

DEEP-SEA FISHES FROM THE ANDAMAN SEA BY R/V CHAKRATONG TONGYAI DURING 1996–2000. PART 3: ORDERS ALBULIFORMES, ATELEPODIFORMES AND LAMPRIFORMES

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ABSTRACT: Twenty-six halosaurids and 1 notacanthid (Albuliformes), 9 atelepodids (Atelepodiformes), and 1 trachipterid (Lampriformes) specimens were collected from deep-sea waters of the Andaman Sea, the eastern Indian Ocean by R/V Chakratong Tongyai during 1996–2000 under the project of the Biodiversity of the Andaman Sea Shelf. Halosaurids *Aldrovandia affinis* (Günther, 1877), *Aldrovandia mediorostris* (Günther, 1887) and *Aldrovandia phalacra* (Vaillant, 1888), and notacanthid *Notacanthus abbotti* Fowler, 1934 are newly recorded from the Andaman Sea, eastern Indian Ocean.

Keywords: Halosauridae, Notacanthidae, Atelepodidae, Trachipteridae, Thailand, BIOSHELF

INTRODUCTION

In the late nineteenth century, many deep-sea fish specimens which were collected from the Andaman Sea by the Royal Indian marine survey ship Investigator, were studied taxonomically (e.g., Alcock 1889, 1891, 1894, 1898, 1899). After almost a century since these expeditions, no deep-sea expeditions were conducted in this area. Although deep-sea expeditions were conducted in the Andaman Sea off Thailand in 1980's (see Aungtonya *et al.* 2000), no comprehensive taxonomic studies of fishes were shown.

The Biodiversity of the Andaman Sea Shelf (BIOSHELF) project was operated by R/V Chakratong Tongyai during 1996–2000 (see Aungtonya *et al.* 2000). Specimens captured by this expedition (surface to 1,020 m depth) have been deposited at the Reference Collection of the Phuket Marine Biological Center, Thailand (PMBC). On the basis of examination of deep-sea (deeper than 200 m) fish specimens captured by this expedition, 9 scorpaeniform species were listed in Kawai *et al.* (2017) as well as 4 beryciform and 4 stephanoberyciform species in Kimura *et al.* (2019b). In addition, two new species, i.e. *Melamphaes brachysomus* and *Bembradium magnoculum*, were

described based on specimens of BIOSHELF (Kimura *et al.* 2019a; Kishimoto *et al.* 2019).

As a part of a comprehensive species list of this expedition under the BIOSHELF, we report fishes of the orders Albuliformes, Atelepodiformes and Lampriformes (*sensu* Nelson 2006) in this study.

MATERIALS AND METHODS

All specimens caught from deep-sea waters of the Andaman Sea by BIOSHELF have been deposited at PMBC. For detailed information on sampling stations see Aungtonya *et al.* (2000). Those specimens have been kept in 70% ethyl alcohol after fixation by 10% formalin.

Counts and proportional measurements follow McDowell (1973a) for Halosauridae, McDowell (1973b) for Notacanthidae, and Hubbs and Lagler (1958) for Atelepodidae. Preanal length for Trachipteridae is the straight measurement of the distance from the tip of the snout to the anus. Standard, preanal and gnathoproctal lengths are abbreviated as SL, PAL and GPL, respectively. Measurements were made to the nearest 0.1 mm with digital calipers and dividers for Halosauridae, Notacanthidae and Atelepodidae, and 1 mm with a metallic ruler for

Trachipteridae. Lateral-line scales of halosaurids of the present specimens could not be counted because all scales have been lost.

SPECIES LIST

Order Albuliformes

Family Halosauridae

Aldrovandia affinis (Günther, 1877)

Fig. 1

Diagnosis. 10–13 dorsal-fin soft rays; 1 fulcral spine and 11–14 pectoral-fin rays; 12–16 total gill rakers on anterior face of 1st branchial arch; preoral snout length *ca.* 2.0–2.7 in snout length; palatine tooth patches on both sides contacted medially; palatine and pterygoid tooth patches separated; dorsal origin very slightly behind base of pelvic fin; color of anus white; lateral-line scales in the form of rectangles with rounded corners, 25–31 from gill cleft to anus (McDowell 1973a; Sulak 1977; Paulin and Moreland 1979; Filatova 1986; Smith 2003, 2016; Yeh *et al.* 2006; Bañón *et al.* 2016; present study).

Materials. PMBC 26204, 6 specimens, 82.7–137.1 mm GPL, St. E11, 8°28'N, 95°53'E to 8°24'N, 95°52'E, 864–800 m depth, Agassiz trawl, 5 Feb. 2000; PMBC 30182, 4 specimens, 86.9–120.3 mm GPL, St. C12, 8°59'N, 96°03'E to 8°56'N, 96°01'E, 930–962 m depth, Agassiz trawl, 4 Feb. 2000.

Distribution. Eastern Atlantic (from Gulf of Biscay, Madeira and Canarias islands to off South Africa), western Atlantic (from New England to Florida, Gulf of Mexico, off Caribbean islands and South America), Indo-Pacific (Mozambique, Zanzibar, west coast of Indian Peninsula, Saya de Malha Bank, Laccadives, Ceylon, Maldives, western and southeastern Australia, Tasman Sea, Timor Sea, Philippines, Taiwan, Korea, Japan, Kermadec Ridge and Hawaii) and eastern Pacific (Günther 1877; McDowell 1973a; Paulin and Moreland 1979; Filatova 1986; Yeh *et al.* 2006; Nakabo and Kai 2013a; Bañón *et al.* 2016; Smith 2016), and Andaman Sea (present study).

Remarks. Preoral snout length is 2.3–2.7 in snout length in the present specimens, while it is *ca.* 2.0–2.5 in previous studies (Sulak 1977; Smith 2003, 2016; Yeh *et al.* 2006; Bañón *et al.* 2016). Although *Aldrovandia affinis* has been known from a warm and tropical waters of the world (Günther 1877; McDowell 1973a; Paulin and Moreland 1979; Filatova 1986; Yeh *et al.* 2006; Nakabo and Kai 2013a; Bañón *et al.* 2016; Smith 2016), this species had never been reported from the Andaman Sea (*e.g.*, Satapoomin 2011; Rajan *et al.* 2013). Therefore, the specimens examined here represent the first record from the Andaman Sea.



Figure 1. *Aldrovandia affinis*, PMBC 30182, 120.3 mm GPL. Scale bar 10 mm.

***Aldrovandia mediorostris* (Günther, 1887)**

Fig. 2

Diagnosis. 11 dorsal-fin soft rays; 1 fulcral spine and 8–10 pectoral-fin rays; 17–20 total gill rakers on anterior face of 1st branchial arch; preoral snout length 3.0–3.3 in snout length; palatine tooth patches on both sides separated medially; palatine tooth patch in contact with pterygoid tooth patch; dorsal origin well behind base of pelvic fin; color of anus black; one lateral-line scale for every three transverse scale rows; 13–19 lateral-line scales from branchial cleft to anus (Günther 1887; Alcock 1899; McDowell 1973a; present study).

Materials. PMBC 30183, 1 specimen, 200.0 mm GPL, St. C12, 8°59'N, 96°03'E to 8°56'N, 96°01'E, 930–962 m depth, Agassiz trawl, 4 Feb. 2000; PMBC 30184, 1 specimen, 164.2 mm GPL, St. U4,

7°07'N, 97°03'E to 7°07'N, 97°01'E, 967–964 m depth, Agassiz trawl, 16 Nov. 1999.

Distribution. Arabian Sea, Philippines and Gulf of Tomini, Sulawesi, Indonesia (Günther 1887; Alcock 1899; McDowell 1973a), and Andaman Sea (present study).

Remarks. The present specimens have 9–10 pectoral-fin rays (8 in Günther 1887; Alcock 1899), 18–20 total gill rakers (17–18 in McDowell 1973a) and preoral snout length 3.0 in snout length (3.3 in Günther 1887). *Aldrovandia mediorostris* has been known only from the Philippines (Günther 1887), Arabian Sea (Alcock 1899) and the Gulf of Tomini, Sulawesi, Indonesia (McDowell 1973a). Therefore, the Andaman specimens represent the fourth record of the species as well as the first record from the Andaman Sea.



Figure 2. *Aldrovandia mediorostris*, PMBC 30183, 200.0 mm GPL. Scale bar 10 mm.

***Aldrovandia phalacra* (Vaillant, 1888)**

Fig. 3

Diagnosis. 10–13 dorsal-fin soft rays; 1 fulcral spine and 9–14 pectoral-fin rays; 17–27 total gill rakers on anterior face of 1st branchial arch; preoral snout length 3.0–3.5 in snout length; palatine tooth patches on both sides separated medially; palatine and pterygoid tooth patches only narrowly separated, their gap less than half of palatine tooth

patch; dorsal origin well behind base of pelvic fin; color of anus white; one lateral-line scale for every two transverse scale rows; lateral-line scales in the form of vertical ovals, 19–31 from gill cleft to anus (McDowell 1973a; Sulak 1977; Filatova 1986; Yeh *et al.* 2006; Bañón *et al.* 2016; present study).

Materials. PMBC 30181, 11 specimens, 49.6–84.0 mm GPL, St. E11, 8°28'N, 95°53'E to 8°24'N, 95°52'E, 864–800 m depth, Agassiz trawl, 5 Feb.

2000; PMBC 30185, 2 specimens, 73.9–74.5 mm GPL, St. C12, 8°59'N, 96°03'E to 8°56'N, 96°01'E, 930–962 m depth, Agassiz trawl, 4 Feb. 2000; PMBC 30186, 1 specimen, 45.0 mm GPL, St. C10, 8°59'N, 96°08'E to 8°56'N, 96°08'E, 691–684 m depth, Agassiz trawl, 4 Feb. 2000.

Distribution. Western Atlantic (from Greenland, New England, USA to Bahamas and southern Brazil), central Atlantic (Azores), eastern Atlantic (from Gulf of Biscay to Guinea and South Africa), Indo-Pacific [Arabian Sea, Maldives, Bali (questionable), Taiwan and Hawaii] and eastern Pacific (Chile) (Vaillant 1888; McDowell 1973a; Yeh *et al.* 2006;

Bañón *et al.* 2016; Poulsen *et al.* 2017), and Andaman Sea (present study).

Remarks. The number of total gill rakers of the present specimens (21–27) are slightly more than that given in previous studies (17–25; McDowell 1973a; Filatova 1986; Yeh *et al.* 2006; Bañón *et al.* 2016). Because *Aldrovandia phalacra* had been known only from the Arabian Sea, Maldives, Bali (questionable), Taiwan and Hawaii in the Indo-Pacific (Vaillant 1888; McDowell 1973a; Yeh *et al.* 2006; Bañón *et al.* 2016; Poulsen *et al.* 2017), the specimens examined here represent the first record of this species in the Andaman Sea.



Figure 3. *Aldrovandia phalacra*, PMBC 30185, 74.5 mm GPL. Scale bar 10 mm.

Family Notacanthidae
***Notacanthus abbotti* Fowler, 1934**
Fig. 4

Diagnosis. 12–15 dorsal-fin spines; 12–22 anal-fin spines; length of longest gill raker *ca.* 1.0–5.0 in length of gill filament; distance from tip of snout to posterior margin of eye *ca.* 1.5–1.6 in distance from posterior margin of eye to posteriormost edge of opercle (McDowell 1973b; Mundy *et al.* 2011; Nakabo and Kai 2013b; present study).

Material. PMBC 25085, 1 specimen, 44.5 mm GPL, St. E9, 8°30'N, 98°58'E to 8°28'N, 95°58'E, 649–550 m depth, otter trawl, 5 Feb. 1999.

Distribution. Philippines, Taiwan, Japan, Emperor Seamounts and Hawaii (Fowler 1934; McDowell 1973b; Machida 1984; Mundy *et al.* 2011; Nakabo and Kai 2013b), and Andaman Sea (present study).

Remarks. *Notacanthus abbotti* had been known only from the western and central North Pacific (Fowler 1934; McDowell 1973b; Machida 1984; Mundy *et al.* 2011; Nakabo and Kai 2013b). Therefore, the specimen examined here represents the first record of this species from the Andaman Sea as well as Indian Ocean.



Figure 4. *Notacanthus abbotti*, PMBC 25085, 44.5 mm GPL. Scale bar 10 mm.

Order Ateleopodiformes
Family Ateleopodidae
Ateleopus indicus Alcock, 1891

Fig. 5

Diagnosis. 8–10 dorsal-fin rays; 76–86 anal- + caudal-fin rays; 10–13 pectoral-fin rays; 0 + 7–8 gill rakers; upper jaw teeth present; lower jaw almost or completely toothless; vertebrae 22–24 + 75–80 = 97–103 (Alcock 1891, 1899; Kaga 2016; present study).

Materials. PMBC 30187, 2 specimens, 263.1–291.9 mm SL, St. G8, 8°00'N, 97°06'E to 8°00'N, 97°04'E, 508–518 m depth, otter trawl, 20 Nov. 1999; PMBC 30188, 1 specimen, 323 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 30189, 1 specimen, 362 mm SL, Andaman Sea, no further information; PMBC 30190, 5 specimens, 236–271 mm SL, St. L8, 6°46'N, 97°33'E to 6°44'N, 97°35'E, 513–501 m depth, otter trawl, 22 Feb. 2000.

Distribution. Laccadive Sea, Maldives and Andaman Sea (Alcock 1891, 1899; Satapoomin 2011; Kaga 2016; present study).

Remarks. Although the species had been known as having 76–82 anal- + caudal-fin rays and 12–13 pectoral-fin rays (Alcock 1891, 1899; Kaga 2016), the present specimens have 77–86 anal- + caudal-fin rays and 10–12 pectoral-fin rays.



Figure 5. *Ateleopus indicus*, PMBC 30187, 263.1 mm SL. Scale bar 10 mm.

Order Lampriformes
Family Trachipteridae
Trachipterus sp.

Fig. 6

Material. PMBC 30191, 1 specimen, 119 mm PAL, St. J8, 7°15'N, 97°33'E to 7°15'N, 97°30'E, 473–494 m depth, otter trawl, 18 Feb. 2000.

Remarks. Taxonomy of the genus *Trachipterus* in the species level, including validity of recognized

species and their diagnostic characters, has been still confused mainly due to the absence of comprehensive taxonomic studies. The present specimen is in poor condition, and could not be identified to the species level based on diagnostic characters previously known for the species, such as the numbers of dorsal-, pectoral- and caudal-fin rays, vertebrae, and gill rakers on the first arch (Savinykh and Baitalyuk 2011; Angulo and López-Sánchez 2017).



Figure 6. *Trachipterus* sp., PMBC 30191, 119 mm PAL. Scale bar 10 mm.

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