

DEEP-SEA FISHES FROM THE ANDAMAN SEA BY R/V CHAKRATONG TONGYAI DURING 1996–2000. PART 5: ORDER PERCIFORMES

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ABSTRACT: Perciform fish specimens collected by the project of the Biodiversity of the Andaman Sea Shelf (BIOSHELF) during 1996–2000 were identified as 19 species which belong to 9 families. This study represents the first records of the following 7 species from the Andaman Sea: *i.e.*, acropomatid *Parascombrops pellucidus* Alcock, 1889, *Symphysanodon maunaloae* Anderson, 1970, chiasmodontids *Chiasmodon braueri* Weber, 1913 and *Kali kerberti* (Weber, 1913), champsodontid *Champsodon sagittus* Nemeth, 1994, trichiurid *Benthodesmus macrophthalmus* Parin and Becker, 1970, and nomeid *Cubiceps kotlyari* Agafonova, 1988.

Keywords: *Parascombrops pellucidus*, *Symphysanodon maunaloae*, *Chiasmodon braueri*, *Kali kerberti*, *Champsodon sagittus*, *Benthodesmus macrophthalmus*, *Cubiceps kotlyari*, Thailand, BIOSHELF

INTRODUCTION

A comprehensive taxonomic study of deep-sea fishes collected by R/V Chakratong Tongyai through the Biodiversity of the Andaman Sea Shelf (BIOSHELF) project (see details in Aungtonya *et al.* 2000) was started by Kawai *et al.* (2017) who treated the order Scorpaeniformes (*sensu* Nelson 2006). Later, species of the orders Beryciformes and Stephanoberyciformes (*sensu* Nelson 2006) were reported by Kimura *et al.* (2019a), the orders Albuliformes, Atelepodiformes and Lampriformes (*sensu* Nelson 2006) by Kawai *et al.* (2020), and the order Argentiniformes (*sensu* Nelson 2006) by Senda *et al.* (2020). *Melamphaes brachysomus* (order Stephanoberyciformes) and *Bembradium magnoculum* (order Scorpaeniformes) were newly described by Kimura *et al.* (2019b) and Kishimoto *et al.* (2019), respectively. Following previous studies, 19 deep-sea fish species which belong to Acropomatidae, Champsodontidae, Chiasmodontidae, Epigonidae, Gempylidae, Nomeidae, Ostracoberycidae,

Symphysanodontidae and Trichiuridae in the order Perciformes (*sensu* Nelson 2006) are reported in this study. According to Nelson *et al.* (2016), Champsodontidae and Chiasmodontidae are included in Trachiniformes, Gempylidae, Nomeidae and Trichiuridae in Scombriformes, and the others in Perciformes.

MATERIALS AND METHODS

All specimens were caught from deep-sea waters of the Andaman Sea by BIOSHELF (Aungtonya *et al.* 2000). Those specimens have been kept in 70% ethyl alcohol after fixation by 10% formalin, and have been deposited at the Reference Collection of Phuket Marine Biological Center, Phuket, Thailand (PMBC). Comparative materials are also deposited at PMBC.

Counts and proportional measurements follow Hubbs and Lagler (1958), but the number of gill rakers of *Trichiurus lepturus* was counted in accordance with Burhanuddin *et al.* (2002). Terminology

of the sensory canals of *Chiasmodon* and the jaw dentition of *Kali* follow Webb (1989) and Melo (2008), respectively. Total, standard and head lengths are abbreviated as TL, SL and HL, respectively. Measurements were made to the nearest 0.1 mm with calipers and a metallic ruler. Dorsal-, anal- and caudal-fin rays, and vertebrae were counted from a radiograph.

SPECIES LIST

Family Acropomatidae

Parascombrops pellucidus Alcock, 1889

Fig. 1

Diagnosis. Anal-fin rays II, 7; second spine of first dorsal fin, and second spine of anal fin without serration; pectoral fin reaching anal-fin origin, pectoral-fin length 27–31% SL; pelvic-fin spine serrated; no tooth patch on tongue; vomerine tooth

patch V-shaped; dentary with 2–4 lateral fangs; total gill rakers 19–25 (Schwarzhan and Prokofiev 2017).

Materials. PMBC 25061, 37 specimens, 34.8–49.3 mm SL, St. K4, 7°00'N 98°21'E to 6°59'N 98°21'E, 104–101 m depth, Agassiz trawl, 23 Feb. 2000; PMBC 30088, 2 specimens, 46.1–47.1 mm SL, St. L6, 6°45'N 98°06'E to 6°44'N 98°05'E, 303–313 m depth, Agassiz trawl, 23 Feb. 2000.

Distribution. Red Sea, off Somalia and Arabian Sea to Bay of Bengal (Schwarzhan and Prokofiev 2017), and Andaman Sea (present study).

Remarks. Because this species has never been known from the Andaman Sea (*e.g.*, Alcock 1899; Satapoomin 2011; Rajan *et al.* 2013), this report is the first record from this area.



Figure 1. *Parascombrops pellucidus*, PMBC 30088, 47.1 mm SL. Scale bar indicates 10 mm.

Synagrops japonicus (Döderlein in Steindachner and Döderlein, 1883)

Fig. 2

Diagnosis. Dorsal fins separated by a gap; anal-fin rays II, 7–8; pectoral fin not reaching to anus; pelvic-fin spine smooth; lateral-line scales 28–33; canines in jaws; distinct longitudinal ridge on lateral surface of maxilla; top of head naked; gill rakers on lower limb 12–15 (Hatooka 2013a; Heemstra 2016).

Materials. PMBC 25060, 29 specimens, 110.4–152.5 mm SL, St. J8, 7°21'N 97°26'E to 7°20'N 97°25'E, 520–531 m depth, otter trawl, 27 Jan. 1999; PMBC

25062, 1 specimen, 118.7 mm SL, St. Z3, 7°42'N 97°20'E to 7°42'N 97°18'E, 493–322 m depth, otter trawl, 24 Jan. 1999; PMBC 27110, 2 specimens, 118.3–122.7 mm SL, St. E8, 8°32'N 96°04'E to 8°31'N 96°07'E, 488–478 m depth, otter trawl, 6 Feb. 1999.

Distribution. Tropical and temperate waters of the world except for eastern Pacific (*e.g.*, Yamakawa 1982; Heemstra 1986, 2016; Satapoomin 2011; Hatooka 2013a).

Comparative material. PMBC 29989, 1 specimen, 127.4 mm SL, eastern Indian Ocean, 300–400 m depth, otter trawl, 8 Sep. 1980.



Figure 2. *Synagrops japonicus*, PMBC 25062, 118.7 mm SL. Scale bar indicates 10 mm.

Family Symphysanodontidae

***Symphysanodon maunaloae* Anderson, 1970**

Fig. 3

Diagnosis. Anal-fin rays III, 7; length of second anal-fin spine 11–15% SL; pectoral-fin rays 15–17; lateral-line scales 42–49; total gill rakers 29–39; body depth 20–33% SL; caudal peduncle depth 10–13% SL (Anderson 1970, 1999; Tameka 1982; Anderson and Springer 2005; Senou 2013).

Material. PMBC 29975, 1 specimen, 53.3 mm SL, St. Z2, 7°42'N 97°28'E to 7°42'N 97°31'E, 464–464 m depth, otter trawl, 23 Jan. 1999.

Distribution. Malacca Strait, Lombok, Sumbawa, Solomon, New Caledonia, Tuamotu, Society, Philippines, Caroline, Mariana, Kyushu-Palau Ridge, Hawaii and Johnston Atoll (Anderson 1970, 1999; Tameka 1982; Myers and Donaldson 2003; Anderson and Springer 2005; Mundy 2005; Senou 2013), and Andaman Sea (present study).

Remarks. *Symphysanodon maunaloae* was only reported from the Malacca Strait in the Indian Ocean (Anderson and Springer 2005). Therefore, this report is the first record of the species from the Andaman Sea.



Figure 3. *Symphysanodon maunaloae*, PMBC 29975, 53.3 mm SL. Scale bar indicates 10 mm.

Family Ostracoberycidae

***Ostracoberyx dorygenys* Fowler, 1934**

Fig. 4

Diagnosis. Third dorsal spine longest; posterior margin of opercle smooth; lower gill rakers (excluding single raker at the angle) 15–18 (Quéro and Ozouf-Costaz 1991; Carpenter 1999; Ramach-

andran *et al.* 2011; Hatooka 2013b; present study).

Materials. PMBC 29972, 8 specimens, 104.7–127.5 mm SL, PMBC 29973, 6 specimens, 111.6–126.7 mm SL, PMBC 30172, 2 specimens, 109.3–117.0 mm SL, PMBC 30173, 10 specimens, 114.4–134.7 mm SL, PMBC 30343, 23 specimens, 83.8–126.8 mm SL, St. E8, 8°32'N 96°04'E to

8°31'N 96°07'E, 488–478 m depth, otter trawl, 6 Feb. 1999; PMBC 29976, 1 specimen, 97.1 mm SL, St. C8, 9°00'N 96°15'E to 9°00' N 96°13'E, 478–480 m depth, Agassiz trawl, 3 Feb. 2000.

Distribution. Madagascar, Zanzibar, Maldives, southwest coast of India, Andaman Sea, Philippines, southern Japan and Taiwan (Quéro and Ozouf-Costaz

1991; Carpenter 1999; Ramachandran *et al.* 2011; Satapoomin 2011; Hatooka 2013b).

Remarks. The present specimens have 15–18 lower gill rakers on the first arch [vs. 15–17 in Quéro and Ozouf-Costaz (1991), Carpenter (1999), Ramachandran *et al.* (2011) and Hatooka (2013b)].



Figure 4. *Ostracoberyx dorygenys*, PMBC 29973, 118.9 mm SL. Scale bar indicates 30 mm.

Family Epigonidae
***Epigonus thai* Prokofiev and Bussarawit in**
Parin, Prokofiev and Bussarawit, 2012

Fig. 5

Diagnosis. Strong opercular spine present; ribs absent on last abdominal vertebra; tongue toothless; maxillary mustache-like process absent; total gill rakers 27; vertebrae 10 + 15; pored lateral-line scales 44 + 3; dorsal-fin rays VII + I,10; pectoral-fin rays 19; pyloric caeca 12 (Okamoto and Aungtonya 2013).

Material. PMBC 26430, holotype, 95.2 mm SL (data from Okamoto and Aungtonya 2013), St. L6, 6°45'N 98°06'E to 6°44'N 98°05'E, 303–313 m depth, Agassiz trawl, 23 Feb. 2000.

Remarks. This holotype is in poor condition caused by decalcification. See Parin *et al.* (2012) and Okamoto and Aungtonya (2013) for further details.



Figure 5. *Epigonus thai*, PMBC 26430. Photo after Okamoto and Aungtonya (2013).

Family Chiasmodontidae
***Chiasmodon braueri* Weber, 1913**

Fig. 6

Diagnosis. Pectoral-fin rays 12–13; upper-jaw length 70.0–77.1% HL; fangs on premaxillary head one; lower-jaw length 76.0–83.8% HL; teeth on second basibranchial and second ceratobranchial present; supraorbital pores 8; infraorbital pores 13–15; vertebrae 42–44 (Melo 2009).

Material. PMBC 29977, 1 specimen, 178.8 mm SL, St. E9, 8°30'N 95°58'E to 8°28'N 95°58'E,

649–550 m depth, otter trawl, 5 Feb. 1999.

Distribution. Off Tanzania, and tropical to subtropical waters in the western and central Pacific, and off southeast coast of Brazil (Melo 2009), and Andaman Sea (present study).

Remarks. This species was previously known only from off Tanzania in the Indian Ocean (Melo 2009). Therefore, this report is the first record of the species from the Andaman Sea.



Figure 6. *Chiasmodon braueri*, PMBC 29977, 178.8 mm SL. Scale bar indicates 30 mm.

***Kali kerberti* (Weber, 1913)**

Fig. 7

Diagnosis. Second dorsal-fin rays 22–26; anal-fin rays 24–27; teeth in lateral series of premaxilla 15–31 and in dentary 12–25; teeth in mesial series of premaxilla and dentary remarkably elongated; teeth in mesial series of premaxilla 5–6; teeth in mesial series of dentary 4–5; teeth in palatine 0–6; gill rakers present on first arch (Melo 2008).

Material. PMBC 30060, 1 specimen, 166.3 mm SL, St. J10, 7°15'N 97°16'E to 7°15'N 97°14'E, 662–696 m depth, otter trawl, 19 Feb. 2000; PMBC

30082, 1 specimen, 86.9 mm SL, St. J10, 7°20'N 97°14'E to 7°22'N 97°13'E, 655–651 m depth, otter trawl, 28 Jan. 1999.

Distribution. Off Tanzania, and tropical to subtropical waters in the Pacific and Atlantic (Melo 2008), and Andaman Sea (present study).

Remarks. This species was previously known only from off Tanzania in the Indian Ocean, being similar to *Chiasmodon braueri* (Melo 2008). Therefore, this report is the first record of the species from the Andaman Sea.



Figure 7. *Kali kerberti*, PMBC 30060, 166.3 mm SL. Scale bar indicates 30 mm.

Family Champsodontidae
***Champsodon nudivittis* (Ogilby, 1895)**

Fig. 8

Diagnosis. Premaxilla with a distinct notch lateral to symphysis; maxilla extending beyond posterior margin of eye; ventral margin of pupil indented by tab of iris; gill rakers 1 + 10–12; breast with small central patch of scales; chin, belly and area between pectoral-fin and pelvic-fin bases without scales (Nemeth 1994, 2001).

Materials. PMBC 29974, 2 specimens, 34.2–38.7 mm SL, St. K4, 7°00'N 98°21'E to 6°59'N 98°21'E,

104–101 m, Agassiz trawl, 23 Feb. 2000.

Distribution. Madagascar, Andaman Sea, Australia except for southern coast, Java Sea, Kai (Indonesia), and Philippines (Nemeth 1994; Bray *et al.* 2006a; Satapoomin 2011; Nakayama 2017).

Comparative materials. *Champsodon nudivittis*. PMBC 30059, 4 specimens, 38.6–55.0 mm SL, eastern Indian Ocean, M/V Pak Nam, 340 m depth, trawl, 19 Mar. 1989.



Figure 8. *Champsodon nudivittis*, PMBC 30059, 50.7 mm SL. Scale bar indicates 10 mm.

***Champsodon sagittus* Nemeth, 1994**

Fig. 9

Diagnosis. Premaxilla smoothly curved lateral to symphysis; maxilla not extending beyond posterior margin of eye; ventral margin of pupil indented by tab of iris; gill rakers 2 + 12–14; breast, belly and area between pectoral-fin and pelvic-fin bases without scales (Nemeth 1994).

Material. PMBC 30051, 1 specimen, 56.3 mm SL, St. L6, 6°45'N 98°06'E to 6°44'N 98°05'E, 303–313 m depth, otter trawl, 23 Feb. 2000.

Distribution. Gulf of Mannar (India), northern and western Australia, Kai (Indonesia) and Philippines (Nemeth 1994; Bray *et al.* 2006a; Rahangdale *et al.* 2018), and Andaman Sea (present study).

Remarks. This species was previously known only from the Gulf of Mannar and off the Western Australia in the Indian Ocean (Nemeth 1994; Bray *et al.* 2006a; Rahangdale *et al.* 2018). Therefore, this report is the first record of the species from the Andaman Sea.



Figure 9. *Champsodon sagittus*, PMBC 30051, 56.3 mm SL. Scale bar indicates 20 mm.

Family Gempylidae***Nesiarchus nasutus* Johnson, 1862**

Fig. 10

Diagnosis. Dorsal-fin rays XIX–XXI-I, 19–24; pelvic-fin rays I, 5; lateral line single, fairly straight; body fairly elongate, its depth 8.6–13.0 in SL; keels on body absent; anterior tip of lower jaw extending beyond anterior tip of upper jaw; dermal processes on tips of both jaws; vomerine teeth absent; gill rakers degenerated (Nakamura and Parin 1993; Nakabo and Doiuchi 2013a).

Materials. PMBC 15972, 3 specimens, 176–364 mm SL, St. E9, 8°30'N 95°58'E to 8°28'N 95°58'E, 649–550 m depth, otter trawl, 5 Feb. 1999; PMBC 15973, 1 specimen, 200.2 mm SL, St. J10, 7°20'N 97°14'E to 7°22'N 97°13'E, 655–651 m depth, otter trawl, 28 Jan. 1999.

Distribution. Worldwide in tropical and subtropical seas except eastern Pacific (*e.g.*, Nakamura and Parin 1993, 2001a; Satapoomin 2011; Nakabo and Doiuchi 2013a; present study).



Figure 10. *Nesiarchus nasutus*, PMBC 15972, 364 mm SL. Scale bar indicates 10 mm.

***Neopinnula orientalis* (Gilchrist and von Bonde, 1924)**

Fig. 11

Diagnosis. Dorsal fin inserted behind upper angle of gill opening; pectoral-fin rays 13–15; interorbital space wider than eye diameter (Nakamura and Parin 1993; Nakabo and Doiuchi 2013b).

Materials. PMBC 15967, 4 specimens, 149.6–177.0 mm SL, St. E8, 8°32'N 96°04'E to 8°31'N 96°07'E, 488–478 m depth, otter trawl, 6 Feb. 1999; PMBC 15968, 2 specimens, ca. 140–153.6 mm SL, St. E9, 8°30'N 95°58'E to 8°28'N 95°58'E, 649–550 m depth, otter trawl, 5 Feb. 1999; PMBC 15969, 1 specimen, 161.0 mm SL, St. Z3, 7°42'N 97°20'E to 7°42'N 97°18'E, 493–322 m depth, otter trawl,

24 Jan. 1999; PMBC 15970, 1 specimen, 160.2 mm SL, St. Z2, 7°42'N 97°28'E to 7°42'N 97°31'E, 464–464 m depth, otter trawl, 23 Jan. 1999; PMBC 15971, 19 specimens, 123.7–203.8 mm SL, St. J8, 7°21'N 97°26'E to 7°20'N 97°25'E, 520–531 m depth, otter trawl, 27 Jan. 1999.

Distribution. Indo-West Pacific from off South Africa to Japan (e.g., Nakamura and Parin 1993, 2001a; Satapoomin 2011; Nakabo and Doiuchi 2013a).

Comparative materials. PMBC 30052, 2 specimens, 147.4–151.4 mm SL, eastern Indian Ocean, R/V Dr Fridtjof Nansen, 300–400 m depth, otter trawl, 8 Sep. 1980.



Figure 11. *Neopinnula orientalis*, PMBC 15970, 160.2 mm SL. Scale bar indicates 10 mm.

***Rexea bengalensis* (Alcock, 1894)**

Fig. 12

Diagnosis. Dorsal-fin rays XVIII (rarely XIX)-I, 14–16; base of first dorsal fin 2.7–3.3 times of base of second dorsal fin; two dorsal and anal finlets, respectively; pectoral-fin rays 14 (rarely 13 or 15); pelvic-fin rays I; lateral line bifurcating below the fifth spine of first dorsal fin or further posterior;

body naked (Alcock 1894; Nakamura and Parin 1993, 2001a).

Material. PMBC 30348, 1 specimen, 110.2 mm SL, St. unknown.

Distribution. Tropical to temperate waters of Indo-West Pacific (e.g., Nakamura and Parin 1993, 2001a; Satapoomin 2011).



Figure 12. *Rexea bengalensis*, PMBC 30348, 110.2 mm SL. Scale bar indicates 10 mm.

Family Trichiuridae***Benthodesmus macrophthalmus* Parin and Becker, 1970**

Fig. 13

Diagnosis. Dorsal-fin elements 109–127 including 34–37 spines; anal-fin soft rays 70–76, external soft rays developed only in posterior half of fin base; pelvic fin inserted below pectoral-fin base; vertebrae 113–129 (Parin and Becker 1970; Nakamura and Parin 1993, 2001b; present study).

Materials. PMBC 64, 1 specimen, 539.8 mm SL, St. L8, 6°45'N 97°36'E to 6°44'N 97°34'E, 482–507 m depth, Agassiz trawl, 22 Feb. 2000; PMBC 66, 14 specimens, 520.2–666.1 mm SL, St. Z3, 7°42'N 97°20'E to 7°42'N 97°18'E, 493–322 m depth, otter trawl, 24 Jan. 1999; PMBC 29979, 1 specimen, 526.0 mm SL, St. G8, 8°00'N 97°11'E to 8°00'N 97°13'E, 495–488 m depth, Agassiz trawl, 9 Feb. 2000; PMBC 29980, 2 specimens, 531.3–565.5 mm SL, PMBC 30100, 1 specimen, 501.5 mm SL, St. B8, 9°10'N 96°18'E to 9°09'N 96°16'E, 489–504 m depth, otter trawl, 11 Feb. 1999; PMBC 30081, 3 specimens, 384.3–563.4 mm SL, St. J8, 7°15'N 97°33'E to 7°15'N 97°30'E, 473–494 m depth, otter trawl, 18 Feb. 2000; PMBC 30084, 2 specimens, 482.6–496.0 mm SL, St. Z2, 7°42'N 97°28'E to 7°42'N 97°31'E, 464–464 m depth, otter

trawl, 23 Jan. 1999; PMBC 30101, 2 specimens, 399.1–609.1 mm SL, St. J8, 7°15'N 97°30'E to 7°15'N 97°32'E, 490–479 m depth, Agassiz trawl, 18 Feb. 2000; PMBC 30102, 2 specimens, 397.2–513.5 mm SL, St. C8, 9°00'N 96°15'E to 9°00'N 96°13'E, 478–480 m depth, Agassiz trawl, 3 Feb. 2000; PMBC 30125, 2 specimens, 411.6–412.9 mm SL, St. E7, 8°30'N 97°01'E to 8°29'N 97°03'E, 449–446 m depth, Agassiz trawl, 8 Feb. 2000; PMBC 30148, 2 specimens, 408.9–476.7 mm SL, St. E7, 8°30'N 97°07'E to 8°29'N 97°04'E, 435–444 m depth, otter trawl, 9 Feb. 2000; PMBC 30168, 6 specimens, 326.5–600.5 mm SL, St. E8, 8°32'N 96°04'E to 8°31'N 96°07'E, 488–478 m depth, otter trawl, 6 Feb. 1999.

Distribution. Java, northwestern Australia and Arafura Sea (Parin and Becker 1970; Nakamura and Parin 1993, 2001b; Bray *et al.* 2006b; Larson *et al.* 2013), and Andaman Sea (present study).

Remarks. The specimens examined have 109–127 total dorsal-fin elements and 113–129 vertebrae (vs. 113–121 and 119–124, respectively: Parin and Becker 1970; Nakamura and Parin 1993, 2001b). This species has never been known from the Andaman Sea (e.g., Satapoomin 2011; Rajan *et al.* 2013). Therefore, this report is the first record of the species from this location.

Comparative materials. *Benthodesmus macrophthalmus*. PMBC 30087, 1 specimen, 368.8 mm SL, eastern Indian Ocean, 300–400 m depth, otter

trawl, R/V Dr Fridtjof Nansen, 8 Sep. 1980; PMBC 30109, 1 specimen, 423.7 mm SL, captured data unknown.



Figure 13. *Benthodesmus macrophthalmus*, PMBC 30100, 501.5 mm SL. Scale bar indicates 50 mm.

***Trichiurus lepturus* Linnaeus, 1758**

Fig. 14

Diagnosis. Dorsal-fin rays III, 130–135; first anal-fin spine situated below 37th–41st soft dorsal-fin soft ray; dorsal-fin base length 71–80% TL; pectoral-fin spine not serrated; gill rakers 10–14 (7–11) + 1 (1) + 16–21 (14–18) = 27–36 (23–27); precaudal peduncle length 81–91% TL; caudal peduncle length 9–15% TL; snout length 4–5% TL (Nakamura and Parin 1993; Burhanuddin *et al.* 2002; present study).

Materials. PMBC 15149, 2 specimens, 931–937 mm TL, St. E8, 8°32'N 96°04'E to 8°31'N 96°07'E, 488–478 m depth, otter trawl, 6 Feb. 1999; PMBC

30349, 3 specimens, 1025–1050 mm TL, St. J8, 7°21'N 97°26'E to 7°20'N 97°25'E, 520–531 m depth, otter trawl, 27 Jan. 1999.

Distribution. Tropical and temperate waters of the world's oceans (*e.g.*, Nakamura and Parin 1993, 2001b; Satapoomin 2011; Rajan *et al.* 2013; Parin and Nakamura 2016).

Remarks. Present specimens have 130–133 dorsal-fin soft rays and 11–14 (8–11) + 1 (1) + 20–26 (14–23) = 32–40 (24–35) gill rakers [vs. 132–135 and 10–14 (7–10) + 1 (1) + 16–21 (15–18) = 27–34 (23–27); Burhanuddin *et al.* 2002].



Figure 14. *Trichiurus lepturus*, PMBC 30349, 1047 mm TL. Scale bar indicates 50 mm.

Family Nomeidae

***Cubiceps pauciradiatus* Günther, 1872**

Fig. 15

Diagnosis. Dorsal-fin rays X–XI-I, 15–18; anal-fin rays II, 14–17; tooth patches on vomer and tongue broad; lateral-line scales 46–60; vertebrae 30–31;

bony keel on breast (Butler 1979; Agafonova 1988, 1994; Last 2001).

Materials. PMBC 30133, 4 specimens, 96.2–104.9 mm SL, St. E9, 8°30'N 95°58'E to 8°28'N 95°58'E, 649–550 m depth, otter trawl, 5 Feb. 1999.

Distribution. Tropical and temperate waters of the world's oceans (e.g., Butler 1979; Agafonova 1994; Last 2001; Satapoomin 2011).

Comparative material. *Cubiceps pauciradiatus*. PMBC 30351, 1 specimen, 98.9 mm SL, St. Z3, Thailand, 95–102 m depth, 19 Feb. 2007.



Figure 15. *Cubiceps pauciradiatus*, PMBC 30133, 97.6 mm SL. Scale bar indicates 30 mm.

***Cubiceps kotlyari* Agafonova, 1988**

Fig. 16

Diagnosis. Dorsal-fin rays X–XI-I, 21–24; anal-fin rays III, 20–23; teeth on vomer and tongue uniserial or obscured; lateral-line scales 57–65; vertebrae 31–32; profile of snout pointed; dorsal profile of body strongly convex, greatest body depth 27.8–32.3% SL; scales on top of head uniform in size (Agafonova 1988, 1994; Last 2001; Ho *et al.* 2010; present study).

Material. PMBC 30056, 1 specimen, 101.1 mm SL, St. E9, 8°30'N 95°58'E to 8°28'N 95°58'E,

649–550 m depth, otter trawl, 5 Feb. 1999.

Distribution. Off southern Java, northwestern Australia, Luzon and Taiwan (Agafonova 1988, 1994; Last 2001; Ho *et al.* 2010), and Andaman Sea (present study).

Remarks. The number of dorsal-fin soft rays is 24 in the present specimen, although the number was previously known as 21–23 (Agafonova 1988, 1994; Ho *et al.* 2010). This species is the first recorded from the Andaman Sea.



Figure 16. *Cubiceps kotlyari*, PMBC 30056, 101.1 mm SL. Scale bar indicates 30 mm.

***Cubiceps whiteleggii* (Waite, 1894)**

Fig. 17

Diagnosis. Dorsal-fin rays IX–XI–I–II, 18–21; anal-fin rays III, 16–20; teeth on vomer and tongue uniserial or obscured; lateral-line scales 55–65; vertebrae 31–32; profile of snout pointed; dorsal profile of body strongly convex, greatest body depth 25.4–36.7% SL; two distinct scales in size, *i.e.*, very small anteriorly and large posteriorly, on top of head (Butler 1979; Agafonova 1988, 1994; Last 2001).

Materials. PMBC 29981, 3 specimens, 118.7–131.2 mm SL, St. E8, 8°32'N 96°04'E to 8°31'N 96°07'E, 488–478 m depth, otter trawl, 6 Feb. 1999; PMBC 30345, 4 specimens, 126.2–133.8 mm SL, St. Z3, 7°42'N 97°20'E to 7°42'N 97°18'E, 493–322 m depth, otter trawl, 24 Jan. 1999.

Distribution. Tropical and temperate waters in the Indo-West Pacific (*e.g.*, Last 2001; Satapoomin 2011; Nakabo and Doiuchi 2013b; Rajan *et al.* 2013; Okamoto 2017).

Remarks. This species was previously known as *Cubiceps squamiceps* (Lloyd, 1909) by many studies (*e.g.*, Haedrich 1986; Agafonova 1988, 1994). See Parin and Piotrovsky (2004) for further details about synonymy of this species.

Comparative materials. *Cubiceps whiteleggii*. PMBC 29982, 3 specimens, 85.4–115.3 mm SL, eastern Indian Ocean, R/V Dr Fridtjof Nansen, 300–400 m depth, otter trawl, 8 Sep. 1980.



Figure 17. *Cubiceps whiteleggii*, PMBC 29981, 124.2 mm SL. Scale bar indicates 30 mm.

***Psenes arafurensis* Günther, 1889**

Fig. 18

Diagnosis. Dorsal-fin soft rays 18–23; anal-fin soft rays 20–23; lateral-line scales 44–50; scales on top of head uniform in size; predorsal scales extending forward to about level of mid-eye; scaleless area present above gill cover; vertebrae 30–31 (Haedrich 1967, 2003, 2016; Ahlstrom *et al.* 1976; Last 2001; Parin and Piotrovsky 2004; Nakabo and Doiuchi 2013b; Lee *et al.* 2016).

Material. PMBC 29999, 1 specimen, 216.3 mm SL, St. E9, 8°30'N 95°58'E to 8°28'N 95°58'E, 649–550 m depth, otter trawl, 5 Feb. 1999.

Distribution. Tropical to temperate waters of the world's oceans (*e.g.*, Last 2001; Haedrich 2003, 2016; Parin and Piotrovsky 2004).



Figure 18. *Psenes arafurensis*, PMBC 29999, 216.3 mm SL. Scale bar indicates 50 mm.

***Psenes cyanophrys* Valenciennes in Cuvier and Valenciennes, 1833**

Fig. 19

Diagnosis. Dorsal-fin soft rays 23–28; anal-fin soft rays 23–31; lateral-line scales 60–63; scales on top of head in two distinct sizes, anterior scales very small and scaled area extending forward to nostrils; predorsal scales extending forward to about level of mideye; scales present above gill cover (Haedrich

1967; Ahlstrom *et al.* 1976; Last 2001; Parin and Piotrovsky 2004; Nakabo and Doiuchi 2013b).

Materials. PMBC 30167, 2 specimens, 170.7–171.4 mm SL, St. E9, 8°30'N 95°58'E to 8°28'N 95°58'E, 649–550 m depth, otter trawl, 5 Feb. 1999.

Distribution. Tropical to temperate waters of the world (*e.g.*, Last 2001; Haedrich 2003, 2016; Parin and Piotrovsky 2004).



Figure 19. *Psenes cyanophrys*, PMBC 30167, 170.7 mm SL. Scale bar indicates 50 mm.

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