



Boleophthalmus boddarti (Pallas, 1770)

Family: Gobiidae (FC: 460)

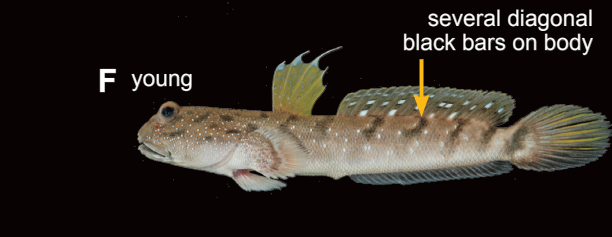
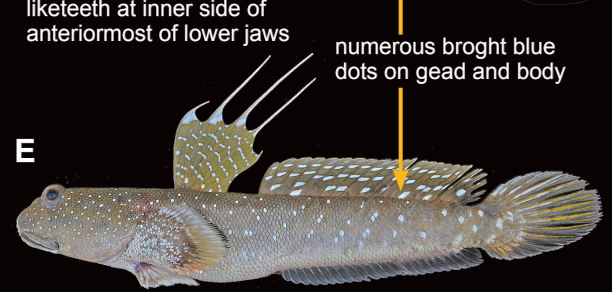
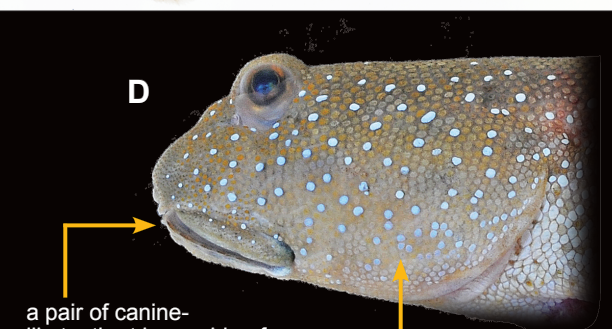
Size: 13.5 cm SL (Larson & Lim, 2005: 73).

Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A relatively large-sized species of mudskippers, found on exposed mudflats in brackish estuaries and adjacent waters; it is one of the most common species of mudskippers in the region, which is commonly seen in/around mangrove areas of the Vietnamese Mekong. Like the other typical mudskippers (e.g., *Periophthalmodon* and *Periophthalmus*), it usually crawls, skips, and sometimes jumps around watersides of exposed mudflats during the low-tide hours. Live fish are commonly sold at local markets in the Mekong delta of Vietnam (photo G).

Boleophthalmus resembles *Periophthalmodon* and *Periophthalmus* in general appearance, but always has 5 spines of the first dorsal fin (vs. 4–17 spines in the other 2 genera), 24–28 rays of second dorsal fin (vs. 10–14 rays), 24–27 anal-fin rays (vs. 9–14 rays), and a pair of enlarged canine-like teeth at the inner side of the anteriormost area of the lower jaws (vs. enlarged canine-like teeth are absent on the lower jaws) (Murdy, 1989). See also "Notes" of *Scartelaos histophorus*, next page.

Boleophthalmus boddarti is hitherto the only known species of the genus in the Mekong. Rainboth *et al.* (2012: 106) also listed *B. pectinirostris* in their book of the fishes of their "Greater Mekong Ecosystem," it was based on Orsi (1974), a checklist of freshwater fishes of Vietnam giving no detailed localities. *Boleophthalmus pectinirostris* is the East Asian species (Murdy, 1989; Jaafar & Parenti, 2017), but is also known from peninsular and eastern Malaysia and Sumatra (Murdy & Jaafar, 2017). The record of the species from the Mekong needs to re-check based on its voucher specimen.



A) Aggregation on a mudflat, not collected (Cà Mau, Vietnam, photo: KS); B) CTU-P 4714 (photo: LXT); C) CTU-P 1198 (photo: LXT); D and E) CTU-P 1197 (photo: LXT); F) CTU-P 2212 (photo: LXT); G) marketed fish, not preserved (Tra Binh, Vietnam, photo: KS)



***Scartelaos histophorus* (Valenciennes, 1837)**

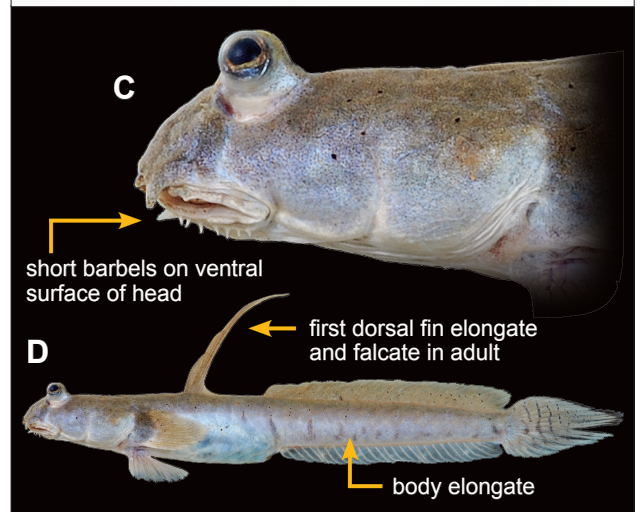
Family: Gobiidae (FC: 460)

Size: 10.5 cm SL (Larson & Lim, 2005: 147).

Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A relatively large-sized species of mudskippers, found on exposed mudflat in brackish estuaries and adjacent waters; it is sometimes seen at extensive mudflats of the Vietnamese Mekong. The fish shown in the photo A is a small young, photographed at a mudflat in Bạc Liêu (shown in photograph below).

Scartelaos is readily distinguished from the other typical mudskipper genera (e.g., *Boleophthalmus*, *Periophthalmodon*, and *Periophthalmus*) by its elongated body and short barbels on the ventral surface of the head. Like *Boleophthalmus*, it has 5 spines of the first dorsal fin, long-based second dorsal and anal fins, and a pair of enlarged canine-like teeth at the inner side of the anteriormost area of the lower jaws. *Scartelaos histophorus* is the only known species of the genus in the Mekong.



A) A small young on mudflat, not collected (Bac Lieu, Vietnam, photo: KS); B–D) CTU-P 3361 (photo: LXT); E) CTU-P 1179 (photo: LXT)

A mudflat at Bạc Liêu, Vietnam, where one of the photographed fish (A) was found (photo: KS)

Periophthalmodon septemradiatus (Hamilton, 1822)**Family:** Gobiidae (FC: 460)**Size:** 8.6 cm SL (Murdy, 1989: 29).**Distribution:** Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A medium-sized species of mudskippers, found on exposed mudflats in brackish estuaries; it is fairly common in/around mangrove areas of the Vietnamese Mekong, but, during our surveys in 2007–2013, we did not see this species in the local markets.

Periophthalmodon quite well resembles *Periophthalmus* in general appearance, and can be distinguished from the latter by having 2 rows of teeth on the upper jaw (vs. a single row in *Periophthalmus*) and a black stripe from the eye to caudal peduncle (Murdy, 1989). Note that the color of the body is slightly changed depending on the fish condition, and the black stripe may be indistinct in darkened-colored individuals.

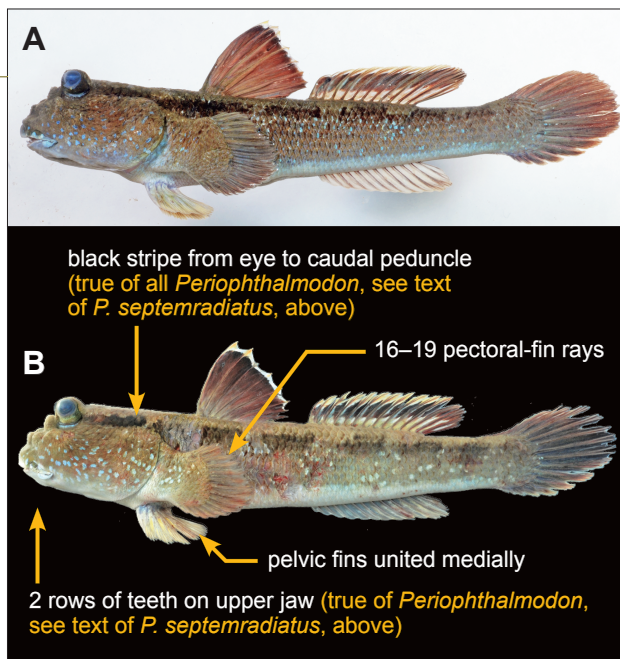
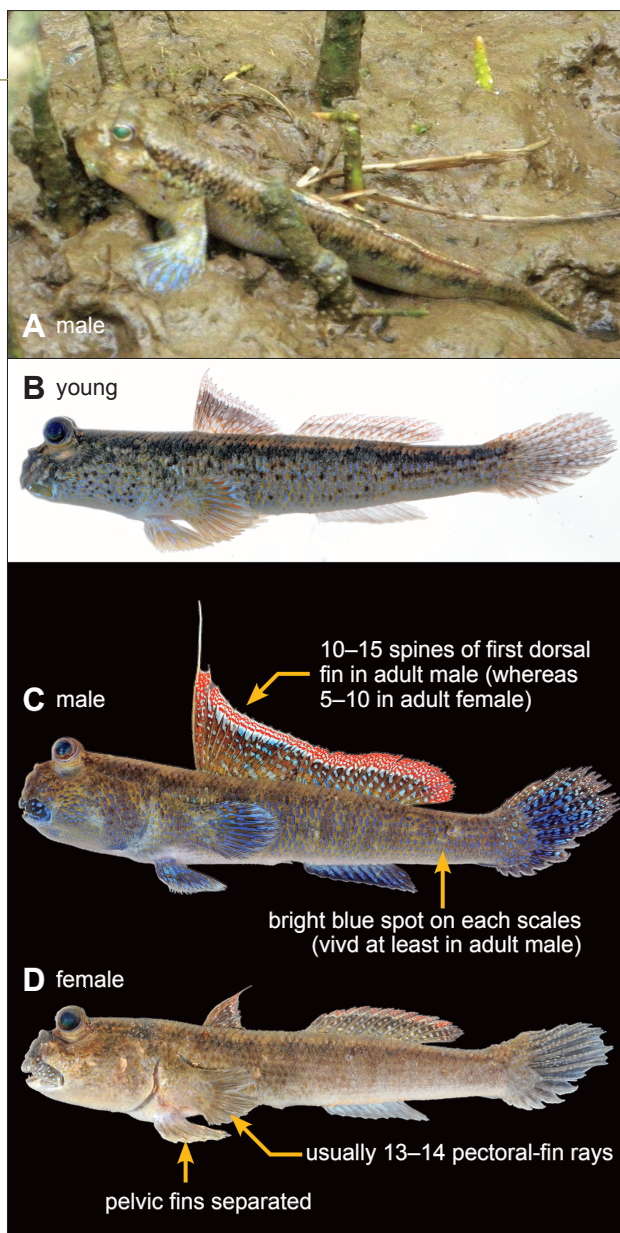
Three species are known in *Periophthalmodon*, of which 2 are found in the Mekong. *Periophthalmodon septemradiatus* is a relatively small-sized species in the genus [the other 2 congeners reach 21 cm SL (Murdy, 1989)], and differs in having 12–15 (usually 13 or 14) pectoral-fin rays (vs. 15–17 in the others), completely scaled isthmus (vs. naked), and separated pelvic fins (vs. united medially into a disc) (Murdy, 1989).

Males showing courtship behavior (not given in this book) represent a peculiar metallic-blue coloration of the body; in the males with such an appearance, the ground color of the body turns to be blackened, and a vivid blue spot on each scale appears to be enlarged (see photographs of males in Ayeyarwady River of the Myanmar, given in Onishi, 2013: 206).

Periophthalmodon schlosseri (Pallas, 1770)**Family:** Gobiidae (FC: 460)**Size:** 21.0 cm SL (Murdy, 1989: 28).**Distribution:** Mekong Basin in Vietnam; Western Pacific.

Notes: A large-sized species of mudskippers, found on exposed mudflats in brackish estuaries; it is common in/around mangrove areas of the Vietnamese Mekong, and the live fish is sometimes sold at the local markets.

This is one of 2 large-sized species of the genus (see "Notes" of *Periophthalmodon septemradiatus*, above), and is thus called "Giant mudskipper" as its English name; the other large species, *Periophthalmodon freycineti*, is confined to the Philippines, eastern Indonesia, southern Papua New Guinea, and northern Australia (Murdy, 1989; Murdy and Jaafar, 2017), and is not expected to be from the Mekong.



A) A large fish (not collected) on exposed mud bottom at mangrove area (Sóc Trăng, Vietnam, photo: KS); B) CTU-P 1266 (photo: LXT); C) CTU-P 5202 (photo: HVM); D) CTU-P 849 (photo: LXT)

A) CTU-P 3142 (photo: LXT); B) CTU-P 1394 (photo: LXT); C) a large female (not collected) on exposed mud bottom at mangrove area (Bến Tre, Vietnam, photo: KS)



A female (above) and male (below)

Periophthalmus gracilis Eggert, 1935

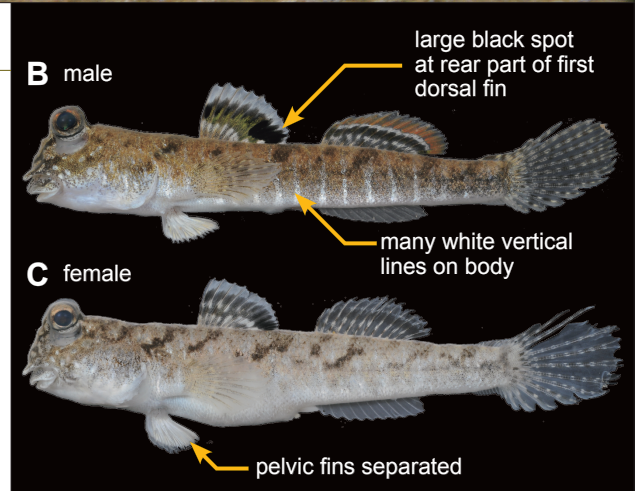
Family: Gobiidae (FC: 460)

Size: 4.5 cm SL (Murdy, 1989: 37).

Distribution: Mekong Basin in Vietnam; Western Pacific.

Notes: A small-sized species of mudskippers, found on exposed mudflat in brackish estuaries; it is common in/around mangrove areas of the Vietnamese Mekong, but, during our surveys in 2007–2013, we did not see this species in the local markets (probably less-esteemed as food fish due to its small size).

Periophthalmus quite well resembles *Periophthalmodon* in general appearance, and can be distinguished from the latter by having only a single row of teeth on the upper jaw (vs. 2 rows in *Periophthalmus*) (Murdy, 1989). *Periophthalmus* is the most species-rich genus of mudskippers, comprising 19 species from the Indo-West Pacific and eastern Atlantic Ocean. During our field surveys in 2007–2013, we collected 3 species from the Vietnamese Mekong: *P. chrysopilos*, *P. gracilis*, and *P. variabilis*. Of these, *P. gracilis* is the smallest species; it is easily identified based on its numerous white vertical lines on the body and a large black spot at the rear part of the first dorsal fin. See also "Notes" on *P. chrysopilos*, next page.



B male

large black spot at rear part of first dorsal fin

C female

many white vertical lines on body

pelvic fins separated

Periophthalmus variabilis Eggert, 1935

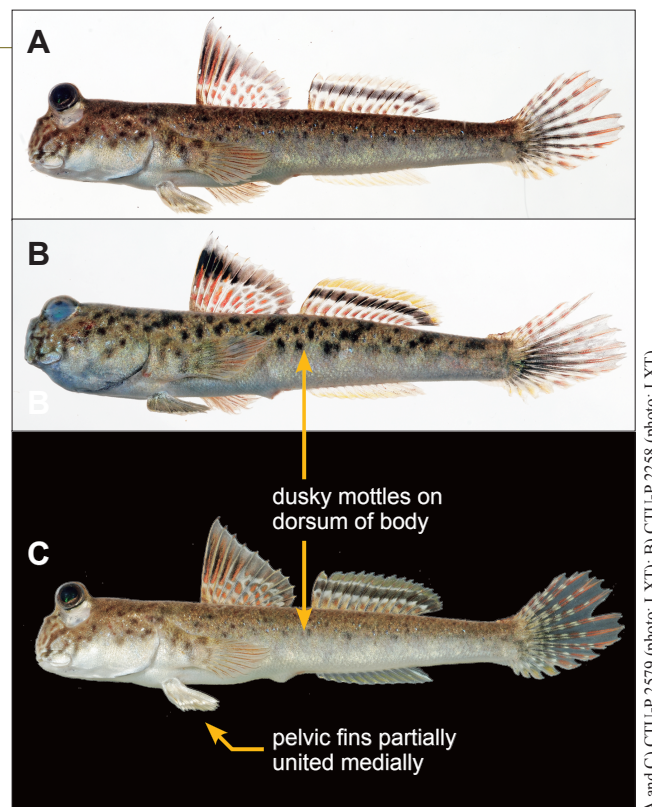
Family: Gobiidae (FC: 460)

Size: 6.43 cm SL (Jaafar *et al.*, 2009: 174).

Distribution: Mekong Basin in Vietnam; Western Pacific.

Notes: A relatively small-sized species of mudskippers, found on exposed mudflats in brackish estuaries; it is less common, but is sometimes found in/around mangrove areas of the Vietnamese Mekong, together with *Periophthalmodon septemradiatus* and/or *Periophthalmus gracilis*. Like *P. gracilis*, during our surveys in 2007–2013, we could not see this species in the local markets.

This species was once confused with *Periophthalmus novemradiatus*, a species actually confined to the Indian Ocean and Andaman Sea (Jaafar *et al.*, 2009); Murdy and Jaafar (2017) noted that the species is also known from the western Pacific, but, judging from the photographed specimen, the record given by the literature they followed (Ghaffar & Shibukawa *in* Matsunuma *et al.*, 2011) was undoubtedly based on a misidentification of *P. variabilis*. Rainboth *et al.* (2012: 106) listed both *P. novemradiatus* and *P. variabilis* in their book of fishes of their "Greater Mekong Ecosystem." However, the literatures they based their



A

B

C

dusky mottles on dorsum of body

pelvic fins partially united medially

findings on (Murdy, 1989; Larson *et al.*, 2008) were published before Jaafar *et al.* (2009). *Periophthalmus novemradiatus* is actually not expected to be from the Mekong.

A) A pair (not collected) on exposed mud bottom at mangrove area (Tra Vinh, Vietnam, photo: KS); B) CTU-P 1363 (photo: LXT); C) CTU-P 1364 (photo: LXT)

A and C) CTU-P 2579 (photo: LXT); B) CTU-P 2258 (photo: LXT)



***Periophthalmus chrysospilos* Bleeker, 1853**

Family: Gobiidae (FC: 460)

Size: 12.9 cm SL (Murdy, 1989: 36).

Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A medium-sized species of mudskippers, found on exposed mudflats in brackish estuaries. *Periophthalmus chrysospilos* is a very common species of the genus, and is abundantly seen in/around mangrove areas of the Vietnamese Mekong; it is sometimes seen in the local markets.

Periophthalmus chrysospilos is a characteristic species, having numerous orange dots on head and body and united pelvic fins forming a circular disc (see photo F); the other 2 congeners in the Mekong (see "Notes" of *P. gracilis*, p. 477) have largely separated pelvic fins, which do not form a disc.

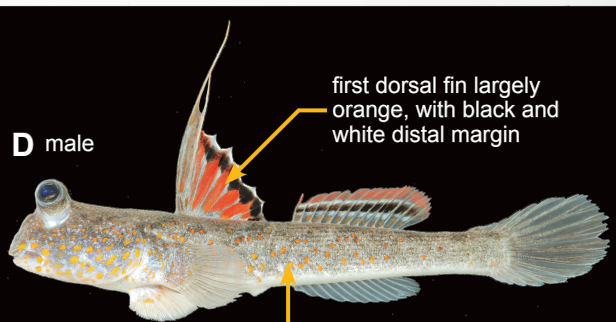
All 3 species of the Mekong mudskippers were syntopically found, but *P. chrysospilos* appears to prefer more open space than the other 2 congeners. Namely, *P. chrysospilos* was also seen outside of the mangrove forests (e.g., extensive mudflats around large rivers), whereas the others, viz., *P. gracilis* and *P. variabilis*, were usually confined within the mangrove forests and adjacent canals. *Periophthalmus chrysospilos* is frequently seen forming aggregations or schools (see photos A and H). The species is also an active swimmer (compared with the other 2 congeners in the Mekong); when disturbed, they dive into water, and swim water near the surface while peeking around by erected eyes (photo A).



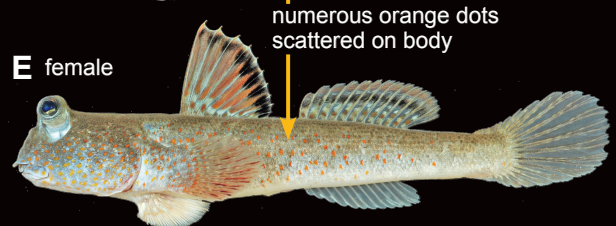
C male



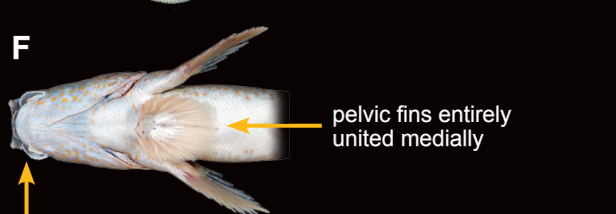
D male



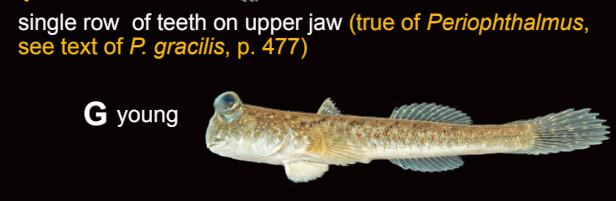
E female



F



G young



A) Aggregation (not collected), swimming around beach when disturbed (Bae Lieu, Vietnam, photo: KS); B) a fish (not collected) on exposed sandy-mud beach (Bae Lieu, Vietnam, photo: KS); C) CTU-P 2580 (photo: LXT); E and F) CTU-P 1187 (photo: LXT); G) CTU-P 1177 (photo: LXT); H) aggregation (not collected) on sandy-mud beach (Soc Trang, Vietnam, photo: KS)



Periophthalmus chrysospilos, escaping from water at high-tide hour (Sóc Trăng, Vietnam, photo: KS)



Pseudapocryptes elongatus (Cuvier, 1816)

Family: Gobiidae (FC: 460)

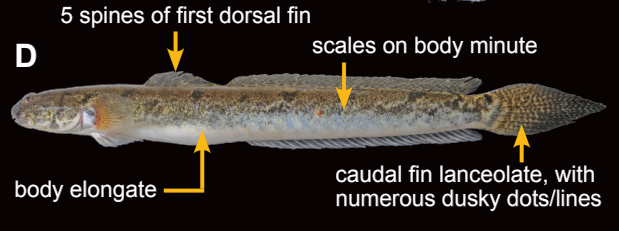
Size: 18.7 cm SL (Murdy, 1989: 48, as *P. lanceolatus*).

Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A relatively large-sized, elongate species of gobies, found in brackish estuaries; it is commonly seen in mangrove swamps and creeks in the Vietnamese Mekong. *Pseudapocryptes elongatus* is a very popular food fish (called "Cá kèo" in Vietnam) in the Mekong Delta, and live fish are abundantly seen in the local markets (see photograph of next page).

Pseudapocryptes is one of the mudskipper genera, but, unlike the other typical mudskippers (e.g., *Boreophthalmus*, *Periophthalmodon*, *Periophthalmus*, and *Scartelaos*), fishes of the genus are not found on exposed mudflats. Although its general appearance is similar to *Parapocryptes* (see below), *Pseudapocryptes* has smaller and more numerous scales on the body.

Pseudapocryptes elongatus, once well known as *P. lanceolatus* (see Ferraris, 1995), is the only species of the genus known from the Mekong. Its only congener, *P. borneensis*, is confined to Singapore and Kalimantan (Murdy, 1989).



A) CTU-P 4630 (photo: KS); B–D) CTU-P 1539 (photo: LXT)



Parapocryptes serperaster (Richardson, 1846)

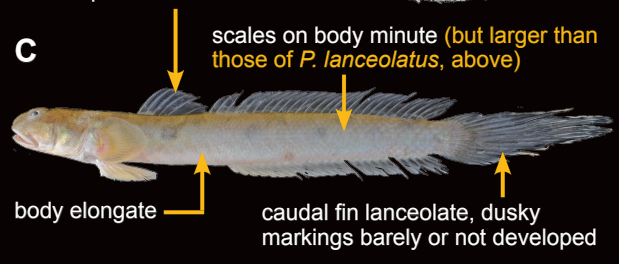
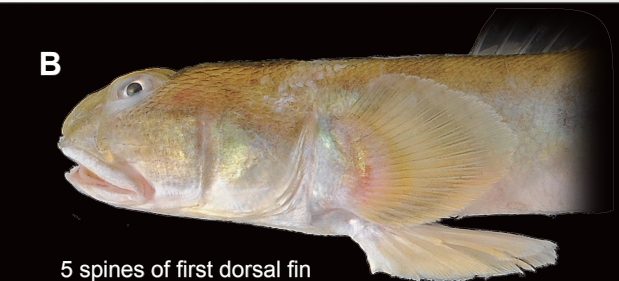
Family: Gobiidae (FC: 460)

Size: 17.3 cm SL (Murdy, 1989: 24).

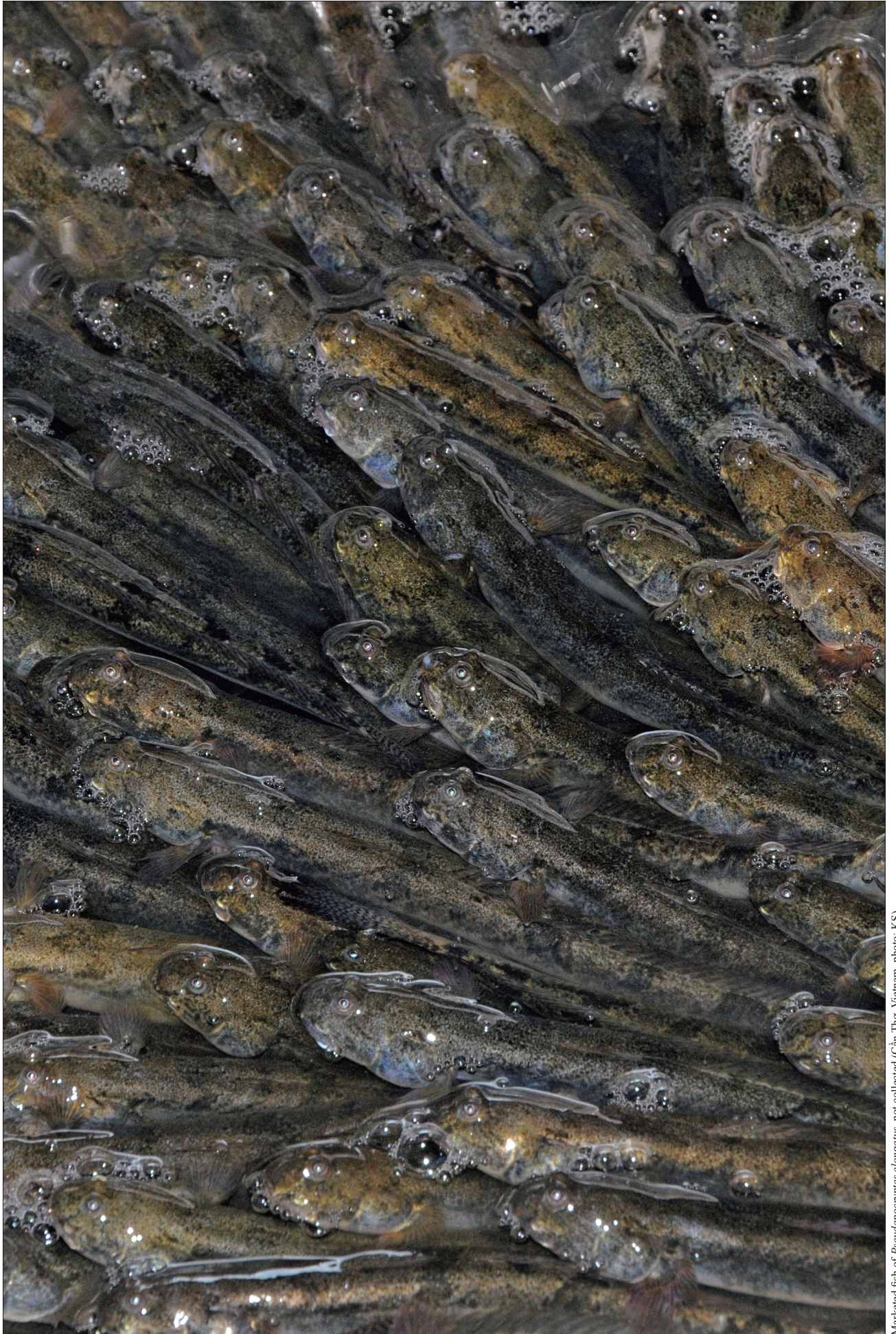
Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A relatively large-sized species of gobies, found in brackish estuaries; it is commonly seen in mangrove swamps and creeks in the Vietnamese Mekong. It is also seen in the local markets in the Mekong Delta, but is much less common in the markets and less popular than the similar-looking *Pseudapocryptes elongatus* (above). While they are similar to each other, *Pa. serperaster* is readily distinguished from *Ps. elongatus* by its larger scales and undotted dorsal and caudal fins.

Like *Pseudapocryptes*, fishes of *Parapocryptes* are not found on exposed mudflats. Two species are known in *Parapocryptes* in South and Southeast Asian countries, and the other congener, *Parapocryptes rictuosus*, is confined to India (Murdy, 1989).



A) CTU-P 2490 (photo: LXT); B and C) CTU-P 1504 (photo: LXT)



Marketed fish of *Pseudapoecryptes elongatus*, not collected (Cần Thơ, Vietnam, photo: KS)



Taenioides gracilis (Valenciennes, 1837)

Family: Gobiidae (FC: 460)

Size: 20 cm (Rainboth, 1996b: 213).

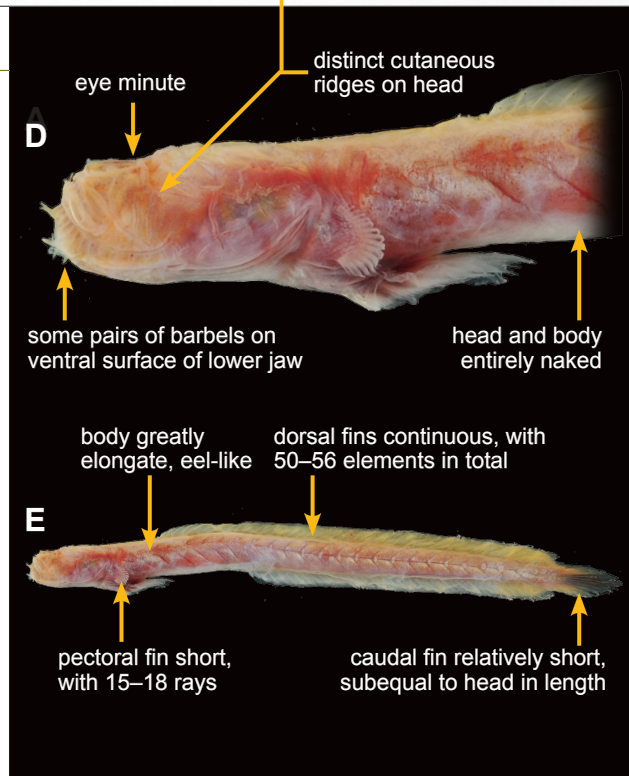
Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A large-sized species of eel gobies, found in brackish estuaries and adjacent waters with soft mud bottoms; it is sometimes seen also in the local markets in the Mekong delta. This is a typical mud-dwelling goby, usually hidden under the soft mud bottoms.

Taenioides resembles *Trypauchenopsis* (next page) in lacking scales on its body, but has distinct cutaneous ridges on the head (vs. no cutaneous ridges on the head in *Trypauchenopsis*).

In his recent review of *Taenioides*, Murdy (2018) recognized 5 species in the genus (as well as several additional poorly known species in need of further considerations): *T. anguillaris*, *T. gracilis*, *T. kentalleni*, *T. purpurascens*, and *T. snyderi*. Of these, we collected only a single species *T. gracilis* from the Mekong delta, during our field surveys in 2007–2013.

Since taxonomy of *Taenioides* was seriously confused before Murdy's (2018) review, previous records of this genus undoubtedly need re-confirmation based on the voucher specimens. See also "Notes" on "*Taenioides nigromarginatus*", next page.



A) One of CTU-P specimens (Bến Tre, Vietnam, photo: KS); B, D, and E) CTU-P 1497 (photo: LXT); C) CTU-P 5170 (photo: HVM)



"*Taenioides*" *nigrimarginatus* Hora, 1924

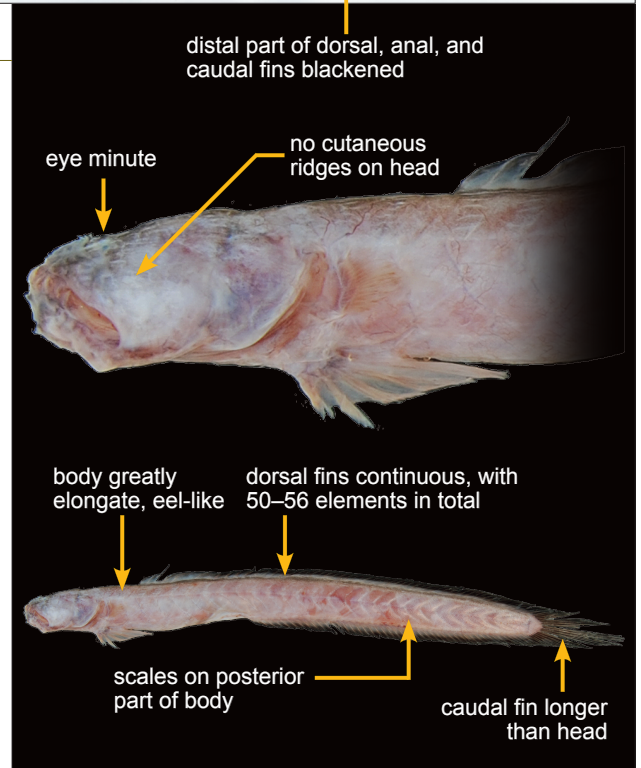
Family: Gobiidae (FC: 460)

Size: 23.0 cm SL (Tran *et al.*, 2013: 152).

Distribution: Mekong Basin in Vietnam; Malay Peninsula.

Notes: A large-sized species of eel gobies, found in brackish estuaries and adjacent waters with soft mud bottoms; sometimes seen also in the local markets in the Mekong delta. This is a typical mud-dwelling goby, usually under the soft mud bottoms.

This is one of the poorly-known eel goby species that Murdy (2018) left unresolved taxonomically (see "Notes" on *Taenioides gracilis*, left page). Although it resembles fishes of *Taenioides*, it has scales on its body (vs. not scaled in *Taenioides*), no cutaneous ridges on the head (vs. ridges are present), and lacks the osteological modification (*i.e.*, spatulate anal-fin pterygiophore, see Murdy, 2018) found in *Taenioides*. Classification of several poorly-known eel gobies, including "*Taenioides*" *nigrimarginatus*, is being revised by E.O. Murdy and one of us (KS).



CTU-P 1159 (photo: LXT)



Trypauchenopsis intermedia Voltz, 1903

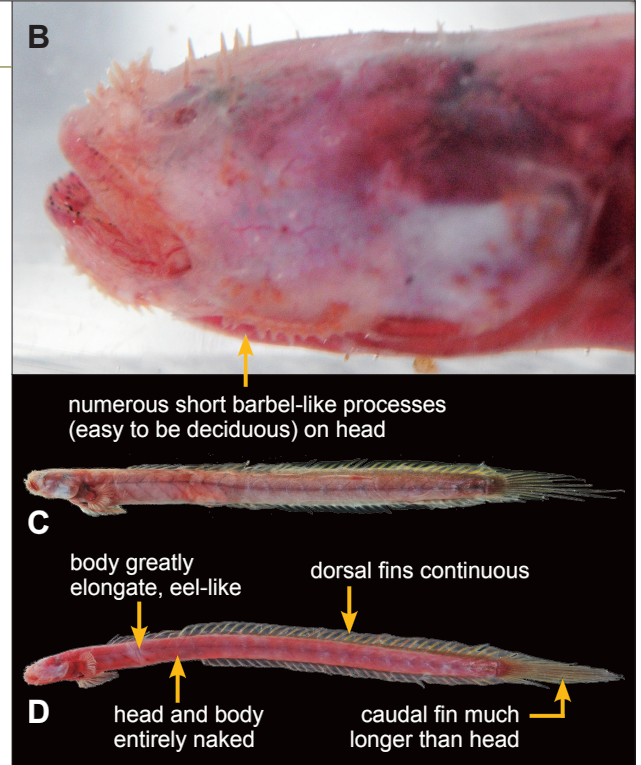
Family: Gobiidae (FC: 460)

Size: 10.3 cm SL (Tran *et al.*, 2013: 153).

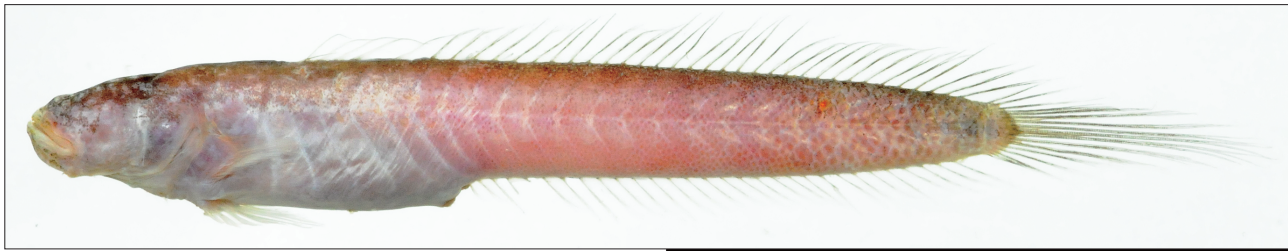
Distribution: Mekong Basin in Vietnam; Indo-Pacific.

Notes: A medium-sized species of eel gobies, found in brackish estuaries and adjacent waters with soft mud bottoms; it is found in mangrove creeks, but is much more common in trawled fishes from large rivers in the Vietnamese Mekong. Probably due to its small size, it is not seen in the local markets. This is a typical mud-dwelling goby, usually hidden under the soft mud bottoms.

Trypauchenopsis intermedia, the only known species of the genus, was once mis-assigned to *Taenioides*, but Shibukawa & Murdy (2012) re-classified it as a species of distinct genus *Trypauchenopsis*. Although *Trypauchenopsis* is similar to fishes of *Taenioides*, the former has numerous, easily deciduous, short barbel-like processes on the head (vs. cutaneous ridges on the head), and lacks the osteological modification found in *Taenioides* (*i.e.*, spatulate anal-fin pterygiophore, see Shibukawa & Murdy, 2012).



A, B, and D) CTU-P 4426 [photo: LXT (A and D) and KS (B)]; C) CTU-P 1491 (photo: LXT)



***Brachyamblyopus brachysoma* (Bleeker, 1854)**

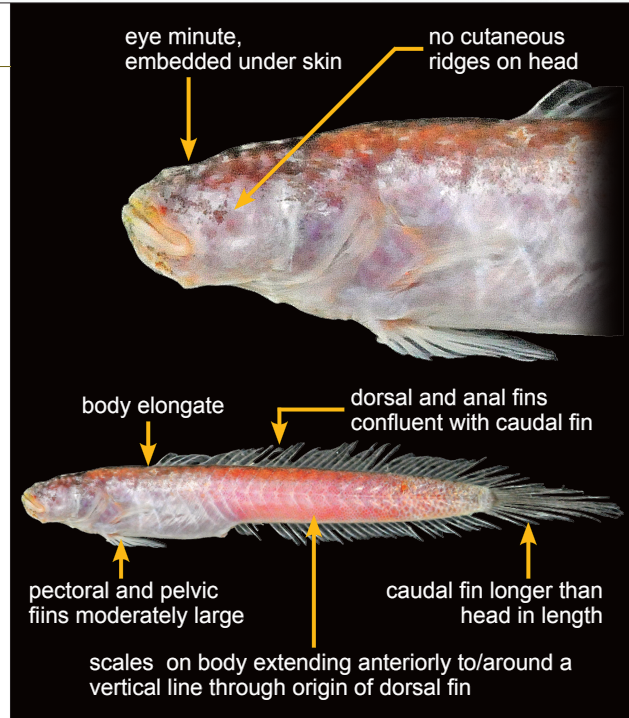
Family: Gobiidae (FC: 460)

Size: 11.5 cm SL (Tran *et al.*, 2013: 153).

Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A relatively small-sized species of eel gobies, found in brackish estuaries and adjacent waters with soft mud bottoms; it is sometimes seen also in the local markets in the Mekong Delta. This is a typical mud-dwelling goby, usually under the soft mud bottoms.

This is one of the poorly known eel-goby species, and is now being studied in detail by E.O. Murdy and one of us (KS). The combination of a relatively short body (compared with the other typical eel gobies, *e.g.*, *Taenioides* and *Trypauchenopsis*), relatively large mouth, and scaled body easily distinguishes *B. brachysoma* from the other eel gobies of the Mekong. When alive or freshly collected, coloration of the head and body is reddish (like *Caragobius urolepis*, below); note that the coloration of the photographed specimen shown here is slightly faded following fixation using 10% formalin.



CTU-P 4936 (photo: KS)



***Caragobius urolepis* (Bleeker, 1852)**

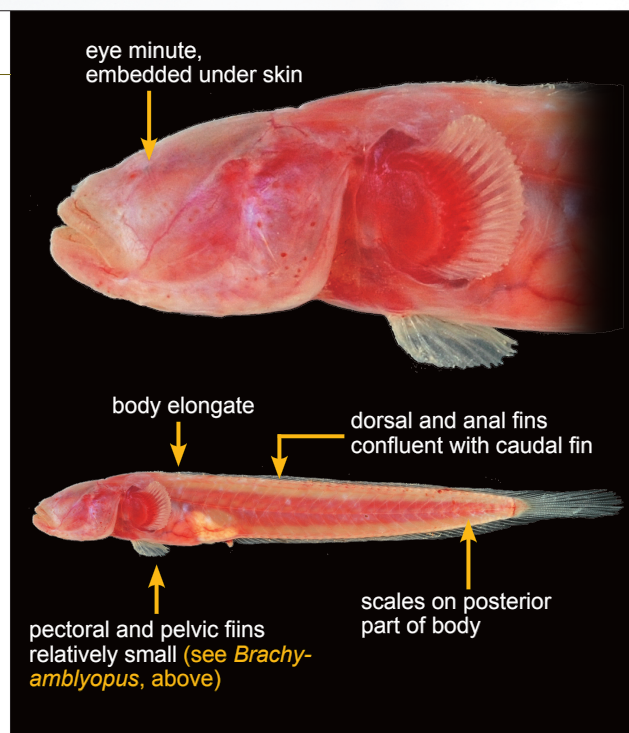
Family: Gobiidae (FC: 460)

Size: 7.15 cm SL (Murdy & Shibukawa, 2003: 5).

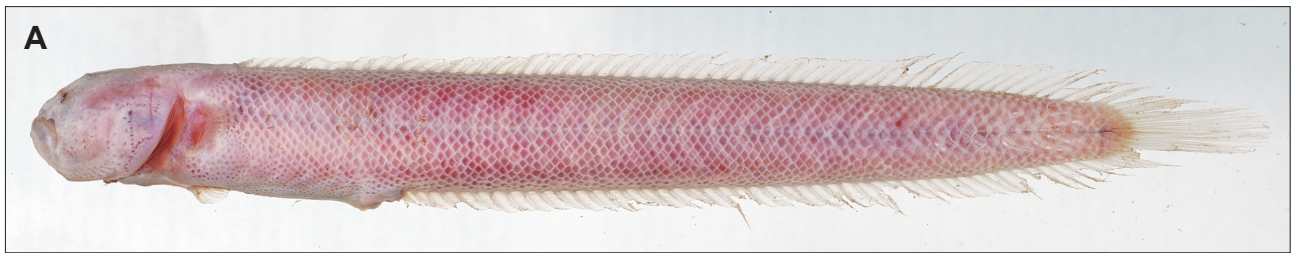
Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A small-sized species of eel gobies, found in brackish estuaries and adjacent waters with soft mud bottoms; it is found in mangrove creeks, but is, like *Trypauchenopsis intermedia* (p. 483), much more common in trawled fishes from large rivers in the Vietnamese Mekong. This species is barely seen in the local markets (probably due to its small size). This is a typical mud-dwelling goby, usually hidden under the soft mud bottoms.

Fishes of *Caragobius* were once mis-assigned to *Brachyamblyopus* (above), but Murdy & Shibukawa (2003) recognized *Caragobius* as a distinct genus. Two species are known in *Caragobius* (*i.e.*, *C. rubristriatus* and *C. urolepis*), of which one is found in the Mekong. *Caragobius urolepis* is fairly similar to small specimens of *Trypauchen* (next page), but lacks scales on the anterior part of the body and a shallow pouch along the dorsal margin of operculum.



CTU-P 1185 (photo: KS)



Trypauchen vagina (Bloch & Schneider, 1801)

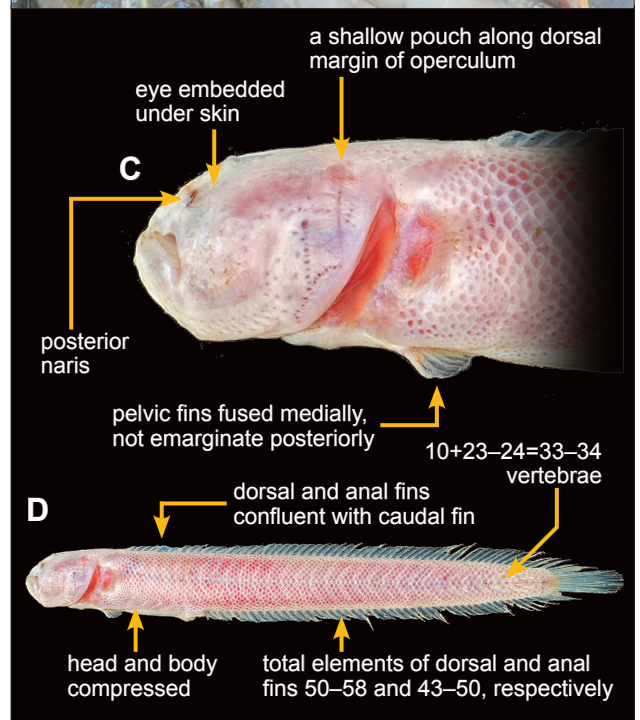
Family: Gobiidae (FC: 460)

Size: 17.0 cm SL (Murdy, 2006: 61).

Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A relatively large-sized species of eel gobies, found in brackish estuaries and adjacent waters with soft mud bottoms; it is sometimes seen also in the local markets in the Mekong Delta (photo B). This is a typical mud-dwelling goby, usually hidden under the soft mud bottoms.

Taxonomy of *Trypauchen* and allies (*i.e.*, *Ctenotrypauchen*, *Paratrypauchen*, *Trypauchen*, and *Trypauchenichthys*) was revised by Murdy (2006, 2008a, 2008b). Fishes of these genera share a peculiar appearance, including a compressed, ribbon-like body largely covered by scales, reddish or pink coloration of the body when alive or freshly-collected, compressed head, a shallow pouch along the dorsal margin of operculum, deeply embedded or lacking eyes, a small mouth, and short pectoral/pelvic fins. In particular, the pouch along the dorsal margin of operculum is unique for these genera within the gobioid fishes. Respective genera/species can be identified based on pelvic-fin morphology, fin-ray counts, and some osteological features. *Trypauchen* can be distinguished from the other 3 genera by having united pelvic fins not emarginate posteriorly (*vs.* emarginate or entirely separated in the others) (Murdy, 2006). Of these genera, we collected only a single genus *Trypauchen* from the Mekong Delta during our field surveys in 2007–2013, although some others were also expected to be found. Some additional species were given in previous literatures (*e.g.*, Rainboth *et al.*, 2012); these records need re-confirmation based on the voucher specimens. See also "Notes" of *Trypauchen pelaeos*, below.



A, C, and D) CTU-P 1485 (photo: LXT); B) marketed fish (indicated by yellow arrow), not preserved (Sóc Trăng, Vietnam, photo: KS)



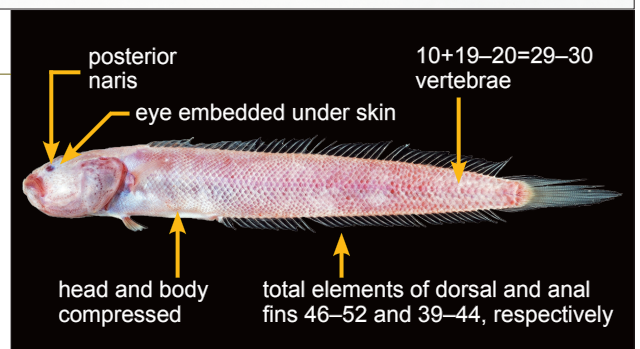
Trypauchen pelaeos Murdy, 2006

Family: Gobiidae (FC: 460)

Size: 14.56 cm SL (Murdy, 2006: 65).

Distribution: Mekong Basin in Vietnam; Indo-West Pacific.

Notes: A relatively large-sized species of eel gobies, found in brackish estuaries and adjacent waters with soft mud bottoms; it is possibly syntopic with the congener *T. vagina* (above). Although very similar to *T. vagina*, it can be distinguished by having, *e.g.*, fewer counts of fin rays and vertebrae.



CTU-P 2177 (photo: LXT)