

# A new species of freshwater threadfin, *Polynemus aquilonaris*, from Indochina, and redescription of *Polynemus dubius* Bleeker, 1853 (Perciformes: Polynemidae)

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**Abstract** The taxonomic status of two nominal species of *Polynemus*, viz. *P. dubius* Bleeker, 1853 and *P. longipectoralis* Weber and de Beaufort, 1922, is revised. Although regarded as separate taxa up to the present time, examination of the holotype of *P. longipectoralis* revealed its close similarity to the type series of *P. dubius*, in the synonymy of which the former is now included. *Polynemus dubius* is redescribed as a valid species and a lectotype of the species is designated. In addition, a new species, *P. aquilonaris*, previously identified as *P. dubius* or *P. longipectoralis*, is described from Indochina on the basis of 28 specimens. *Polynemus aquilonaris* differs from *P. dubius* in having higher counts of pored lateral-line scales [80–86 (mode 81) vs. 69–79 (78) in the latter] and scale rows below the lateral line [14–17 (mode 14, rarely 13 or 17) vs. 13 (rarely 12)], and lower counts of gill rakers [25–29 (mode 27) vs. 29–33 (30), respectively]. The former is known from Indochina (Chao Phraya and Mekong River systems including Lake Tonle Sap), whereas the latter is currently known from the Malay Peninsula, Sumatra, and Kalimantan.

**Key words** Polynemidae · *Polynemus aquilonaris* sp. nov. · *Polynemus dubius* · *Polynemus longipectoralis*

The freshwater threadfin, *Polynemus dubius* Bleeker, 1853, originally described from Sumatra and Kalimantan, Indonesia, has long been regarded as a valid species (e.g., Kottelat et al., 1993; Randall and Lim, 2000), a second threadfin, *P. longipectoralis* Weber and de Beaufort, 1922, originally described from Kalimantan, Indonesia, also having been regarded as a valid species by many researchers (e.g., Chevey, 1932; Kottelat, 1989; Talwar and Jhingran, 1991; Mishra and Krishnan, 1993; Kottelat, 2001). Furthermore, Weber and de Beaufort (1922), Myers (1936), and Rainboth (1996) all regarded both species as valid. Accordingly, their taxonomic status has been equivocal, contributing to the overall taxonomic confusion of Southeast Asian *Polynemus*. Recently, Feltes (2002) recognized *P. longipectoralis* as a junior synonym of the former, but gave neither reasons nor an indication of materials examined.

Examination of the types of *P. dubius* and *P. longipectoralis*, together with non-type specimens from Malaysia and Indonesia, has shown the two nominal species to be conspecific, characterized by having seven pectoral filaments, eight spines in the first dorsal fin, vomer with villiform teeth, 69–79 pored lateral-line scales, and 29–33 gill rakers. Accordingly, *P. longipectoralis* is herein regarded as a junior synonym of the former.

*Polynemus dubius* (= *P. longipectoralis*) has been considered to be widely distributed in Southeast Asia (e.g., Kottelat et al., 1993; Rainboth, 1996; Feltes, 2002). However, specimens collected from Indochina (Chao Phraya and

Mekong River systems), including Thailand, Cambodia, Vietnam, and Laos, previously identified as *P. dubius* or *P. longipectoralis*, are here considered to represent an undescribed species of *Polynemus*, being distinguished from *P. dubius* by numbers of pored lateral-line scales, scale rows above the lateral line, and gill rakers.

This article includes a redescription of *P. dubius* (as a senior synonym of *P. longipectoralis*), with designation of a lectotype, and a description of new species, *P. aquilonaris*, with discussion of morphological variations. Detailed comparisons are made with other congeners.

## Materials and Methods

Counts and measurements followed Motomura et al. (2002a). Pectoral-fin ray counts included only those interconnected by a membrane, the lower free rays being considered separately; counts of pectoral filaments begin with the anterior element. Standard length and total length are expressed as SL and TL, respectively. Terminology of supraneural bones follows Mabee (1988), and the formula for configuration of supraneural bones, anterior neural spines, and anterior dorsal-fin pterygiophores follows Ahlstrom et al. (1976). Osteological characters were confirmed from X-ray photos taken of all specimens. A lateral dissection (right side) of the abdomen of all six non-type specimens of *Polynemus dubius* and 12 specimens [ANSP 177982, 177984

(2 specimens); BSKU 14846–14848 (3); UMMZ 181266 (2), 195407, 232331 (2); URM-P 13930] of *P. aquilonaris* confirmed the condition of a swimbladder. 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).

***Polynemus aquilonaris* sp. nov.**

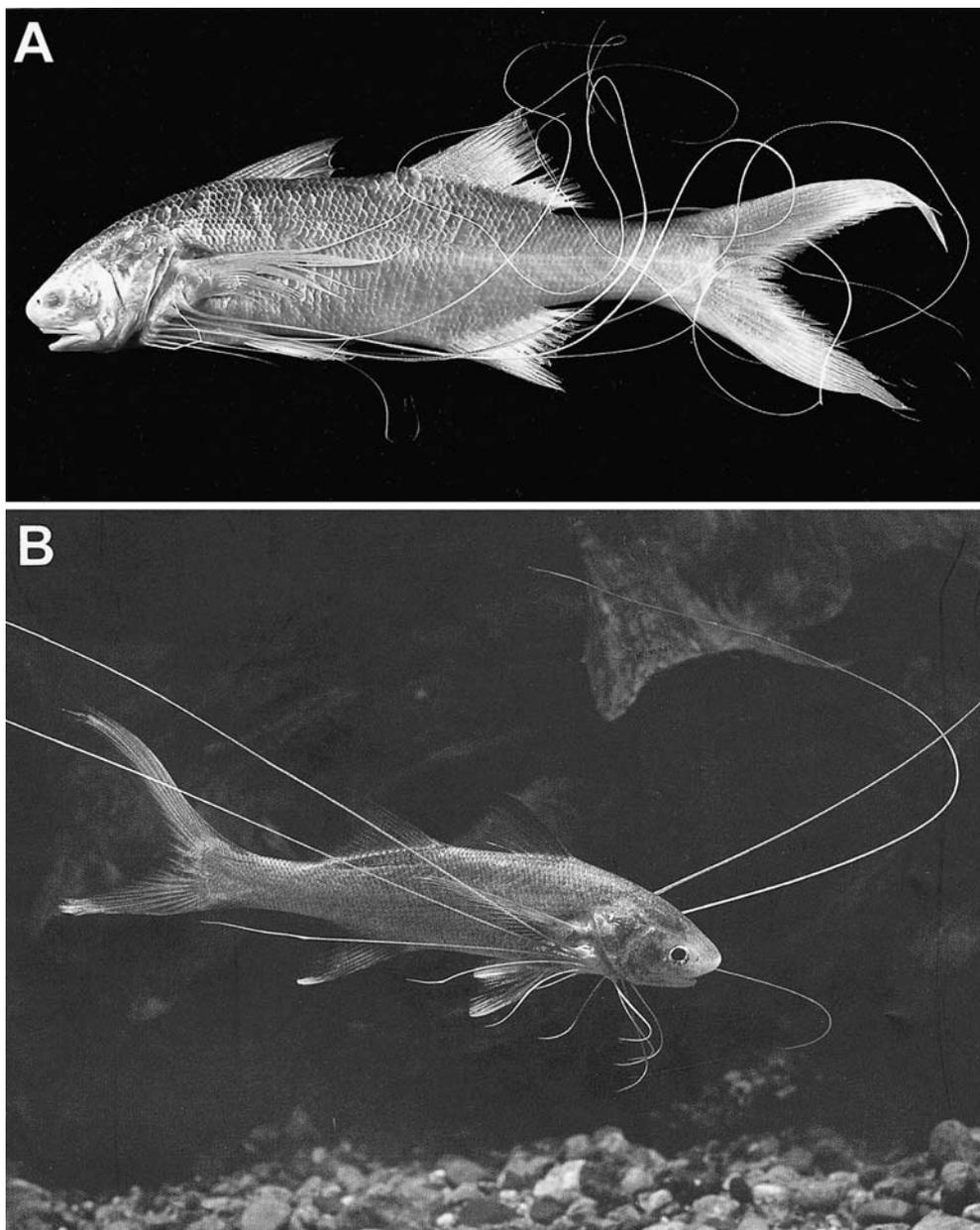
(New English name: northern paradise fish)

(Figs. 1–3; Tables 1, 3)

**Holotype.** URM-P 13930, 136 mm SL, Chao Phraya River (purchased at Samyan market by H. Senou), Thailand, 10 Feb. 1984.

**Paratypes.** 12 specimens, 64–145 mm SL. ANSP 177982, 108 mm SL, Chao Phraya River in vicinity of Phayuha Khiri, Thailand; ANSP 177984 (2 specimens), 88–96 mm SL, eastern channel of Chao Phraya River at Bang Pa-In, Ayutthaya, Thailand; CAS 92821, 114 mm SL, Prachinburi, Thailand; NRM 24267, 104 mm SL, Mekong River below Khone waterfalls, Laos; UMMZ 181145 (3), 132–139 mm SL, Mekong River drainage at Toch, Banam (ca. 2 km above main stream of Mekong River), Cambodia; UMMZ 195407, 105 mm SL, Koke Tong Canal, tributary of Chao Phraya River, at 17.5 km north of Ayutthaya, Thailand; UMMZ 224815, 64 mm SL, Bassac River at An Phu, Vietnam; UMMZ 232331 (2), 138–145 mm SL, Mekong River at Stung Treng, Cambodia.

**Other material.** 15 specimens, 63–158 mm SL. BSKU 14846–14848 (3 specimens), 96–108 mm SL, Lake Tonle Sap, Cambodia; NSMT-P 21772, 138 mm SL, Chao Phraya River at Nakhon Swan, Thailand;



**Fig. 1.** Photographs of *Polynemus aquilonaris* sp. nov. **A** URM-P 13930 (holotype), 136 mm SL, Thailand. **B** Underwater photograph (taken by Y. Tohyama) in aquarium (specimen from Thailand, not retained)

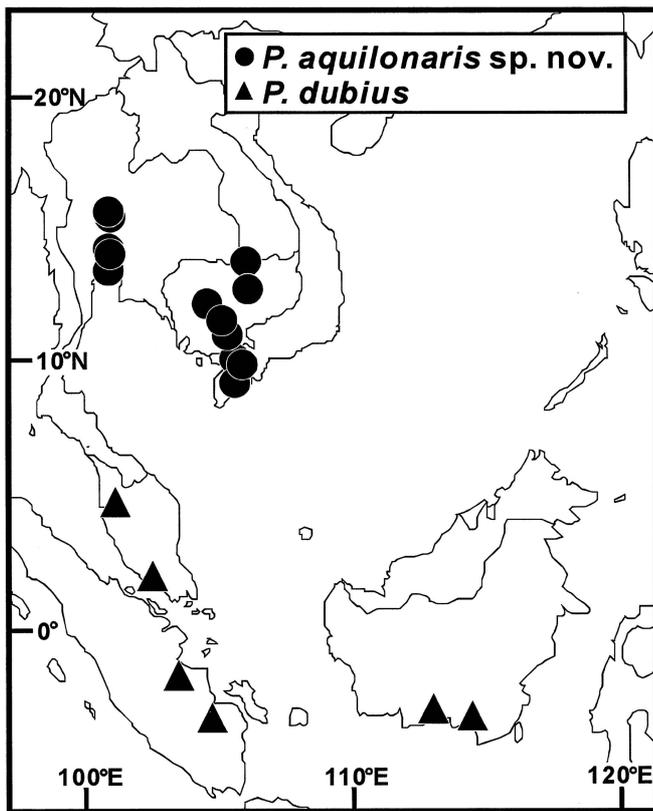


Fig. 2. Geographic distribution of *Polynemus aquilonaris* sp. nov. (circles) and *P. dubius* (triangles), based on specimens examined in this study

NSMT-P 21775 (2), 83–105 mm SL, Lake Tonle Sap, Cambodia; NSMT-P 21776, 133 mm SL, Chao Phraya River at Nakhon Swan, Thailand; NSMT-P 47598 (2), 137–158 mm SL, Lake Tonle Sap, Cambodia; UMMZ 181266 (2), 110–118 mm SL, Lake Tonle Sap at Kompong Lvong, Cambodia; UMMZ 213356 (1 of 30 specimens), 63 mm SL, Bassac River adjacent to Dong Phu, Phong Dinh, Vietnam; UMMZ 232689 (3), 118–133 mm SL, Tonle Sap River at second channel east of Kompong Chhnang, Cambodia.

**Diagnosis.** A species of *Polynemus* with the following combination of characters: 8 first dorsal-fin spines; 7 pectoral filaments, upper 2 filaments longer than TL; 3 anal-fin spines; 80–86 (mode 81) pored lateral-line scales; 6–8 (7) scale rows above lateral line, 13–17 (14) below; 9–11 (10) gill rakers in upper series, 16–18 (17) in lower, 25–29 (27) total; vomer with villiform teeth; orbit diameter 4% of SL; posterior portion of maxilla less than orbit diameter.

**Description.** Counts and proportional measurements as percentages of SL of the holotype, paratypes, and non-type material of *Polynemus aquilonaris* are given in Table 1. Characters given in the species' diagnosis are not repeated here. Data for the holotype are presented first, followed by other material data (if different) in parentheses.

Body oblong, compressed; occipital profile nearly straight throughout life; upper jaw lip poorly developed (well-developed in larger specimens from Lake Tonle Sap,

Cambodia); 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 well beyond level of posterior margin of adipose eyelid; adipose eyelid poorly developed; teeth villiform in broad bands on palatines and ectopterygoids; ectopterygoids very small, length less than half that of palatines; vomerine teeth present (varying in number from one to numerous, infrequently covered with thin skin); all first dorsal-fin spine bases of similar thickness; first spine of first dorsal fin very small, third spine longest; first spine of anal fin very small, third spine longest; all pectoral-fin rays unbranched, inserted near midline of body; posterior tip of pectoral fin just reaching to (same, just short of, or extending slightly beyond) level of anal-fin origin; first pectoral filament shortest, not reaching to level of posterior tip of pelvic fin; second pectoral filament just reaching to (same, not reaching to, or extending slightly beyond) level of posterior tip of pelvic fin; third pectoral filament extending beyond (rarely just short of) level of posterior tip of pelvic fin; fourth pectoral filament reaching to level of posterior base of anal fin (same, extending beyond level of anal-fin origin, or reaching to level of middle of anal-fin base); fifth pectoral filament extending beyond level of posterior tips of caudal-fin lobes (same or level of mid-distal margin of caudal-fin membrane); sixth (usually longest) and seventh pectoral filaments longer than other filaments, extending well beyond posterior tips of caudal-fin lobes; 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/ (same or /0/0 + 2/1 + 1/1/1/1/); 5 (same or 6, rarely 4) epineurals; 10 + 15 vertebrae; swimbladder not apparent (same or present, varying in size less than ca. 23% of SL).

**Life color.**—Based on color transparencies of a live specimen that was not retained (Fig. 1B) and ANSP 177984 (88 mm SL, Thailand): head and body grayish-silver dorsally, silver ventrally; anterior margin of first dorsal fin and posterior margin of second dorsal fin blackish, remaining parts translucent; pectoral fin translucent; base of pectoral filaments white, becoming blackish on posterior tips; base and posterior margin of pelvic fin white, remaining parts translucent; posterior margin of anal fin translucent, remaining parts white; posterior margin of caudal fin translucent, remaining parts white.

**Color of preserved specimens.**—Head and body gray dorsally, pale silver ventrally; posterior tip of first dorsal fin blackish, remaining parts yellowish-silver; posterior margins of second dorsal, anal, and caudal fins translucent, remaining parts pale yellow; pectoral fin and filaments translucent, rarely with a small number of scattered melanophores; pelvic fin pale yellow.

**Geographic distribution and habitat.** *Polynemus aquilonaris* occurs on sandy or muddy bottoms in freshwater rivers and estuaries, being currently known from the Chao Phraya River system (Thailand), Mekong River system below the Khone waterfalls of Laos (Cambodia, southernmost of Laos, and southern Vietnam), and Lake

**Table 1.** Counts and measurements of *Polynemus aquilonaris* sp. nov., including the holotype, paratypes, and non-type specimens, expressed as percentages of standard length

	Holotype of <i>Polynemus aquilonaris</i> URM-P 13930	Paratypes of <i>Polynemus aquilonaris</i> (n = 12)	Non-type specimens of <i>Polynemus aquilonaris</i> (n = 15)
Standard length (mm)	136	64–145	63–158
<b>Counts</b>			
Dorsal-fin rays	VIII-I, 17	VIII-I, 15–19	VIII-I, 16–18
Anal-fin rays	III, 12	III, 12–13	III, 11–12
Pectoral-fin rays	17	15–17	16–17
Pectoral filaments	7	7	7
Pelvic-fin rays	I, 5	I, 5	I, 5
Pored lateral-line scales	84	80–86	80–85
Scales above/below lateral line	7/14	6–8/13–16	6–8/14–17
Gill rakers	11 + 18 = 29	9–11 + 16–18 = 25–29	10–11 + 16–18 = 26–28
<b>Measurements (means)</b>			
Head length	26	25–29	24–26 (26)
Body depth at 1st dorsal-fin origin	24	22–26	23–26 (25)
Body depth at 2nd dorsal-fin origin	26	24–28	24–28 (26)
Body width at pectoral-fin base	14	13–16	13–16 (14)
Snout length	6	5–7	5–6 (5)
Dermal eye opening	3	3–4	3–4 (3)
Orbit diameter	4	4	4 (4)
Interorbital width	7	7–9	6–8 (8)
Postorbital length	18	16–19	16–18 (17)
Upper jaw length	11	10–12	10–11 (11)
Depth at posterior margin of premaxilla	3	2–3	2–3 (3)
Pre-1st dorsal-fin length	32	32–36	32–34 (34)
Pre-2nd dorsal-fin length	59	57–60	58–61 (59)
Preanal-fin length	60	56–61	57–62 (60)
Pelvic-fin origin to anal-fin origin	29	26–30	26–33 (29)
Second dorsal-fin base length	21	19–23	18–23 (21)
Anal-fin base length	16	15–17	14–17 (16)
Longest pectoral-fin length	35	34–40	34–41 (37)
Longest pectoral-filament length	309	260–371	266–314 (308)
Pectoral-fin base including filament base	13	13–15	13–15 (14)
Longest pelvic-fin ray length	16	18–20	18–20 (18)
Longest 1st dorsal-fin spine length	21	20–21	20–21 (21)
Second dorsal-fin spine length	7	6–8	6–8 (7)
Longest 2nd dorsal-fin ray length	21	20–23	20–23 (22)
Longest anal-fin spine length	8	8–11	8–11 (9)
Longest anal-fin ray length	20	18–22	18–22 (21)
Caudal-peduncle length	27	25–28	25–28 (27)
Caudal-peduncle depth	12	10–12	10–12 (11)
Upper caudal-fin lobe length	44	39–44	39–44 (43)
Lower caudal-fin lobe length	38	33–41	33–41 (38)

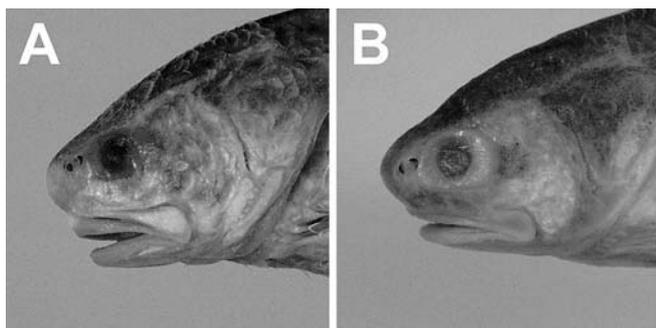
Means in parentheses include data of type specimens

Tonle Sap and related rivers (Cambodia) (see Fig. 2). Two specimens (NSMT-P 21772–21776, 133–138mm SL), collected from the Chao Phraya River at Nakhon Sawan, Thailand, represent the northernmost reliable record of the species.

**Etymology.** The specific name “*aquilonaris*” is derived from the Latin meaning “northern,” in reference to the northern distribution (Indochina) of the species, compared with that of a related species, *Polynemus dubius* (distributed in Malaysia and Indonesia).

**Remarks.** *Polynemus aquilonaris*, previously identified as *P. dubius* (e.g., Suvatti, 1981; Rainboth, 1996) or *P. longipectoralis* (e.g., Rainboth, 1996; Kottelat, 2001), is herein regarded as representing a new species on the basis of its unique combination of morphological characteristics (see Comparisons).

*Polynemus aquilonaris* is currently known from Indochina (Chao Phraya and Mekong River systems), whereas *P. dubius* is distributed in rivers on the Malay Peninsula, Sumatra, and Kalimantan (Fig. 2). The distributions



**Fig. 3.** Head of *Polynemus aquilonaris* sp. nov. **A** NSMT-P 47598, 158 mm SL, Lake Tonle Sap, Cambodia. **B** UMMZ 232331, 138 mm SL, Mekong River, Cambodia

of both species are most likely to be relictual, being presently consistent with the location of Sundaland (see Morley and Flenley, 1987: fig. 5.5) during the last Pleistocene glacial period. According to Bornbusch and Lundberg (1989), Sundaland was drained by several major river systems, at least two of which may have participated in faunal mixing. These systems included the South Indo-China River and North Sunda River, which are now restricted to drainages on Indochina, and Malay Peninsula, Sumatra, and Kalimantan, respectively, following submergence of Sundaland owing to increased sea levels (ca. 150m). The present distributional ranges of *P. aquilonaris* and *P. dubius* indicate that they evidently originated in the South Indo-China and North Sunda Rivers, respectively.

**Morphological variations.** Larger specimens (NSMT-P 47598, 2 specimens, 137–158 mm SL; UMMZ 181266, 2, 110–118 mm SL) of *Polynemus aquilonaris* collected from Lake Tonle Sap had a fleshy lip on the upper jaw (Fig. 3A), smaller specimens (BSKU 14846–14848, 3 specimens, 96–108 mm SL; NSMT-P 21775, 2, 83–105 mm SL) from the lake and all those from other localities having a relatively thin lip (Fig. 3B).

Apart from the lip condition in larger specimens of *P. aquilonaris*, the two geographical forms were difficult to distinguish between because their meristic characters and proportional measurements fully overlapped. Although the difference between the two forms is small, I excluded specimens collected from Lake Tonle Sap and adjacent waters from the type series of *P. aquilonaris* under Article 72.4.1 (ICZN, 1999) (listed as other material). More studies of the two forms of *P. aquilonaris* are needed to assess whether the two represent separate subspecies like *P. melanochir melanochir* and *P. m. dulcis* (see Motomura and Sabaj, 2002).

### *Polynemus dubius* Bleeker, 1853

(English name: eastern paradise fish)

(Figs. 2, 4; Tables 2, 3)

*Polynemus longifilis* (not of Cuvier): Bleeker, 1851: 268 (Banjarasin, Kalimantan, Indonesia); Bleeker, 1852: 418 (Banjarasin and Sampit, Kalimantan, and Palembang, Sumatra, Indonesia).

*Polynemus dubius* Bleeker, 1853: 92 [type locality: Banjarasin and

Sampit, Kalimantan, and Palembang, Sumatra, Indonesia, based on *P. longifilis* of Bleeker (1851, 1852)].

*Polynemus longipectoralis* Weber and de Beaufort, 1922: 213 (type locality: Banjarasin, Kalimantan, Indonesia).

**Lectotype.** RMNH 6014, 126 mm SL, Banjarasin, Sampit or Palembang, Indonesia.

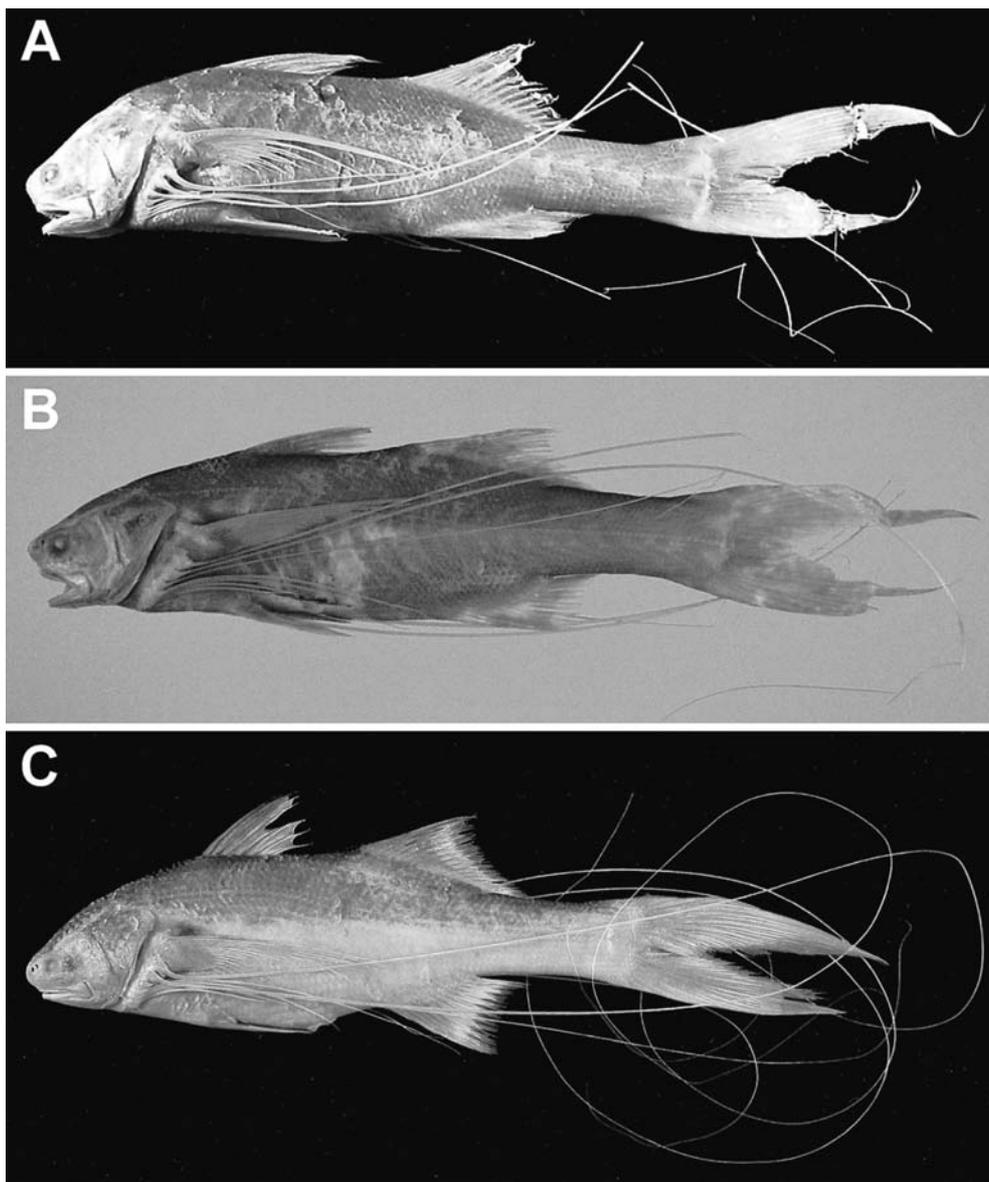
**Paralectotypes.** RMNH 34452 (7 specimens; formerly RMNH 6014), 77–132 mm SL, same data as lectotype.

**Other material.** 7 specimens, 81–184 mm SL. BMNH 1880.4.21.145, 129 mm SL, locality unknown; FMNH 81557, 110 mm SL, mouth of Muar River, Muar, Malaysia; FMNH 81602, 81 mm SL, mouth of Muar River, Muar, Malaysia; RMNH 34453 (formerly RMNH 6014), 150 mm SL, data unknown; WAM-P 30529-003, 140 mm SL, Kuala Kangsar, Malaysia; ZMA 112.570 (holotype of *Polynemus longipectoralis* Weber and de Beaufort), 133 mm SL, Banjarasin, Kalimantan, Indonesia; ZRC 39004, 184 mm SL, Jambi (=Telanai Pura), Sumatra, Indonesia.

**Diagnosis.** A species of *Polynemus* with the following combination of characters: 8 first dorsal-fin spines; 7 pectoral filaments, upper 2 filaments longer than TL; 3 anal-fin spines; 69–79 (mode 78) pored lateral-line scales; 6–8 (7) scale rows above lateral line, 12 or 13 (13) below; 11–13 (12) gill rakers in upper series, 18–21 (18) in lower, 29–33 (30) total; vomer with villiform teeth; orbit diameter 3–4% (mean 4%) of SL; posterior portion of maxilla less than orbit diameter.

**Description.** Counts and proportional measurements as percentages of SL of the lectotype, paralectotypes, and other material of *Polynemus dubius*, including the holotype of *P. longipectoralis*, are given in Table 2. Characters given in the species' diagnosis are not repeated here. Data for the lectotype are presented first, followed by other material data (if different) in parentheses.

Body oblong, compressed; occipital profile nearly straight 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 well beyond level of posterior margin of adipose eyelid; adipose eyelid poorly developed; teeth villiform in broad bands on 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 longest; first spine of anal fin very small, third spine longest; all pectoral-fin rays unbranched, inserted near midline of body; posterior tip of pectoral fin just reaching to (same, just short of, or extending slightly beyond) level of anal-fin origin; first pectoral filament shortest, not reaching to level of posterior tip of pelvic fin; second pectoral filament extending slightly beyond (same or not reaching to) level of posterior tip of pelvic fin; third pectoral filament extending beyond (rarely just short of) level of posterior tip of pelvic fin; fourth pectoral filament reaching to level of middle of anal-fin base (same, extending beyond level of anal-fin origin or level of posterior base of anal fin); (fifth pectoral filament extending beyond level of posterior tips of caudal-fin lobes); (sixth, usually longest, and seventh pectoral filaments longer than other filaments, extending well beyond posterior tips of caudal-fin lobes); lateral line



**Fig. 4.** Photographs of *Polynemus dubius*. **A** RMNH 6014 (lectotype of *P. dubius*), 126 mm SL, Kalimantan or Sumatra, Indonesia. **B** ZMA 112.570 (holotype of *P. longipectoralis*), 133 mm SL, Kalimantan, Indonesia. **C** ZRC 39004 (non-type specimen of *P. dubius*), 184 mm SL, Sumatra, Indonesia

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/ (same or /0/0 + 2/1 + 1/1/1/1/); 6 (same or 5) epineurals; 10 + 15 vertebrae; swimbladder not apparent.

**Color of preserved specimens.**—Head and body gray dorsally, pale silver ventrally; anterior margin and posterior tip of first dorsal fin blackish, remaining parts yellowish-silver; posterior margins of second dorsal, anal, and caudal fins translucent, remaining parts pale yellow; pectoral fin and filaments translucent or white without melanophores; pelvic fin pale yellow.

**Geographical distribution and habitat.** *Polynemus dubius* occurs on sandy or muddy bottoms in freshwater

rivers and estuaries, being currently known from the Kangsar and Muar Rivers (western Malaysia in Malay Peninsula), Musi and Batanghari Rivers (southeastern Sumatra, Indonesia), and Sampit and Barito Rivers (southern Kalimantan, Indonesia) (see Fig. 2).

**Designation of a lectotype.** *Polynemus dubius* Bleeker, 1853 was based on Bleeker's (1851, 1852) descriptions of a species originally believed by him to represent *P. longifilis* (true *P. longifilis* Cuvier and Valenciennes, 1829 has recently been regarded as a junior synonym of *P. paradiseus*; see Motomura et al., 2002b), eight specimens, 90–190 mm TL, having been used by Bleeker for those initial descriptions. Subsequently, Hubrecht (1879) referred to a total of 11 Bleeker specimens as *Trichidion dubium* (group A, 8 specimens; group B, 1 specimen; group C, 1 specimen;

**Table 2.** Counts and measurements of *Polynemus dubius*, including the lectotype, other types, and non-type specimens, expressed as percentages of standard length

	Lectotype of <i>Polynemus dubius</i> RMNH 6014	Paralectotypes of <i>Polynemus dubius</i> RMNH 34452 ( <i>n</i> = 7)	Holotype of <i>Polynemus longipectoralis</i> ZMA 112.570	Non-type specimens of <i>Polynemus dubius</i> ( <i>n</i> = 6)
Standard length (mm)	126	77–132	133	81–184
<b>Counts</b>				
Dorsal-fin rays	VIII-I, 16	VIII-I, 15–16	VIII-I, 15	VIII-I, 14–16
Anal-fin rays	III, 12	III, 12	III, 12	III, 12
Pectoral-fin rays	17	16–18	17	16–18
Pectoral filaments	7	7	7	7
Pelvic-fin rays	I, 5	I, 5	I, 5	I, 5
Pored lateral-line scales	78	75–81	79	69–79
Scales above/below lateral line	7/14	6–8/13–14	6/13	6–8/12–14
Gill rakers	12 + 18 = 30	11–13 + 18–21 = 29–33	11 + 18 = 29	11–13 + 19–21 = 30–33
<b>Measurements (means)</b>				
Head length	26	24–27	24	25–27 (26)
Body depth at 1st dorsal-fin origin	24	20–24	23	23–28 (24)
Body depth at 2nd dorsal-fin origin	25	24–26	25	24–28 (25)
Body width at pectoral-fin base	12	11–13	13	11–15 (13)
Snout length	6	5–6	5	5–6 (6)
Dermal eye opening	3	3	3	2–3 (3)
Orbit diameter	3	3–4	4	3–4 (4)
Interorbital width	7	7–8	7	7–8 (8)
Postorbital length	17	16–18	16	17–18 (17)
Upper jaw length	12	10–12	10	11–13 (11)
Depth at posterior margin of premaxilla	3	2–4	3	3–4 (3)
Pre-1st dorsal-fin length	34	33–34	34	33–36 (34)
Pre-2nd dorsal-fin length	58	57–59	58	58–61 (58)
Preanal-fin length	59	56–60	61	58–60 (59)
Pelvic-fin origin to anal-fin origin	26	27–31	30	25–30 (28)
Second dorsal-fin base length	20	19–21	19	19–22 (20)
Anal-fin base length	15	14–16	14	15–16 (15)
Longest pectoral-fin length	40	30–39	35	34–39 (37)
Longest pectoral-filament length	Broken	Broken	Broken	264–312 (293)
Pectoral-fin base including filament base	14	13–14	14	14–15 (14)
Longest pelvic-fin ray length	16	14–18	17	16–20 (17)
Longest 1st dorsal-fin spine length	22	18–21	18	18–20 (19)
Second dorsal-fin spine length	8	5–9	6	6–8 (7)
Longest 2nd dorsal-fin ray length	20	20–21	20	20–23 (21)
Longest anal-fin spine length	9	7–10	9	8–11 (9)
Longest anal-fin ray length	20	17–21	18	19–22 (19)
Caudal-peduncle length	27	26–29	27	28 (28)
Caudal-peduncle depth	11	10–11	11	11–13 (11)
Upper caudal-fin lobe length	46	37–47	39	35–50 (42)
Lower caudal-fin lobe length	36	33–41	35	34–47 (39)

Means in parentheses include data of type specimens

group D, 1 specimen). Although the eight specimens of group A are most likely to be the true syntypes of *P. dubius*, all 11 specimens have been mixed at some time in the past and registered together, as RMNH 6014: [61 mm SL (caudal fin broken), 77 mm SL (110 mm TL), 79 mm SL (108 mm TL), 83 mm SL (113 mm TL), 106 mm SL (ca. 148–159 mm TL, caudal fin broken), 107 mm SL (152 mm TL), 110 mm SL (ca. 154–165 mm TL, caudal fin broken), 114 mm SL (165 mm TL), 126 mm SL (181 mm TL), 132 mm SL (188 mm TL), and 150 mm SL (202 mm TL)]. Although the caudal fin was dam-

aged in three specimens (61, 106, and 110 mm SL), the original total lengths of these individuals (except for the first, which represented a different species from *P. dubius*; see below) were estimated from the measurements of 13 undamaged *P. dubius* (77–184 mm SL) examined during this study (total length 1.4–1.5 times SL).

With the exception of two specimens (61 and 107 mm SL), all those in RMNH 6014 had the vomer with villiform teeth, being one of the diagnostic characters of *P. dubius*. The remaining two specimens, lacking vomerine teeth,

**Table 3.** Frequency distribution of selected meristic characters of *Polynemus aquilonaris* sp. nov. and *P. dubius*

		Second dorsal-fin soft rays						Anal-fin soft rays			Pectoral-fin rays			
		14	15	16	17	18	19	11	12	13	15	16	17	18
<i>P. aquilonaris</i>	<i>n</i> = 28	—	1	15	9 <sup>a</sup>	2	1	3	24 <sup>a</sup>	1	1	17	10 <sup>a</sup>	—
<i>P. dubius</i>	<i>n</i> = 15	1	3	11 <sup>b</sup>	—	—	—	—	15 <sup>b</sup>	—	—	7	6 <sup>b</sup>	2

		Pored lateral-line scales																	
		69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
<i>P. aquilonaris</i>	<i>n</i> = 24	—	—	—	—	—	—	—	—	—	—	—	5	8	3	3	2 <sup>a</sup>	2	1
<i>P. dubius</i>	<i>n</i> = 12	1	—	—	1	1	1	2	1	1 <sup>b</sup>	3	1	—	—	—	—	—	—	—

		Scales above/below lateral line									
		6	7	8	/	12	13	14	15	16	17
<i>P. aquilonaris</i>	<i>n</i> = 22	8	12 <sup>a</sup>	2	—	—	1	12 <sup>a</sup>	6	2	1
<i>P. dubius</i>	<i>n</i> = 12	5	6 <sup>b</sup>	1	—	2	10 <sup>b</sup>	—	—	—	—

		Upper gill rakers					Lower gill rakers					Total gill rakers									
		9	10	11	12	13	16	17	18	19	20	21	25	26	27	28	29	30	31	32	33
<i>P. aquilonaris</i>	<i>n</i> = 28	2	15	11 <sup>a</sup>	—	—	7	13	8 <sup>a</sup>	—	—	—	2	4	10	6	6 <sup>a</sup>	—	—	—	—
<i>P. dubius</i>	<i>n</i> = 15	—	—	4	9 <sup>b</sup>	2	—	—	7 <sup>b</sup>	6	—	2	—	—	—	3	5 <sup>b</sup>	3	2	2	

<sup>a</sup>Holotype of *P. aquilonaris*<sup>b</sup>Lectotype of *P. dubius*

are herein considered to represent a different species from *P. dubius*. In fact, they were also characterized by seven pectoral filaments and eight spines in the first dorsal fin, characters consistent with the diagnosis of *P. melanochir melanochir* given by Motomura and Sabaj (2002). Because Bleeker (1853) had recognized the differences between *P. dubius* and Bleeker's *P. macronema* (not of Pel's *P. macronema*; later replaced with *P. borneensis* Bleeker), which has been regarded as a junior synonym of *P. m. melanochir* (see Motomura and Sabaj, 2002), the two specimens are most likely to be included in RMNH 6014 after the original description of *P. dubius*. Accordingly, the two specimens identified as *P. m. melanochir* (not *P. dubius*) are excluded from the syntypical series of *P. dubius* (reregistered as RMNH 34454).

Of the remaining nine specimens in RMNH 6014, the largest (150mm SL) was not included in the syntypical series because its total length (202mm) was outside the length range (90–190mm TL) given by Bleeker (1851, 1852). That specimen has therefore been reregistered as RMNH 34453 (as a non-type Bleeker specimen). Accordingly, the remaining eight specimens (77, 79, 83, 106, 110, 114, 126, and 132mm SL) are herein regarded as the original syntypes of *P. dubius*.

The proposal of a lectotype for *P. dubius* is justified, owing to the similarity of that species to other congeners. Although Bleeker's (1983) figures were usually reproduced as life size (Motomura et al., 2001), that (1983: Polynemat. pl. 5, pl. 457, fig. 1) of *P. dubius* (as *Trichidion dubium*)

measured ca. 210mm TL, outside the length range of the syntypes. Therefore, the figure may have been enlarged or was based on a non-type specimen. Although ICZN (1999: Article 74.7, Recommendation 74B) has recommended that an illustrated specimen should be designated as lectotype in the first instance, the identity of the specimen used here is unknown. Accordingly, I selected the specimen in the best condition (126mm SL; Fig. 4A) from the eight syntypes and herein designate it as the lectotype of *P. dubius*, the remaining syntypes becoming paralectotypes [reregistered as RMNH 34452 (77, 79, 83, 106, 110, 114, and 132mm SL)].

**Synonymy.** Although *Polynemus dubius* has been regarded as a valid species (e.g., Kottelat et al., 1993; Randall and Lim, 2000), *P. longipectoralis* has also been regarded as a valid species by many researchers (e.g., Chevey, 1932; Kottelat, 1989, 2001; Talwar and Jhingran, 1991; Mishra and Krishnan, 1993), but without comparisons of each nominal species. Weber and de Beaufort (1922), Myers (1936), and Rainboth (1996) regarded both species as valid, the first-mentioned believing *P. dubius* and their new species, *P. longipectoralis*, to be distinguished by the number of lateral-line scales [stated as 67 in *P. dubius* (based on a single specimen) vs. 84 in *P. longipectoralis* (based on the holotype)], but in fact 79, according to examination of that specimen during this study; see Table 2].

The diagnostic characters (seven pectoral filaments, eight spines in the first dorsal fin, 79 pored lateral-line scales, 13 scale rows below lateral line, vomer with villiform teeth, and

posterior portion of the maxilla less than orbit diameter) found in the holotype of *P. longipectoralis* are consistent with those of specimens (including the newly designated lectotype) of *P. dubius*. Accordingly, *P. longipectoralis* is herein regarded as a junior synonym of the latter.

Incidentally, Rainboth (1996) also distinguished between the two nominal species by the number of lateral-line scales (65–67 in *P. dubius* vs. 80–85 in *P. longipectoralis*). However, his *P. longipectoralis* is in fact *P. aquilonaris*. Myers (1936) distinguished the two nominal species by the number of first dorsal-fin spines (7 in *P. dubius* vs. 8 in *P. longipectoralis*). However, *P. dubius*, including the holotype of *P. longipectoralis*, in fact has eight spines in the first dorsal fin. *Polynemus hornadayi* Myers, 1936 and *P. paradiseus* are the only polynemid species with seven spines in the first dorsal fin (Motomura et al., 2002b). The first spine of the first dorsal fin of Myers' (1936) *P. dubius* was apparently overlooked by him because of its very small size, and his *P. dubius* has probably included *P. aquilonaris* and *P. dubius*.

**Comparisons.** The genus *Polynemus* consists of seven taxa (Motomura and Sabaj, 2002; Motomura et al., 2002b; this study): *P. aquilonaris*, *P. dubius*, *P. hornadayi*, *P. melanochir dulcis*, *P. m. melanochir*, *P. multifilis* Schlegel in Temminck and Schlegel, 1843, and *P. paradiseus*.

*Polynemus aquilonaris* and *P. dubius* are easily distinguished from *P. multifilis* by having seven pectoral filaments (14–16 in the latter; Feltes, 2002). Furthermore, the former two species differ from *P. hornadayi* and *P. paradiseus* in having a greater number of first dorsal-fin spines (8; see Motomura et al., 2002b: fig. 3C; Tables 1, 2 vs. 7 in the latter two species; see Motomura et al., 2002b: fig. 3AB, tables 1, 2) and anal-fin spines (3; Tables 1, 2 vs. 2 in *P. paradiseus*; Motomura et al., 2002b: tables 2, 3), a lower number of pored lateral-line scales (80–86 in *P. aquilonaris* and 69–79 in *P. dubius*; Tables 1–3, vs. 90–103 in *P. hornadayi*; Motomura et al., 2002b: tables 1, 4), and the sixth or seventh pectoral filaments longest (fifth longest in *P. hornadayi*; Motomura et al., 2002b).

*Polynemus melanochir dulcis* and *P. m. melanochir* lack villiform teeth on the vomer and have black pigmentation on (usually) more than half of the posterior margin of the pectoral fins (Motomura and Sabaj, 2002), whereas *P. aquilonaris* and *P. dubius* have villiform vomerine teeth and lack black pigmentation on the pectoral fins. Furthermore, *P. aquilonaris* and *P. dubius* differ from both the aforementioned subspecies in having longer pectoral-fin rays [34–41% (mean 37%) of SL in *P. aquilonaris* and 34–40% (37%) in *P. dubius*; Tables 1, 2, vs. 31–35% (33%) in *P. m. dulcis* and 30–35% (32%) in *P. m. melanochir*; see Motomura and Sabaj, 2002: tables 1, 2] and pectoral filaments [longest filament 260–371% (308%) in *P. aquilonaris* and 264–312% (293%) in *P. dubius*; Tables 1, 2, vs. 128–153% (141%) and 141–193% (159%), respectively; Motomura and Sabaj, 2002: tables 1, 2].

Although *P. aquilonaris* is very similar to *P. dubius*, the former can be clearly distinguished from the latter by having higher counts of pored lateral-line scales [80–86 (mode 81) vs. 69–79 (78) in the latter] and scale rows below the

lateral line [14–17 (mode 14, rarely 13 or 17) vs. 13 (rarely 12)], and lower counts of gill rakers [9–11 (mode 11) in upper series, 16–18 (17) in lower, and 25–29 (27) total vs. 11–13 (12), 18–21 (18), and 29–33 (30), respectively] (see Table 3). Furthermore, *P. aquilonaris* differs from *P. dubius* in having a slightly higher second dorsal-fin soft ray count (15–19 vs. 14–16 in the latter) and lower pectoral-fin ray counts (15–17 vs. 16–18) (see Table 3).

**Comparative material examined.** *Polynemus melanochir melanochir*: RMNH 34454 (2 specimens; formerly RMNH 6014), 61–107 mm SL, data unknown.

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