis*): head and body bluish gray dorsally, silver ventrally; bases of first and second dorsal, anal and caudal fins reddish gray; first and second dorsal and caudal fins grayish white; posterior part of anal fin bluish white, remaining parts of anal and pelvic fins and pectoral filaments white; pectoral fin translucent. Colour of preserved specimens: head and body olive gray dorsally, pale yellow ventrally; posterior margins of first and second dorsal, pelvic, anal and caudal fins semitransparent, remaining parts of those fins beige; pectoral fin transparent; pectoral filaments pale yellow; scales above pectoral fin base dark gray.

Distribution.— *Polynemus kapuasensis* is currently known only from the Kapuas River system, western Kalimantan, Indonesia.

Etymology.— The specific name "*kapuasensis*" is based on the Kapuas River where the species is distributed.

*Polynemus multifilis* Temminck & Schlegel, 1843  
(elegant paradise fish; figs. 2, 3b, 4, 5, 6)

*Polynemus multifilis* Temminck & Schlegel, 1843: 29 (type locality: near Banjarmasin, southern Kalimantan, Indonesia); Schlegel, 1851: 11 (more detailed description).

*Polynemus quatordecimfilis* Pel, 1851: 10 (type locality: near Banjarmasin, southern Kalimantan, Indonesia; ?objective synonym of *Polynemus multifilis* Temminck & Schlegel, 1843; see Discussion); Gill, 1861: 277 (as *Polynemus quatuordecimalis*; incorrect spelling); Roberts, 1989: 166 (as *Polynemus quaterdecimfilis*; incorrect spelling).

*Polynemus polydactylus* Bleeker, 1852: 417 (type locality: Banjarmasin, southern Kalimantan, Indonesia; primary homonym of *Polynemus polydactylus* Vahl, 1798; see Discussion).

*Polistonemus multifilis*; Gill, 1861: 277; Kottelat et al., 1993: 178 (as *Polystonemus multifilis*; incorrect spelling).

Material.— Holotype, RMNH 436, 136 mm SL, near Banjarmasin, southern Kalimantan, Indonesia, 1836, S. Müller. Other material (36 specimens, 53-142 mm SL), ANSP 177981, 17 specimens, 53-142 mm

SL, Chao Phraya River in the vicinity of Phayuha Khiri, Thailand (15°27'14"N, 100°08'03"E); ANSP 177983, 4 specimens, 59-112 mm SL, Chao Phraya River at Phayuha Khiri, Thailand; BSKU 18416-18418, 3 specimens, 112-117 mm SL, Chao Phraya River, Thailand; NSMT-P 54112, 144 mm SL, Chao Phraya River at Nakhon Sawan, Thailand; RMNH 6001 (holotype of *Polynemus polydactylus* Bleeker), 133 mm SL, Banjarmasin, Kalimantan, Indonesia; UMMZ 171713, 132 mm SL, Moesi at Moeara Klingi, Sumatra, Indonesia; UMMZ 195406, 4 specimens, 67-78 mm SL, Koke Tong Canal, tributary of Chao Phraya River, 17.5 km north of Ayutthaya, Thailand; ZMH 13651, 117 mm SL, Palembang, Sumatra, Indonesia; ZRC 43075, 111 mm SL, Nipah Panjang, Jambi (= Telanai Pura), Sumatra, Indonesia; ZRC 43175-43176, 2 specimens, 107-118 mm SL, Batang Hari River at Jambi, Sumatra, Indonesia.

Diagnosis.— A species of *Polynemus* with the following combination of characters: 8 first dorsal fin spines; 14-16 (mode 15) second dorsal fin soft rays; 3 anal fin spines; 11-13 (12) anal fin soft rays; 14-16 (15) pectoral fin rays; 14 (rarely 13 on each side of body, asymmetrically 13 and 14, or 14 and 15) pectoral filaments, 12th probably longest; 83-99 (86) pored lateral line scales; 7 or 8 (8) scale rows above lateral line, 14-18 (15) below; 28-

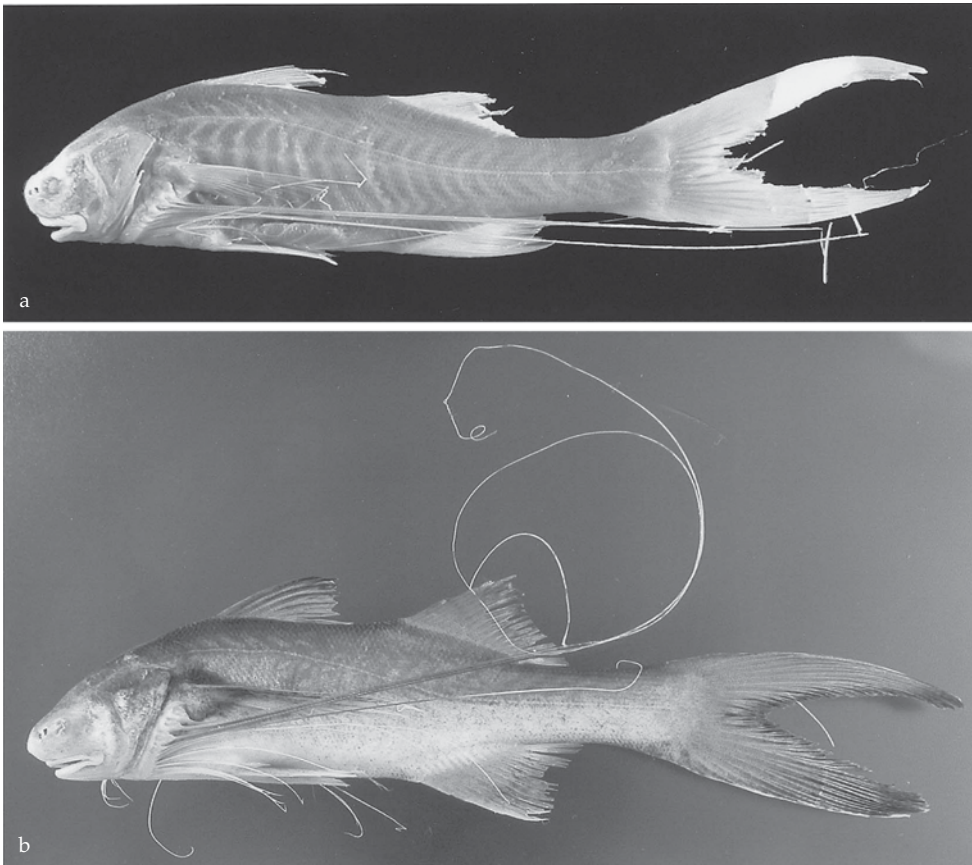


Fig. 2. *Polynemus multifilis*: a, holotype, RMNH 436, 136 mm SL, Banjarmasin, southern Kalimantan, Indonesia; b, non-type, ANSP 177981, 128 mm SL, Chao Phraya River in vicinity of Phayuha Khiri, Thailand.

37 (32) caudal peduncle scales; 9-11 (10) gill rakers in upper series, 15-17 (16) in lower, 24-27 (26) total; vomer with villiform teeth; head length relatively large [mean 25% (range 23-29%) of SL]; anal fin base length relatively large [15% (15-17%) of SL]; pectoral fin length relatively large [36% (33-38%) of SL], posterior tip of pectoral fin reaching or extending beyond level of anal fin origin throughout life; pectoral fin not black.

Description.— First dorsal fin with 8 spines; second dorsal fin with 1 spine and 14-16 (mode 15) [15 in holotype] soft rays; anal fin with 3 spines and 11-13 (12) [12] soft rays; pectoral fin rays 14-16 (15) [15]; pectoral filaments 14 on each side of body, rarely 13 on each side or asymmetrically 13 and 14, or 14 and 15 (14 on each side) [14 on each side]; pelvic fin with 1 spine and 5 soft rays; pored lateral line scales 83-99 (86) [99]; scales above lateral line 7 or 8 (8) [8]; scales below lateral line 14-18 (15) [18]; caudal peduncle scales 28-37 (32) [36]; upper limb gill rakers 9-11 (10) [10], lower limb 15-17 (16) [17], total 24-27 (26) [27]; head length 23-29% of SL (mean 25%) [24% in holotype]; body depth at first dorsal fin origin 23-27 (24) [26]; body depth at second dorsal fin origin 23-26 (24) [25]; body width at pectoral fin base 12-16 (14) [14]; snout length 5-6 (6) [5]; eye diameter 3-4 (3) [3]; orbit diameter 3-5 (4) [3]; interorbital width 7-8 (7) [7]; postorbital length 14-17 (16) [16]; upper jaw length 9-11 (10) [10]; depth at posterior margin of maxilla 2-3 (2) [2]; pre-first dorsal fin length 32-35 (33) [32]; pre-second dorsal fin length 59-62 (60) [60]; pre-anal fin length 57-61 (60) [59]; pelvic fin origin to anal fin origin 29-32 (30) [29]; second dorsal fin base length 17-19 (18) [18]; anal fin base length 15-17 (15) [15]; longest pectoral fin length 33-38 (36) [broken]; longest pectoral filament (probably 12th) length 182-376 (295) [broken]; pectoral fin base including pectoral filaments base 15-17 (16) [16]; longest pelvic fin (2nd) length 17-20 (19) [20]; longest first dorsal fin spine (3rd) length 19-22 (21) [21]; second dorsal fin spine length 6-9 (8) [broken]; longest second dorsal fin ray length 20-23 (22) [broken]; longest anal fin spine (3rd) length 7-11 (9) [9]; longest anal fin ray length 20-23 (21) [22]; caudal peduncle length 25-28 (26) [28]; caudal peduncle depth 11-12 (11) [11]; upper caudal fin lobe length 38-46 (43) [46]; lower caudal fin lobe length 32-41 (38) [40].

Body oblong, compressed; occipital profile nearly straight (including holotype [= RMNH 436]) or slightly protruding throughout life; upper jaw lip poorly developed; lower jaw lip well developed, dentary teeth restricted to dorsal surface; maxilla covered with small scales; posterior margin of preopercle serrated; posterior margin of maxilla extending beyond level of posterior margin of adipose eyelid; adipose eyelid poorly-developed; teeth villiform in broad bands on vomer, palatines and ectopterygoids; ectopterygoids very small, length less than half that of palatines; all first dorsal fin spine bases of similar thickness; first spine of first dorsal fin very small; third spine of first dorsal fin longest; first spine of anal fin very small, sometimes buried under the subcutaneous tissue (including holotype); third spine of anal fin longest; all pectoral fin rays unbranched, inserted near midline of body; posterior tip of pectoral fin reaching (including holotype) or extending beyond level of anal fin origin; first pectoral filament shortest, extending beyond level of pelvic fin origin (first filament broken in holotype); second to sixth pectoral filaments not reaching to level of posterior tip of pelvic fin (fifth filament broken in holotype); seventh and eighth pectoral filaments not reaching (including holotype) or extending beyond level of posterior tip of pelvic fin (eighth filament broken in holotype); ninth pectoral

Table 1. Frequency distribution of fin ray counts in *Polynemus kapuasensis* and *P. multifilis*. D., A. and P. indicate dorsal, anal and pectoral fins, respectively.

	2 <sup>nd</sup> D. soft rays			A. soft rays			P. rays				P. filaments (one side/other side)							
	14	15	16	11	12	13	14	15	16	17	13/13	13/14	14/14	14/15	15/15	15/16	16/16	
<i>P. kapuasensis</i>		9	3	3	9		9	2	1						10	1	1	
<i>P. multifilis</i>	2	24	10	7	28	1	1	29	6		1	3	29	2				

Table 2. Frequency distribution of pored lateral line scale counts in *Polynemus kapuasensis* and *P. multifilis*.

	Pored lateral line scales																						
	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	-	110
<i>P. kapuasensis</i>																		2	2	3	4		1
<i>P. multifilis</i>	2	1	3	7	3	3	3	3	2	1	1	1	2	1	1		1						

Table 3. Frequency distribution of scale counts above and below lateral line in *Polynemus kapuasensis* and *P. multifilis*.

	Scales above lateral line					Scales below lateral line						
	7	8	9	10	11	14	15	16	17	18	19	20
<i>P. kapuasensis</i>			1	10	1				1	5	4	2
<i>P. multifilis</i>	7	28				3	17	12	1	2		

Table 4. Frequency distribution of caudal peduncle scale counts in *Polynemus kapuasensis* and *P. multifilis*.

	Caudal peduncle scales												
	28	29	30	31	32	33	34	35	36	37	38	39	40
<i>P. kapuasensis</i>								1	2		6	2	1
<i>P. multifilis</i>	3	2	9	3	13		1		1	1			

Table 5. Frequency distribution of gill raker (GR) counts (upper, lower and total) in *Polynemus kapuasensis* and *P. multifilis*.

	Upper GR			Lower GR				Total GR					
	9	10	11	15	16	17	18	24	25	26	27	28	29
<i>P. kapuasensis</i>	1	5	6		4	3	4		1	2	2	4	3
<i>P. multifilis</i>	7	28	1	13	18	5		4	12	15	5		

filament extending well beyond level of posterior tip of pelvic fin, sometimes extending beyond level of anal fin origin (including holotype); tenth pectoral filament extending beyond level of anal fin origin, rarely extending beyond level of posterior end of anal fin base (tenth to fourteenth filaments broken in holotype); eleventh pectoral filament extending beyond level of posterior end of hypural plate, but not reaching to level of posterior tips of caudal fin lobes; twelfth to fourteenth (or fifteenth if present) pectoral filaments longer than total length (filaments tips easily damaged); lateral line simple, extending from upper end of gill opening to mid-distal margin of caudal fin membrane; formula for configuration of supraneural bones, anterior neural spines and anterior dorsal pterygiophores /0/0+2/1+1/1/1/ 1/1/ (including holotype), /0/0+2/1/1+1/1/1/1/ or /0+2/1+1/1/1/1/1/; 10 + 15 vertebrae. swimbladder present.

Colouration.— Live colours, based on colour photographs of a live fish (see fig. 4):

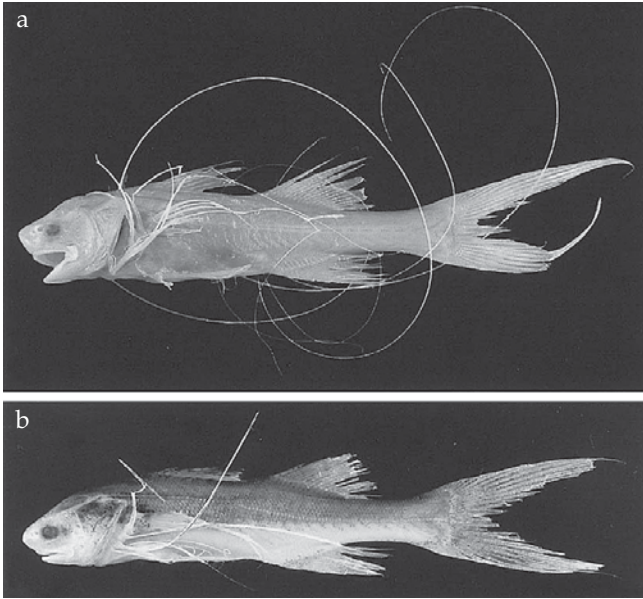


Fig. 3. Juveniles of: a, *Polynemus kapuasensis*, paratype, CAS 49454, 47 mm SL, Kapuas River; and b, *P. multifilis*, ANSP 177981, 53 mm SL, Chao Phraya River.

head and body dark purplish blue dorsally, silver ventrally; bases of first and second dorsal, anal and caudal fins grayish white, anterior margin of pelvic fin white, remaining parts of those fins semitransparent; pectoral fin semitransparent; pectoral filaments white. Colour of preserved specimens: head and body dark gray dorsally, light reddish yellow ventrally; posterior tip of first dorsal fin dark brownish gray, remaining part pale yellow; posterior margins of second dorsal, pelvic, anal and caudal fins semitransparent, remaining part of those fins light yellow; pectoral fin transparent; pectoral filaments pale yellow; scales above pectoral fin base dark gray.

Distribution.— *Polynemus multifilis* is currently known from Thailand (the Chao Phraya River system) and Indonesia (Sumatra and southern Kalimantan). The species does not occur in the Kapuas River, western Kalimantan, where *P. kapuasensis* is distributed. Although Rainboth (1996) wrote that *P. multifilis* occurs in the Mekong delta and probably also in Cambodia, we could not find any specimens of *P. multifilis* collected from Vietnam and Cambodia in museum collections and in any other reliable reports on the species from the area. It is not likely that *P. multifilis* is distributed in the Mekong River system.

Behaviour.— Most *Polynemus* species are known to generally inhabit muddy waters (Motomura & Sabaj, 2002; Motomura, 2003). The pectoral filaments in *Polynemus* species are probably used as a sense organ to search for food in muddy water as it is difficult to depend on eyesight. As corroborating evidence, aquarium observations of *Polynemus* species, including *P. kapuasensis* and *P. multifilis*, showed that the species always spread the pectoral filaments forward and/or downward when swimming (fig. 4). They preyed on small crustaceans and other plankton only after contact with their long, spread pectoral filaments. Motomura et al. (2002c) reported that *Polydactylus* species search for food using both pectoral filaments and eyes, using filaments on the bottom and eyes in intermediate water. Compared to *Poly-*



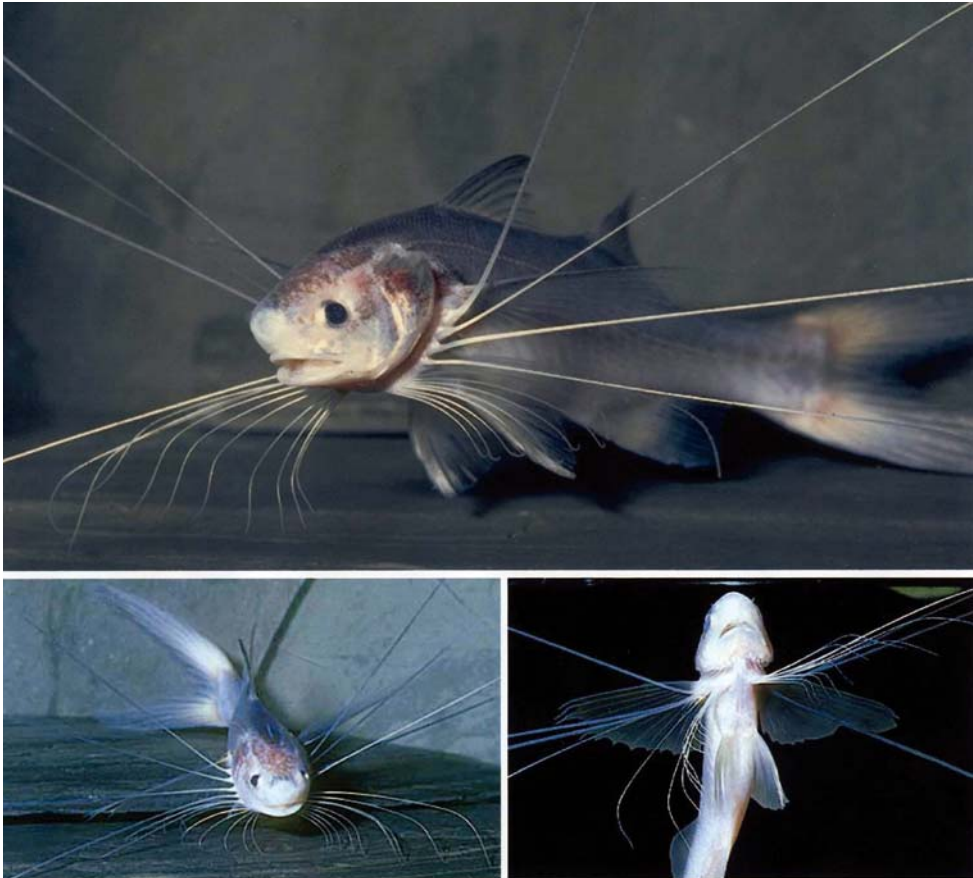


Fig. 4. Underwater photographs of *Polynemus multifilis*, collected from Thailand, specimen not preserved (photograph E. Schraml).

*dactylus*, *Polynemus* species are considered to be more heavily dependent on pectoral filaments to search for food.

### Discussion

The name, *Polynemus multifilis*, first appeared in a footnote of a description of specimens (collected by Bürger & von Siebold) of *Polynemus plebejus* Broussonet, 1782 (presently regarded as *Polydactylus plebeius*; see Motomura et al., 2001b; Motomura, 2002) by Temminck & Schlegel (1843). They described *Polynemus multifilis* in the footnote as follows (faithfully translated from the Dutch original; our notes in parentheses): 'Doubtlessly naturalists will be interested to hear that Mr Müller on the coast of this island (= Kalimantan) has discovered a polynemid that has 14 single rays on each side of the body, as long as those of *longifilis* (= *Polynemus longifilis* Cuvier in Cuvier & Valenciennes, 1829; presently regarded as a junior synonym of *Polynemus paradiseus* Linnaeus, 1758; see Motomura et al., 2002b): this new species will be placed in our gal-

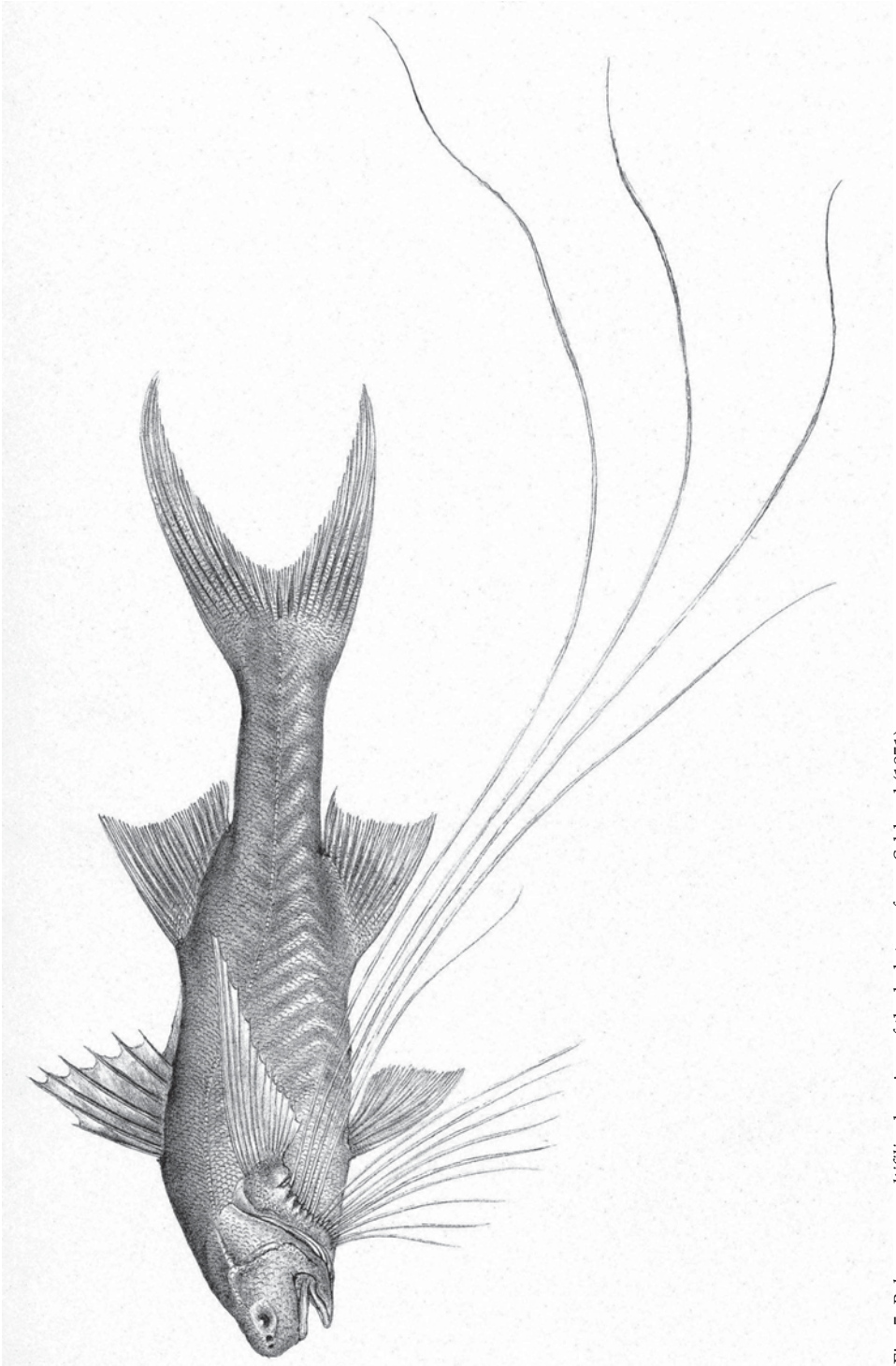


Fig. 5. *Polynemus multifilis*: drawing of the holotype from Schlegel (1851).

leries as *Pol. Multifilis*'. Many researchers (e.g., Bleeker, 1860; Myers, 1936; Rainboth, 1996; Eschmeyer, 1998; Feltes, 2001) indicated the authorship of *P. multifilis* as Schlegel. However, the authorship of the species should be treated as Temminck & Schlegel, because the whole of the volume on Fishes of the Fauna Japonica, including the footnotes, was written by Temminck & Schlegel.

In volume 1 of the *Bijdragen tot de Dierkunde*, Pel (1851) in a key to *Polynemus* species with free pectoral filaments longer than the body, briefly described *Polynemus quatordecimfilis* as a new species having 14 pectoral filaments on the basis of specimen(s) deposited in RMNH, but gave no indication of number of specimens, registration number or collector. On the next pages of this volume, Schlegel (1851) described *P. multifilis* in more detail on the basis of a single RMNH specimen and provided with a figure of the species (reproduced here in fig. 5).

Temminck & Schlegel (1843) referred to a specimen of *P. multifilis* collected by S. Müller (see above). Müller collected fishes on the south coast of Kalimantan in 1836 (Veth, 1879; Fransen et al., 1997) and his collection arrived in Leiden in 1838. Later, Schlegel (1851) stated that his description of *P. multifilis* was based on a single specimen collected by C.A.M. Schwaner at the south coast of Kalimantan. Dr Schwaner made zoological collections in Kalimantan in 1843, but these were not received in Leiden until 1845 (Fransen et al., 1997). Therefore, the specimen referred to as *P. multifilis* by Temminck & Schlegel (1843) cannot be the one collected by Schwaner, although Schlegel (1851) stated that *P. multifilis* was discovered and collected by Schwaner.

There is only one specimen registered as *P. multifilis* in the RMNH collection (RMNH 436). This specimen has been stored with an old label with the following data in handwriting: "*Polynemus multifilis* Fauna Jap. Borneo, S. Müller." Furthermore, in the registers of the fish section, the same data are given in the same handwriting. Accordingly, the specimen (RMNH 436, 136 mm SL) must be the holotype of *P. multifilis*.

The characters of the holotype examined here are well consistent with those of *P. multifilis* described by Schlegel (1851), with the exception of the following counts and measurements: fork length (152 mm in holotype examined here vs. 167 mm in Schlegel's description), upper caudal fin lobe (63 mm vs. 49), head length (6.2 in total length vs. 5), body depth (5.7 in total length vs. 4.25), second dorsal fin soft rays (15 vs. 16) and anal fin soft rays (12 vs. 13). Regarding the differences between soft ray counts of holotype and Schlegel's description, he probably counted the last two elements as two rays, although the two elements are associated with a single pterygiophore. Other differences in the measurements may be explained by shrinking of the specimen.

Bleeker (1852) described *Polynemus polydactylus* as a new species on the basis of a single specimen (RMNH 6001, 133 mm SL) from Banjarmasin, southern Kalimantan, Indonesia. Because that name was preoccupied by *P. polydactylus* of Vahl (1798) which presently is regarded as a junior synonym of *Galeoides decadactylus* (Bloch, 1795) (see Daget & Njock, 1986; Motomura et al., 2001a), Bleeker's *P. polydactylus* is permanently invalid, treated as a primary homonym of Vahl's *P. polydactylus*. Subsequently, Bleeker (1860) recognized that his *P. polydactylus* is the same species as *P. multifilis* (and his opinion is agreed with here).

According to Holthuis (1968: 28), *P. quatordecimfilis* Pel, 1851 was based on the type specimen of *P. multifilis* Temminck & Schlegel, 'which was collected by C.A.M. Schwaner in Borneo (RMNH 436).' However, Pel (1851: 10) states only that his new species is present in the RMNH collection, without even referring to a number of

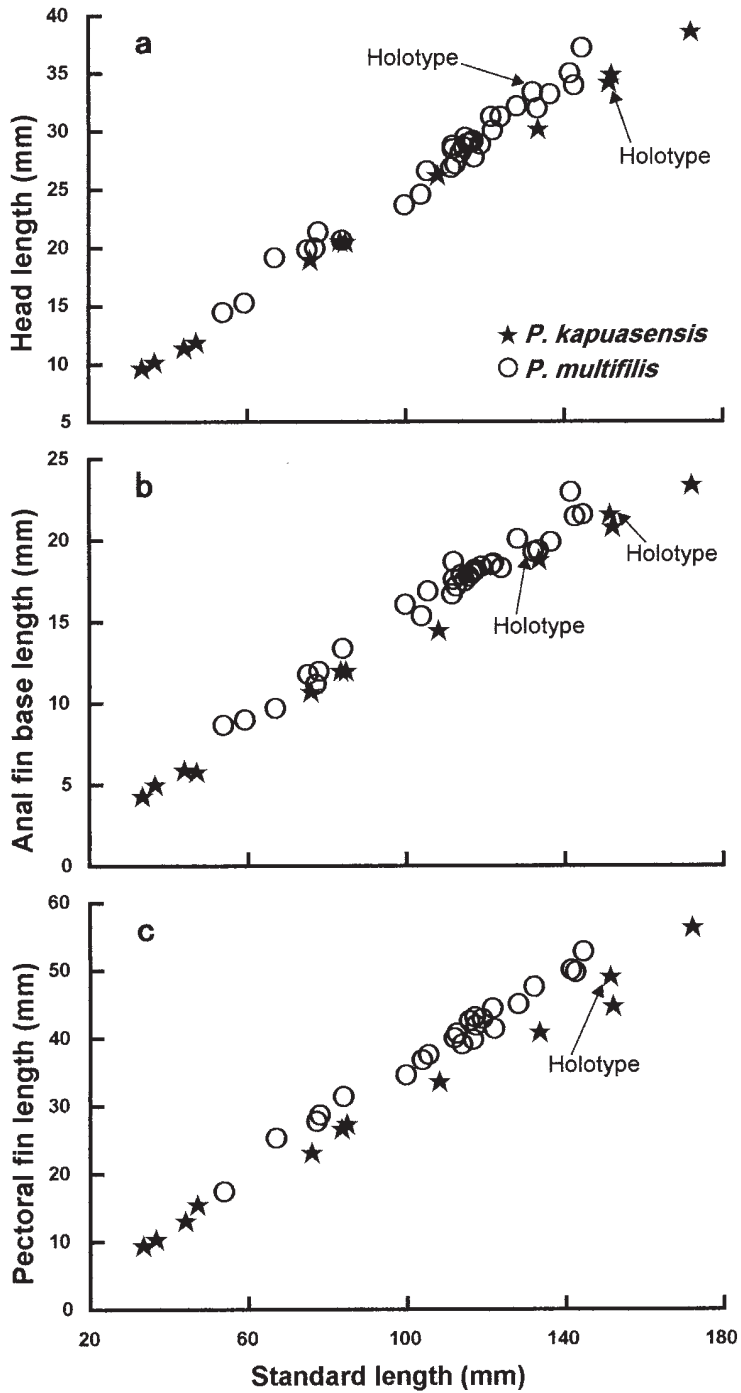


Fig. 6. Relationships of head length (a), anal fin base length (b) and pectoral fin length (c) to standard length in *Polynemus kapuasensis* (stars) and *P. multifilis* (circles).

specimens. The polynemid specimen collected by Schwaner, referred to by Schlegel (1851: 11), may have been in the museum at that time, but till now it could not be traced in either the RMNH collection or the RMNH archives. Without prove of existence of the Schwaner specimen we must presume that Pel's description of *P. quatordecimfilis* was based on the specimen collected by Müller. We concur with Holthuis that Pel's name *quatordecimfilis* is a younger objective synonym of the name *multifilis*.

The genus *Polistonemus*, originally proposed for *Polynemus multifilis* by Gill (1861), based only on a character of the greatly increased number of the pectoral filaments, had been treated as a valid by Myers (1936), de Sylva (1984) and Kottelat et al. (1993). However, the genus has recently been regarded as a junior synonym of the genus *Polynemus* Linnaeus on the basis of internal and external characters of *P. multifilis* by many researchers (e.g., Roberts, 1989; Feltes, 1993; Motomura & Iwatsuki, 2001; Feltes, 2001; Motomura, 2003; this study). Incidentally, Myers' (1936) *Polistonemus multifilis* is probably *Polynemus kapuasensis* because he examined two specimens collected in the Kapuas River, Kalimantan.

*Polynemus kapuasensis* and *P. multifilis* are easily distinguished from all other congeners by having higher counts of pectoral filaments (13-16; table 1) vs. 7, see Motomura & Sabaj, 2002; Motomura et al., 2002b; Motomura, 2003). *Polynemus kapuasensis* differs from *P. multifilis* in having higher counts of pectoral filaments (usually 15 on each side of body, rarely asymmetrically 15 and 16, or 16 on each side vs. usually 14 on each side, rarely 13 on each side, asymmetrically 13 and 14, or 14 and 15 in the latter; table 1), pored lateral line scales [mode 103 (range 100-110) vs. 86 (83-99); table 2], scale rows above and below lateral line [10 (9-11) and 18 (17-20), respectively vs. 8 (7 or 8) and 15 (14-18), respectively; table 3] and caudal peduncle scales [38 (35-40) vs. 32 (28-37); table 4]. Furthermore, *P. kapuasensis* tends to have a slightly shorter head and anal fin base lengths [mean 23% (range 22-23%) of SL in adults over ca. 130 mm SL and 14% (12-14%) of SL, respectively] than *P. multifilis* [mean 25% (range 23-29%) of SL and 15% (15-17%) of SL, respectively], although the proportional measurements for the lengths overlapped between the two species, especially in young stages (fig. 6a-b). Moreover, the former has a short pectoral fin [mean 31% (range 29-33%) of SL], its posterior tip not extending beyond the level of the anal fin origin in adults (over ca. 70 mm SL), whereas the latter has a long pectoral fin [36% (33-38%) of SL], its posterior tip reaching or extending beyond the level of the anal fin origin throughout life (fig. 6c).

**Key to the species of *Polynemus* in Kalimantan (= Borneo)**

- 1. Pectoral filaments 13 or more ..... 2
- Pectoral filaments 7 ..... 3
- 2. Pectoral filaments usually 15 on each side of body; pored lateral line scales 100-110 (mode 103); scales above lateral line 9-11 (10), below 17-20 (18); posterior tip of pectoral fin not extending beyond level of anal fin origin in adults (over ca. 70 mm SL) ..... *P. kapuasensis* spec. nov.
- Pectoral filaments usually 14 on each side of body; pored lateral line scales 83-99 (mode 86); scales above lateral line 7 or 8 (8), below 14-18 (15); posterior tip of pectoral fin reaching or extending beyond level of anal fin origin throughout life ..... *P. multifilis* Temminck & Schlegel, 1843

3. Vomer without teeth; posterior part of pectoral fin black .....  
..... *P. melanochir melanochir* Valenciennes (in Cuvier & Valenciennes), 1831
- Vomer with villiform teeth; pectoral fin without any melanophores ..... 4
4. First dorsal fin spines 8; posterior portion of maxilla less than orbit diameter; pored lateral line scales 69-79 (mode 78); scale rows above lateral line 6-8 (7), below 12 or 13 (13); gill rakers 29-33 (30); posterior tip of pectoral fin not reaching to midpoint of anal fin base ..... *P. dubius* Bleeker, 1853
- First dorsal fin spines 7; posterior portion of maxilla deeper than orbit diameter; pored lateral line scales 90-103 (mode 94); scale rows above lateral line 8-12 (11), below 16-21 (18); gill rakers 26-28 (26); posterior tip of pectoral fin reaching to midpoint of anal fin base ..... *P. hornadayi* Meyers, 1836

### Acknowledgements

We greatly appreciate receiving specimen loans from the following persons: M.H. Sabaj (ANSP); K. Sasaki (BSKU); D. Catania (CAS); K. Matsuura and G. Shinohara (NSMT); D.W. Nelson (UMMZ); H. Wilkens (ZMH); P.K.L. Ng and K.K.P. Lim (ZRC). We are especially grateful to E. Schraml (Augsburg, Germany) and I.J.H. Isbrücker (ZMA) for kindly providing their underwater photographs of *Polynemus multifilis*. We thank Y. Motomura (Sydney, Australia) for her assistance and T. Trnski (AMS), who read the initial manuscript and offered helpful comments. This study was supported in part by a postdoctoral fellowship grant awarded to the senior author by the Japan Society for the Promotion of Science for Research Abroad (Tokyo, Japan).

### References

- Ahlstrom, E.H., J.L. Butler & B.Y. Sumida, 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.
- Bleeker, P., 1852. Zesde bijdrage tot de kennis der ichthyologische fauna van Borneo. Visschen van Pamangkat, Bandjermassing, Praboearta en Sampit.— Nat. Tijdschr. Ned. Ind. 3: 407-442.
- Bleeker, P., 1860. Dertiende bijdrage tot de kennis der vischfauna van Borneo.— Act. Soc. Sc. Indo-Néerl. 8: 1-64.
- Daget, J. & J.C. Njock, 1986. Polynemidae: 352-354. In: J. Daget, J.-P. Gosse & D.F.E. Thys van den Audenaerde (eds). Check-list of the freshwater fishes of Africa, vol. 2: i-xiv, 1-520.— Paris.
- de Sylva, D.P., 1984. Polynemoidei: development and relationships.— Amer. Soc. Ichthyol. Herpetol., Spec. Publ. 1: 540-541.
- Eschmeyer, W.N. (ed.), 1998. Catalog of fishes, vol. 2. Species of fishes (M-Z): 960-1820.— San Francisco.
- Feltes, R.M., 1993. *Parapolynemus*, a new genus for the polynemid fish previously known as *Polynemus verekeri*.— Copeia 1993: 207-215.
- Feltes, R.M., 2001. Polynemidae, Threadfins: 3090-3116. In: K.E. Carpenter & V.H. Niem (eds). FAO species identification guide for fishery purposes: the living marine resources of the western central Pacific, vol. 5: i-iv, 2791-3379.— Rome.
- Fransen, C.H.J.M., L.B. Holthuis & J.P.H.M. Adema, 1997. Type-catalogue of the Decapod Crustacea in the collections of the Nationaal Natuurhistorisch Museum, with appendices of pre- 1900 collectors and material.— Zool. Verh. Leiden 311: i-xvi, 1-344.
- Gill, T.N., 1861. Synopsis of the polynematoids.— Proc. Acad. Nat. Sci. Phila. 13: 271-282.
- Holthuis, L.B., 1968. Biografische notities betreffende verzamelaars voor het Rijksmuseum van Natuurlijke Historie te Leiden. I. Hendrik Severinus Pel (1818-1876).— Zool. Bijdr. 10: 1-32.

- Kottelat, M., A.J. Whitten, S.N. Kartikasari & S. Wirjoatmodjo, 1993. Freshwater fishes of western Indonesia and Sulawesi: i-xxxviii, 1-259.— Jakarta.
- Leviton, A.E., R.H. Gibbs Jr., E. Heal & C.E. Dawson, 1985. Standards in herpetology and ichthyology: Part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology.— *Copeia* 1985: 802-832.
- Linnaeus, C., 1758. *Systema naturae*, 10th ed., vol. 1: i-ii, 1-824.— Holmiae.
- Mabee, P.M., 1988. Supraneural and predorsal bones in fishes: development and homologies.— *Copeia* 1988: 827-838.
- Motomura, H., 2002. Revision of the Indo-Pacific threadfin genus *Polydactylus* (Perciformes: Polynemidae) with a key to the species.— *Bull. Natl. Sci. Mus., Tokyo, Ser. A (Zool.)* 28: 171-194.
- Motomura, H., 2003. A new species of freshwater threadfin, *Polynemus aquilonaris*, from Indochina, and redescription of *P. dubius* Bleeker, 1853 (Perciformes: Polynemidae).— *Ichthyol. Res.* 50: 154-163.
- Motomura, H. & Y. Iwatsuki, 2001. A new genus, *Leptomelanosoma*, for the polynemid fish previously known as *Polydactylus indicus* (Shaw, 1804) and a redescription of the species.— *Ichthyol. Res.* 48: 13-21.
- Motomura, H., Y. Iwatsuki & S. Kimura, 2001a. A poorly known polynemid fish, *Polynemus astrolabi* Sauvage, 1881, a junior synonym of *Galeoides decadactylus* (Bloch, 1795).— *Ichthyol. Res.* 48: 197-202.
- Motomura, H., Y. Iwatsuki, S. Kimura & T. Yoshino, 2002a. Revision of the Indo-West Pacific polynemid fish genus *Eleutheronema* (Teleostei: Perciformes).— *Ichthyol. Res.* 49: 47-61.
- Motomura, H., Y. Iwatsuki & T. Yoshino, 2001b. A new species, *Polydactylus siamensis*, from Thailand and redescription of *P. plebeius* (Broussonet, 1782) with designation of a neotype (Perciformes: Polynemidae).— *Ichthyol. Res.* 48: 117-126.
- Motomura, H., S.O. Kullander, T. Yoshino & Y. Iwatsuki, 2002b. Review of seven-spined *Polynemus* species (Perciformes: Polynemidae) with designation of a neotype for *P. paradiseus* Linnaeus, 1758.— *Ichthyol. Res.* 49: 307-317.
- Motomura, H. & M. H. Sabaj, 2002. A new subspecies, *Polynemus melanochir dulcis*, from Tonle Sap Lake, Cambodia, and redescription of *P. m. melanochir Valenciennes in Cuvier and Valenciennes*, 1831 with designation of a neotype.— *Ichthyol. Res.* 49: 181-190.
- Motomura, H., T. Sado & S. Kimura, 2002c. Feeding behavior of *Polydactylus plebeius* (Perciformes: Polynemidae) in an aquarium.— *Jpn. J. Ichthyol.* 49: 156-157. (in Japanese)
- Myers, G.S., 1936. A new polynemid fish collected in the Sadong River, Sarawak by Dr. William T. Hornaday.— *J. Wash. Acad. Sci.* 26: 376-382.
- Pel, H.S., 1851. Over eene nieuwe soorte van *Polynemus*.— *Bijdr. Dierk.* 1 (1848-54): 9-10.
- Rainboth, W.J., 1996. Fishes of the Cambodian Mekong. FAO species identification field guide for fishery purposes: i-xi, 1-265.— Rome.
- Randall, J.E. & K.K.P. Lim, 2000. A checklist of the fishes of the South China Sea.— *Raffles Bull. Zool. Supplement* (8): 569-667.
- Roberts, T.R., 1989. The freshwater fishes of western Borneo (Kalimantan Barat, Indonesia).— *Mem. Calif. Acad. Sci.* No. 14: i-xii, 1-210.
- Schlegel, H., 1851. Beschrijving eener nieuwe soort van visschen, *Polynemus multifilis*.— *Bijdr. Dierk.* 1: 11-12.
- Temminck, C.J. & H. Schlegel, 1843. Pisces. Parts 2-4: 21-72. In: *Fauna Japonica, sive descriptio animalium quae in itinere per Japoniam suscepto annis 1823-30 collegit, notis observationibus et adumbrationibus illustravit P. F. de Siebold*.— Amsterdam.
- Vahl, M., 1798. Beskrivelse af *Polynemus paradiseus* og *P. polydactylus*.— *Skrivt. Naturh. Selsk. Kiøbenhavn* 4: 158-168.
- Veth, H.J., 1879. Overzicht van hetgeen, in het bijzonder door Nederland, gedaan is voor de kennis der fauna van Nederlandsch Indië: 1-204.— Leiden.

Received: 21.v.2003

Accepted: 25.v.2003

Edited: C. van Achterberg

