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REVIEW OF THE FLATFISHES OF VIETNAM IN THE COLLECTION OF ZOOLOGICAL INSTITUTE, SAINT PETERSBURG

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ABSTRACT

A review of 47 species in 28 genera of flatfishes (families Citharidae, Bothidae, Paralichthyidae, Samaridae, Soleidae and Cynoglossidae) caught off Vietnam and kept in Zoological Institute is presented. Most of the material is collected off Southern Vietnam, smaller part – in the Gulf of Tonkin with maximal number of species and specimens caught to a depth of 50 m. Bothids, soleids and cynoglossids are most numerous, which is typical of Indo-Pacific flatfish fauna. Study of material adds 15 species to the list of 82 previously known from Vietnam. Two species, the paralichthyid *Pseudorhombus oculocirris* and soleid *Soleichthys tubiferus*, are recorded for the first time for the South China Sea, these findings considerably extend their ranges. Thirteen species are indicated for the fauna of Vietnam for the first time: *Arnoglossus macrolophus, Chascanopsetta lugubris*, *Engyprosopon maldivensis*, *Kamoharaia megastoma* (Bothidae), *Samariscus filipectoralis*, *Samariscus luzonensis* (Samaridae), *Aseraggodes dubius*, *Zebrias crossolepis, Zebrias lucapensis* (Soleidae), *Cynoglossus kopsi*, *Cynoglossus quadrilineatus*, *Paraplagusia japonica*, *Symphurus microrhynchus* (Cynoglossidae). Annotated synonymy, diagnostic characters, photographs, counts and map of occurrences are given for each species. The comparison shows similarity of flatfish fauna composition of Northern Vietnam and Southern Vietnam in spite of climatic and hydrological difference between regions. Our findings confirm previously known widespread distribution of the Indo-Pacific flatfishes and characterize species as eurythermal and euryhaline.

Key words: flatfishes, ichthyofauna, Pleuronectiformes, South China Sea, Vietnam

ОБЗОР КАМБАЛООБРАЗНЫХ РЫБ ВЬЕТНАМА ИЗ КОЛЛЕКЦИИ ЗООЛОГИЧЕСКОГО ИНСТИТУТА, САНКТ-ПЕТЕРБУРГ

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РЕЗЮМЕ

Статья содержит обзор камбал 47 видов 28 родов из семейств Citharidae, Bothidae, Paralichthyidae, Samaridae, Soleidae и Cynoglossidae, пойманных у берегов Вьетнама и хранящихся в коллекции Зоологического института РАН. Большая часть материала собрана в водах Южного Вьетнама, меньшая – в Тонкинском заливе. Все

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рыбы пойманы на глубине до 150 м, преимущественно на глубине 50 м. Большинство коллекции составляют представители семейств Bothidae, Soleidae и Cynoglossidae, что характерно для фауны Индо-Пацифики. Нахождение 16 видов дополняет список из 82 ранее указанных для региона видов камбал. Два вида впервые обнаружены в Южно-Китайском море, эти поимки значительно расширяют ареалы данных видов. Ещё тринадцать видов, *Arnoglossus macrolophus, Chascanopsetta lugubris*, *Engyprosopon maldivensis*, *Kamoharaia megastoma* (Bothidae), *Samariscus filipectoralis*, *Samariscus luzonensis* (Samaridae), *Aseraggodes dubius*, *Zebrias crossolepis, Zebrias lucapensis* (Soleidae), *Cynoglossus kopsi*, *Cynoglossus quadrilineatus*, *Paraplagusia japonica*, *Symphurus microrhynchus* (Cynoglossidae), отмечены для фауны Вьетнама впервые. Для каждого вида приведена краткая аннотированная синонимия, диагностические признаки, фотографии, основные меристические признаки и карта нахождений. Сравнение видового состава камбал в южной и северной частях Вьетнама показывает их сходство, несмотря на существенное различие климатических и гидрологических условий в этих районах. Полученные данные подтверждают широкое распространение камбал Индо-Пацифики и характеризует их как эвритермные и эвригалинные.

Key words: камбалообразные, ихтиофауна, Pleuronectiformes, Южно-Китайское море, Вьетнам

INTRODUCTION

Vietnam, as a part of Indo-Malay-Philippine biodiversity hotspot, is of special interest to marine biologists because of its geographic position near the junction of the Indian and Pacific Oceans. Results from several expeditions are published (Chevey 1932; Besednov 1968; Gur'yanova 1972; Orsi 1974). However, the ichthyofauna of Vietnam is insufficiently studied. In particular, there are 45 or less flatfish species in earlier fauna reviews (Kuronuma 1961; Fourmanoir 1965; Besednov 1968; Orsi 1974). A recent checklist includes 82 species (Nguyen 1999), that is half of pleuronectiforms known from South China Sea (Wu and Tang 1935; Punpoka 1964; Chen and Weng 1965; Wongratana 1968; Kyushin et al. 1982; Shen 1982, 1984, 1993; Li and Wang 1995; Ni and Kwok 1999; Vidthayanon 1999a, b; Randall and Lim 2000; Adrim et al. 2004; Matsunuma et al. 2011; Kottelat 2013a). Only some publications contain photographs and brief descriptions, and only a few papers describe the morphology of adult and juvenile flatfishes, collected off Vietnam (Pertseva-Ostroumova 1965; Amaoka 1971, 1972). Specimens from Vietnam are rare in the ichthyological collections, and as a result they are not included in revisions of tropical taxa (Menon 1977; Randall, Johnson 2007; Vachon et al. 2008). There is a lack of a precise diagnostic key, original photos and morphometric data for the majority of flatfishes from Vietnam and adjacent waters (Ni and Kwok 1999).

The current study describes 47 species in 28 genera of flatfishes (families Citharidae, Bothidae, Paralichthyidae, Samaridae, Soleidae and Cynoglossidae) caught off Vietnam with a view to add regional checklist and morphological descriptions.

MATERIAL AND METHODS

The main part of material was collected by second author in Nha Trang Bay (Central Vietnam) in 2005–2010. Bottom trawlings with an opening broadness of 6 m were performed at night and day from the board of a local wooden trawler. Some specimens were bought at the central market of Nha Trang city; obtained from local fishermen hired for fishing, and caught at South Vietnam and Phú Quốc Island. Another part of the material was obtained from a Soviet-Vietnam expedition (1960–1961) on board of *R/V "Pelamida"* in Gulf of Tonkin.

A total of approximately 600 flatfish specimens fixed in 4% formalin were delivered as a whole collection to the Zoological Institute Russian Academy of Sciences, Saint Petersburg (ZIN), for final identification, morphological studies and preservation.

A total of 127 samplings were performed (Table 1).

The classification used in the current paper follows Chapleau (1988) and Hoshino (2001). Updated nomenclature, type locality, annotated synonymy from the most significant publications, diagnostic characters, distribution, photographs and map of occurrences off Vietnam are given for each species. Catalog numbers and main counts are given for specimens with detailed morphometry in species recorded for the first time. Sampling number (sn) follows ZIN catalog number in the text. Species occurrence maps

were created using trial version ArcGIS (ArcMap 10.3.1) (ESRI, 2015). Geographic coordinates were converted into decimal degrees to be compatible with ArcMap. Abbreviations used are as follows: *D*, *A*, *P*, *C* – number of rays in the dorsal, anal, pectoral, and caudal fins respectively, *ll* – number of lateral-line scales, *sp.br.* – number of gill rakers on the lower limb of first gill arch, *vert.* – number of vertebrae, *SL* – standard length. Vertebral and epicranial complex counts were taken from radiographs. Scale bar 1 cm if not otherwise stated.

RESULTS

Genus *Tephrinectes* (Lacepède, 1802)

Monotypic genus of uncertain taxonomic status. Eyes on left or right side of head. Dorsal-fin origin above middle of upper eye, its anterior rays much more widely separated than those which follow, all the rays branched, not scaled.

Tephrinectes sinensis (Lacepède, 1802)
(Fig. 1A; Map 1)

Pleuronectes sinensis Lacepède 1802:595 (type locality: China).

Tephrinectes sinensis: Wu 1932:75–77 (six specimens, Canton, Amoy and Hong-Kong, description, counts and measurements). – Norman 1934:63–64 (five specimens, China, Amoy, synonymy, description, distribution, illustration). – Chen and Weng 1965:33–35 (seven specimens, Taiwan, description, counts, illustration). – Shen 1993:805 (photograph). – Li and Wang 1995:113–116 (18 specimens, China, counts and measurements, illustration). – Hoshino and Amaoka 1998:69–77 (osteology, taxonomy, phylogeny).

Distribution. Western Pacific: China, Taiwan.

Material. 1 dextral sp. 178.5 mm *SL*, ZIN 55719 (sn 119); Nha Trang Bay. *D* 46, *A* 36, *ll* 82, *sp.br.* 10.

Family Citharidae de Buen, 1935
(Map 1)

Both short-based pelvic fins with one spine and five soft rays.

Genus *Brachypleura* Günther, 1862

Monotypic genus. Eyes on right side of head. Some anterior dorsal-fin rays elongate in male, but not in female, all rays except a few at posterior end of fin unbranched. Scales large and deciduous, ctenoid on eyed side, cycloid or weakly ctenoid on blind side. Lateral line with 28 to 33 scales.

Brachypleura novaezeelandiae Günther, 1862
(Fig. 1B; Table 2)

Brachypleura novaezeelandiae Günther 1862:419 (type locality: New Zealand).

Brachypleura novaezeelandiae: Norman 1927:43–44, Norman 1934:400–401 (extensive material, Ganjam Coast and Maldive, Bay of Bengal, Burmese coast, synonymy, description, illustration). – Wu 1932:121–122 (one specimen, Hainan, description, counts and measurements). – Wu and Tang 1935:395 (six specimens, Hainan). – Pertseva-Ostroumova 1965:201 (larva 4.6–8.0 mm, Gulf of Tonkin, above depth 56–80 m, measurements, illustrations of different size specimens). – Amaoka 1971:20–22 (13 specimens, Gulf of Tonkin, description, counts and measurements, sexual dimorphism, illustration). – Amaoka 1972:263–273 (two specimens, Gulf of Tonkin, illustration, osteology). – Li and Wang 1995:108–109 (12 specimens, China, measurements and counts, illustration). – Ho et al. 2009:8 (one specimen, Taiwan, counts, photograph). – Matsunuma et al. 2011:226 (photographs).

Distribution. From Maldive Islands, throughout eastern Indian Ocean and Indo-Australian Archipelago, to northern area of South China Sea.

Material. 38 sp., 47.6–107.6 mm *SL* (12 females, 11 males, 15 juveniles); Gulf of Tonkin, Nha Trang Bay; ZIN 55106 (sn 5), ZIN 55545 (sn 51), ZIN 55546 (sn 62), ZIN 55892 (sn 18), ZIN 55893 (sn 6), ZIN 55894 (sn 1), ZIN 55896 (sn 12), ZIN 55898 (sn 10), ZIN 55899 (sn 22), ZIN 56016 (sn 35), ZIN 56017 (sn 39), ZIN 56018 (sn 38). *D* 68–77, *A* 44–53, *ll* 26–30, *sp.br.* 8–10.

Family Bothidae Smitt, 1892
(Map 2)

No fin spines. Eyes on left side of head. Left pelvic fin with long base on midventral line with origin anterior to origin of pelvic fin of right side; right pelvic fin with short base above midventral line.

Genus *Arnoglossus* Bleeker, 1862

Mouth of moderate size. Interorbital region narrow, bony ridge forms the interorbital area. Males without rostral spines. Scales on eyed side with short ctenii or scales cycloid.

Arnoglossus aspilos (Bleeker, 1851)
(Fig. 1C; Table 3)

Rhombus aspilos Bleeker 1851a:408 (type locality: Jakarta, Java, Indonesia).

Arnoglossus aspilos: Norman 1934:187 (five specimens, Malay Peninsula; synonymy, description, distribution, illustration). – Chen and Weng 1965:3–4 (three specimens, Taiwan, description, counts, illustration). – Amaoka and Last 2014:91–92 (five specimens, Japan, Kyoto Prefecture, counts and measurements, colour photograph).

Diagnostic characters. Dorsal-fin rays 80–95, anterior rays not prolonged. Teeth in both jaws small, closely spaced. Gill rakers not serrate. Lateral-line scales 46–53. Body depth 1.9 to 2.9 times in *SL*. No dark spot on distal portion of pectoral fin.

Distribution. Indo-Pacific, including Persian Gulf, Malay Peninsula and Archipelago, Thailand.

Material. 19 sp., 33.5–83.4 mm *SL* (4 females, 10 males, 5 juveniles); Gulf of Tonkin, Nha Trang Bay, Vân Phong Bay; ZIN 55058 (sn 2), ZIN 55103 (sn 20), ZIN 55307 (sn 16), ZIN 55563 (sn 33), ZIN 55564 (sn 50), ZIN 55565 (sn 79), ZIN 55566 (sn 78), ZIN 55907 (sn 12). *D* 79–90, *A* 63–71, *ll* 44–50, *sp.br.* 5–10.

Arnoglossus macrolophus Alcock, 1889
(Fig. 1D; Table 3)

Arnoglossus macrolophus Alcock 1889:280 (type locality: Bay of Bengal, Orissa State, India).

Arnoglossus macrolophus: Arai and Amaoka 1996:359–365 (18 specimens, Japan, Gulf of Tonkin, South China Sea, New Caledonia, counts and measurements, illustration). – Amaoka and Mihara 2000:791–794 (18 specimens, New Caledonia, synonymy, description, counts and measurements, illustrations). – Ohashi and Motomura 2011:85 (one specimen, Japan, counts, colour photograph). – Matsunuma et al. 2011:230 (photograph).

Arnoglossus tapeinosoma: Norman 1934:185–186 (about 20 specimens, Persian Gulf, India and Burma, Ceylon, Java Sea, synonymy, description, distribution, illustration). – Amaoka 1971:28 (two specimens, Gulf of Tonkin, counts and measurements, description, illustration). – Amaoka et al. 1992:262–263 (five specimens, Japan, description, counts and measurements, photograph). – Shen 1993:801 (photograph).

Diagnostic characters. First four or five dorsal-fin rays greatly elongate in males, only slightly elongate in females. Lateral-line scale 55–62. A dark spot at base of posterior parts of dorsal and anal fins, a dark spot on distal portion of pectoral fin. Gill rakers not serrate, tip of prevomer projecting into mouth.

Distribution. Indo-Pacific, Red Sea and Persian Gulf, southern Japan, Taiwan, Indo-Australian Archipelago, New Caledonia.

Material. 19 sp., 20.9–76.2 mm *SL* (4 females, 4 males 11 juveniles); Nha Trang Bay; ZIN 55573 (sn 32), ZIN 55574 (sn 33), ZIN 55575 (sn 36), ZIN 55576 (sn 93), ZIN 55577 (sn 96), ZIN 55804 (sn 51), ZIN 56001 (sn 38), ZIN 56002 (sn 78). *D* 81–97, *A* 68–73, *ll* 48–61, *sp.br.* 6–10.

Arnoglossus polyspilus (Günther, 1880)
(Fig. 1E; Table 3)

Anticitharus polyspilus Günther 1880:48 (type locality: Indonesia, Arafura Sea).

Arnoglossus polyspilus: Norman 1934:190 (one specimen, Timor Sea; synonymy, description, distribution, illustration). – Amaoka 1969:127–130[191–194] (extensive material, Japan, diagnosis, description, illustration). – Chen and Weng 1965:4–5 (five specimens, Taiwan, description, counts, illustration). – Shen 1984:136 (photograph). – Shen 1993:190 (photograph). – Li and Wang 1995:156–158 (13 specimens, China, counts and measurements, illustration). – Masuda et al. 1984:350 (Japanese Archipelago, brief description, counts, colour photograph). – Amaoka and Mihara 2000:791–806 (12 specimens, New Caledonia, synonymy, description, counts and measurements, photograph).

Diagnostic characters. Dorsal-fin rays 103–116, anterior rays are somewhat longer than the succeeding, but not longer than those behind the middle of the length of the fin. Anterior teeth of upper jaw larger than posterior teeth, teeth of lower jaw stronger and more widely spaced than lateral teeth of upper jaw. Gill rakers serrate. Lateral-line scales 70–80. Middle caudal rays bifurcated.

Distribution. Eastern Indian Ocean, southern Japan to Taiwan Province of China, New Caledonia, and several areas of the Indo-Australian Archipelago.

Material. 36 sp., 17.5–83.7 mm *SL* (5 females, 6 males, 25 juveniles); Hon Dun Island, Nha Trang Bay; Vân Phong Bay; ZIN 55567 (sn 28), ZIN 55568 (sn 52), ZIN 55569 (sn 56), ZIN 55570 (sn 55), ZIN 55571 (sn 87), ZIN 55572 (sn 94), ZIN 55802 (sn 116), ZIN 55803 (sn 94), ZIN 56004 (sn 38), ZIN 56098 (sn 116). *D* 97–109, *A* 74–85, *ll* 59–65, *sp.br.* 6–9.

Remarks. The specimens examined agree with Günther's original species description, but differ in lacking a pair of dark spots at the base of the caudal fin. Absence of marked spots was mentioned in an earlier study, but it was supposed that they might be revealed in fresh specimens (Amaoka 1969). We con-

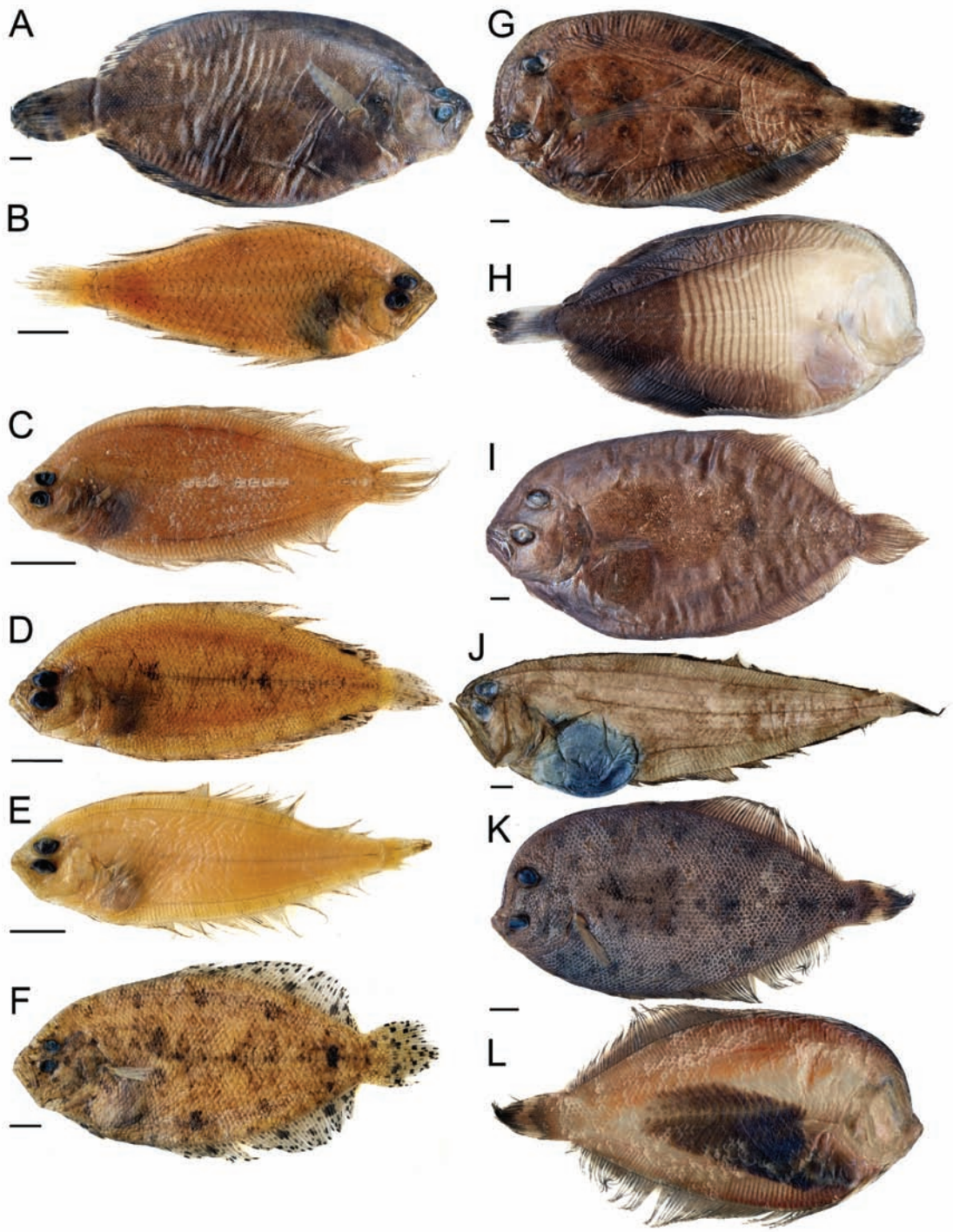

Fig. 1. A – *Tephrinectes sinensis* (Lacepède, 1802) 178.5 mm *SL*, ZIN 55719; B –*Brachypleura novaezeelandiae* Günther, 1862 ♂ 68.9 mm *SL*, ZIN 55546; C – *Arnoglossus aspilos* (Bleeker, 1851) ♂ 62.4 mm *SL*, ZIN 55565; D – *Arnoglossus macrolophus* Alcock, 1889 ♀ 73.1 mm *SL*, ZIN 55573; E – *Arnoglossus polyspilus* (Günther, 1880) ♂ 68.8 mm *SL*, ZIN 55567; F – *Asterorhombus intermedius* (Bleeker, 1866) ♂ 115.9 mm *SL*, ZIN 55641; G, H – *Bothus myriaster* (Temminck et Schlegel, 1846) ♂ 153.1 ZIN 55715; I – *Bothus pantherinus* (Rüppell, 1830) ♀ 210.5 mm *SL*, ZIN 55718; J – *Chascanopsetta lugubris* Alcock, 1894 ♂ 212.4 mm *SL*, ZIN 55722; K, L – *Crossorhombus azureus* (Alcock, 1889) ♂ 122.8 mm *SL*, ZIN 55569. A–G, I–K – ocular side; H, L – blind side.

sider somewhat smaller number of lateral-line scales in our specimens (maximum *SL* 83.7 mm) – 59–65 vs 70–75 described earlier in type specimens (180 and 220 mm *SL*) (Norman 1934) as individual variation of smaller specimens studied.

Genus *Asterorhombus* Tanaka, 1915

Mouth small. Interorbital region concave, narrow in both sexes, no rostral or orbital spines. Gill rakers palmate with small tooth-like structures on margins. First dorsal-fin ray elongate 1.4 to 3.1 times in head length, longer than second ray. Both eyes usually with one unbranched tentacle, rarely missing or branched.

Asterorhombus intermedius (Bleeker, 1865)
(Fig. 1F; Table 4)

Platophrys intermedius Bleeker 1865:47 (type locality: Sulawesi, Indonesia, Celebes Sea).

Arnoglossus intermedius: Norman 1934:197–198 (12 specimens, Maldives, Seychelles, Qeensland; synonymy, description, distribution, illustration).

Asterorhombus intermedius: Amaoka 1969:111–113 [175–177] (two specimens, Japan, diagnosis, description, illustration). – Amaoka and Mihara 2001:194 (30 specimens, New Caledonia, Chesterfield Plateau, counts and measurements). – Hensley and Randall 2003:1–9, Hensley 2005:445–460 (75 specimens, western Indian Ocean, including the Red Sea, Australia, Japan, Hong Kong, Taiwan, comparison, key, counts and measurements, photograph, illustration). – Masuda et al. 1984:349 (Japanese Archipelago, brief description, counts, colour photograph). – Li and Wang 1995:179–181 (four specimens, China, counts and measurements, illustration). – Ohashi and Motomura 2011:88 (six specimens, Japan, counts, colour photograph).

Diagnostic characters. First dorsal-fin ray elongate, with broad, deeply indented and branched membrane on distal two-thirds to three-fourths.

Distribution. Western Indian Ocean, including Red Sea, to southern Japan, Indo-Australian Archipelago, and Tonga Islands.

Material. 4 sp., 98.5–124.5 mm *SL* (3 females 1 male); Nha Trang Bay; ZIN 55641 (sn 84), ZIN 55643 (sn 110), ZIN 56005 (sn 111). *D* 80–84, *A* 62–66, *ll* 54–57, *sp.br.* 8–9.

Genus *Bothus* Rafinesque, 1810

Mouth small. Interorbital region broad and concave, broader in males than females. First ray of pelvic fin of eyed side below middle or front half of lower eye. Lateral-line scales 69 or more. The caudal bones without deep clefts.

Bothus myriaster (Temminck et Schlegel, 1846)
(Figs 1G, H; Table 5)

Rhombus myriaster Temminck et Schlegel 1846:181 (type locality: Nagasaki, Japan).

Bothus myriaster: Norman 1934:236–237 (three specimens, China Sea, Formosa, Indo-China). – Chen and Weng 1965:16–17 (three specimens, Taiwan, description, counts, illustration). – Amaoka 1969:98–102[162–166] (extensive material, Japan, synonymy, counts and measurements, description, sexual dimorphism, illustration). – Masuda et al. 1984:349 (Japanese Archipelago, brief description, counts, colour photograph). – Shen 1984:134 (six specimens, colour photographs). – Li and Wang 1995:208–210 (15 specimens, China, counts and measurements, illustration).

Diagnostic characters. Males with strong spine on snout and smaller spines around orbits. Both eyes in males with a broad flap. Pectoral fin on eyed side with 8 to 10 rays, longer in males than females. Scales small, cycloid on eyed side except at upper and lower edges of body. Blind side yellowish white on front half of body, darker posteriorly with several dark cross bars, darkest in males (Fig. 1H), faint or missing in juveniles and females.

Distribution. Throughout the Indian Ocean to Java, Sumatra, Vietnam, Philippines, Taiwan Province of China, South Korea, Japan, and Lord Howe Island.

Material. 30 sp., 26.3–193.5 mm *SL* (8 females, 5 males, 17 juveniles); Nha Trang Bay; ZIN 55512 (sn 97), ZIN 55708 (sn 116), ZIN 55709 (sn 64), ZIN 55710 (sn 68), ZIN 55711 (sn 85), ZIN 55713 (sn 98), ZIN 55714 (sn 99), ZIN 55715 (sn 106), ZIN 55716 (sn 54), ZIN 55717 (sn 115), ZIN 55806 (sn 55, 56), ZIN 55807 (sn 90), ZIN 55808 (sn 94), ZIN 55809 (sn 109), ZIN 56006 (sn 111). *D* 83–97, *A* 63–72, *ll* 71–86, *sp.br.* 6–8.

Bothus pantherinus (Rüppell, 1830)
(Fig. 1I)

Rhombus pantherinus Rüppell 1830:121 (type locality: Muelih Muwaylih, Tabuk Province, Saudi Arabia, Red Sea).

Bothus pantherinus: Norman 1934:233–235 (more than 70 specimens, Indian Ocean, Philippines, Pacific Ocean; synonymy, description, distribution, illustration). – Chen and Weng 1965:15–16 (one specimen, Taiwan, counts,

illustration). – Amaoka 1969:106–110[170–174] (five specimens, Amami Islands, Japan, counts and measurements, sexual dimorphism, illustrations). – Masuda et al. 1984:349 (Japanese Archipelago, brief description, counts, colour photograph). – Shen 1984:135 (one specimen, colour photograph). – Shen 1993:191 (colour photograph). – Li and Wang 1995:212–214 (nine specimens, China, counts and measurements, illustration). – Randall 2005:612, 614 (Hawaiian Islands, colour photograph). – Ohashi and Motomura 2011:89 (four specimens, Japan, counts, colour photograph).

Diagnostic characters. Both eyes with 2 or 3 ocular tentacles in males, females usually with 2 ocular tentacles on each eye, less frequently with 0 or 1. Dorsal-fin rays 81–97, anal-fin rays 61–73, pectoral fin on eyed side with 9–12 rays, greatly elongate (length 0.3 to 0.9 times in head length) in males larger. Scales ctenoid on eyed side, cycloid on blind side. Eyed side with numerous dark spots, blotches, and rings on body and median fins, one distinct dark blotch on middle of straight section of lateral line, pectoral fin on eyed side usually with narrow dark cross bars. Blind side tan or whitish, without distinctive markings.

Distribution. Throughout Indian Ocean, including Red Sea and Persian Gulf, to Tuamotu Archipelago, Marquesas Islands, Hawaii, Lord Howe Island, Norfolk Island, and Japan.

Material. 1 sp., 210.5 mm *SL* (female); Nha Trang Bay; ZIN 55718 (sn 89). *D* 91, *A* 69, *ll* 86, *sp.br.* 6.

Genus *Chascanopsetta* Alcock, 1894

Mouth very large, upper jaw 0.9 to 1.8 times in head length, extending well beyond rear edge of lower eye. Front tip of upper jaw not protruding beyond tip of snout, no enlarged canine teeth in either jaw, gill rakers absent.

Chascanopsetta lugubris Alcock, 1894
(Fig. 1J)

Chascanopsetta lugubris Alcock 1894:129 (type locality: Bay of Bengal).

Chascanopsetta lugubris: Norman 1934:250–251 (15 specimens, Natal, Ceylon, Madras, Japan; synonymy, description, distribution, illustration). – Chen and Weng 1965:22–23 (15 specimens, Taiwan, description, counts, illustration). – Amaoka 1969:156–160[221–225] (extensive material, Japan, osteology, diagnosis, description, counts and measurements, illustrations). – Amaoka and Yamamoto 1984:201–224 (extensive material, Japan, Thailand, genus review, key, synonymy, diagnoses, morphometry, photographs). – Masuda et al. 1984:350 (Japanese Archipelago, brief description, counts, colour photograph). – Shen 1984:137 (two specimens, colour photographs). – Shen 1993:191 (colour photograph). – Li and Wang 1995:218–220 (two specimens, Taiwan, synonymy, counts and measurements, illustration). – Ohashi and Motomura 2011:89 (two specimens, Japan, counts, colour photograph).

Diagnostic characters. Lateral line present on both sides.

Distribution. Widespread in the Indo-West Pacific.

Material. 1 sp., 212.4 mm *SL* (male); Nha Trang Bay; ZIN 55722 (sn 120). *D* 118, *A* 85, *ll* 170, *sp.br.* 0.

Genus *Crossorhombus* Regan, 1920

Mouth of moderate size. Interorbital region broad and concave, males with a rostral spine and 1 to 3 low bony bumps around orbits. First dorsal-fin ray not elongate, shorter than second ray, gill rakers not palmate. Scales on eyed side with long ctenii.

Crossorhombus azureus (Alcock, 1889)
(Figs 1K, L; Table 6)

Rhomboidichthys azureus Alcock 1889:283 (type locality: Bay of Bengal, India).

Crossorhombus azureus: Wu 1932:93–94 (two specimens, Hong-Kong, Hainan, counts and measurements). – Norman 1934:219–220 (nine specimens, Indian Ocean, Vietnam, synonymy, description, distribution, illustration). – Wu and Tang 1935:394 (26 specimens, Hainan). – Chen and Weng 1965:13–14 (15 specimens, Taiwan, counts, illustration). – Pertseva-Ostroumova 1965:194–199 (larva 2.90–13.14 mm, Gulf of Tonkin, description, illustrations). – Amaoka 1971:26–27 (one specimen, Gulf of Tonkin, counts and measurements, description, illustration). – Hensley and Randall 1993:1125 (extensive material, India, Australia, Vietnam, China, in key, comparison with congeners, counts and measurements, colouration, illustration). – Li and Wang 1995:186–187 (16 specimens, China, counts and measurements, illustration). – Ohashi and Motomura 2011:90 (five specimens, Japan, counts, colour photograph).

Diagnostic characters. Lateral-line scales 56–63, lateral line absent on blind side. Pectoral fin of ocular side short in males (1.3–1.5 times in head length). Caudal fin with dark cross bands, length of eyed side pectoral fin in males 1.3 to 1.5 times in head length, dark colour pattern on blind side in males pear-shaped (Fig. 1L).

Distribution. Bay of Bengal, northwestern Australia, South China Sea, China (including Taiwan Province), Japan, and Aru Islands.

Material. 66 sp., 36.9–130.6 mm *SL* (12 females, 12 males, 42 juveniles), Gulf of Tonkin, Nha Trang Bay, Phú Quốc Island; ZIN 55284 (sn 13), ZIN 55569 (sn 105), ZIN 55661 (sn 42), ZIN 55662 (sn 47), ZIN 55663 (sn 97), ZIN 55664 (sn 98), ZIN 55665 (sn 99), ZIN 55666 (sn 92), ZIN 55667 (sn 93), ZIN 55668 (sn 91), ZIN 55670 (sn 112), ZIN 55701 (sn 127), ZIN 55702 (sn 119), ZIN 55703 (sn 115), ZIN 56008 (sn 111), ZIN 56009 (sn 113). *D* 83–93, *A* 62–74, *ll* 45–65, *sp.br.* 5–8.

Remarks. We consider somewhat smaller number of lateral-line scales in our specimens (36.9–130.6 mm *SL*) – 45–65 vs 56–63 in 14 specimens (48.1–131.7 mm *SL*) described earlier (Hensley and Randall 1993) as individual variation of smaller specimens studied.

Genus *Engyprosopon* Günther, 1862

Mouth small. Interorbital region distinctly concave, increasing in relative width with size and wider in males than females. First ray of pelvic fin of eyed side below posterior margin of lower eye. Lateral-line scales 36–63. The caudal bones with deep clefts.

Engyprosopon grandisquama (Temminck et Schlegel, 1846)

(Fig. 2A; Table 7)

Rhombus grandisquama Temminck et Schlegel 1846:183 (type locality: Nagasaki, Japan).

Engyprosopon grandisquama: Wu 1932:91–92 (one specimen, China, counts and measurements). – Norman 1934:219–220 (more than 50 specimens, Indian Ocean, Australia and Japan; synonymy, description, distribution, illustration). – Wu and Tang 1935:392 (nine specimens, Hainan). – Chen and Weng 1965:10–11 (12 specimens, Taiwan, counts, illustration). – Pertseva-Ostroumova 1965:192–195 (larva 2.8–14.3 мм, Gulf of Tonkin, description, counts and measurements, illustration). – Amaoka 1969:79–82[143–146] (two specimens, Japan, description, counts and measurements, sexual dimorphism, illustration). – Kyushin et al. 1982:263 (three specimens, South China Sea, colour photograph). – Masuda et al. 1984:348 (Japanese Archipelago, brief description, counts, colour photograph). – Amaoka et al. 1993:380–385 (29 specimens, Coral Sea, in key, synonymy, diagnosis, sexual dimorphism, distribution, illustrations). – Li and Wang 1995:194–196 (23 specimens, China, synonymy, counts and measurements, illustration). – Matsunuma et al. 2011:231 (photographs). – Ohashi and Motomura 2011:90 (extensive material, Japan, counts, colour photograph).

Diagnostic characters. A strong rostral spine present in the males, absent or feeble in females, an orbital spine on rim of each orbit. Teeth in upper jaw biserial. Gill rakers on first arch not serrate, 5 to 8 on lower limb. Pectoral fin of eyed side shorter than head length. Caudal fin with a pair of large prominent jet-black blotches, extending between second and fifth rays from dorsal and ventral margins of fin.

Distribution. East Africa, throughout the Indian Ocean and Indo-Australian Archipelago to Australia and New Caledonia, and north to southern Japan.

Material. 34 sp., 46.5–95.8 mm *SL* (8 females 13 males 13 juveniles); Gulf of Tonkin, Nha Trang Bay; ZIN 42529 (sn 17), ZIN 55104 (sn 27), ZIN 55105 (sn 14), ZIN 55297 (sn 13), ZIN 55553 (sn 32), ZIN 55654 (sn 43), ZIN 55655 (sn 46), ZIN 55656 (sn 49), ZIN 55657 (sn 50), ZIN 55658 (sn 97), ZIN 55659 (sn 110), ZIN 55897 (sn 24), ZIN 55905 (sn 12), ZIN 56010 (sn 113), ZIN 56011 (sn 111), ZIN 56012 (sn 50). *D* 82–93, *A* 62–72, *ll* 38–49, *sp.br.* 6–7.

Remarks. We consider somewhat smaller number of lateral-line scales in our specimens (46.5–95.8 mm *SL*) – 38–49 vs 41–48 in 29 specimens (28.3–102.9 mm *SL*) described earlier (Amaoka et al. 1993) as individual variation.

Engyprosopon latifrons (Regan, 1908)

(Fig. 2B; Table 7)

Scaeops latifrons Regan 1908:233 (type locality: Seychelles).

Engyprosopon latifrons: Norman 1934:213 (11 specimens, Indian Ocean; synonymy, description, distribution, illustration). – Amaoka et al. 1993:380, 410, 415, 416 (five specimens, Indian Ocean, comparative material, counts and measurements). – Li and Wang 1995:204–206 (12 specimens, Guangdong province, China, counts and measurements, illustration).

Diagnostic characters. A rostral spine present in the male, but no orbital spines. Teeth of upper jaw biserial anteriorly (at least in adults) (Norman 1934). Gill rakers on first arch serrate, less than 10 on lower limb. Scales in lateral line about 40. Pectoral fin of eyed side shorter than head length. Caudal fin with no prominent blotches. Traces of dark spots and markings on body and fins.

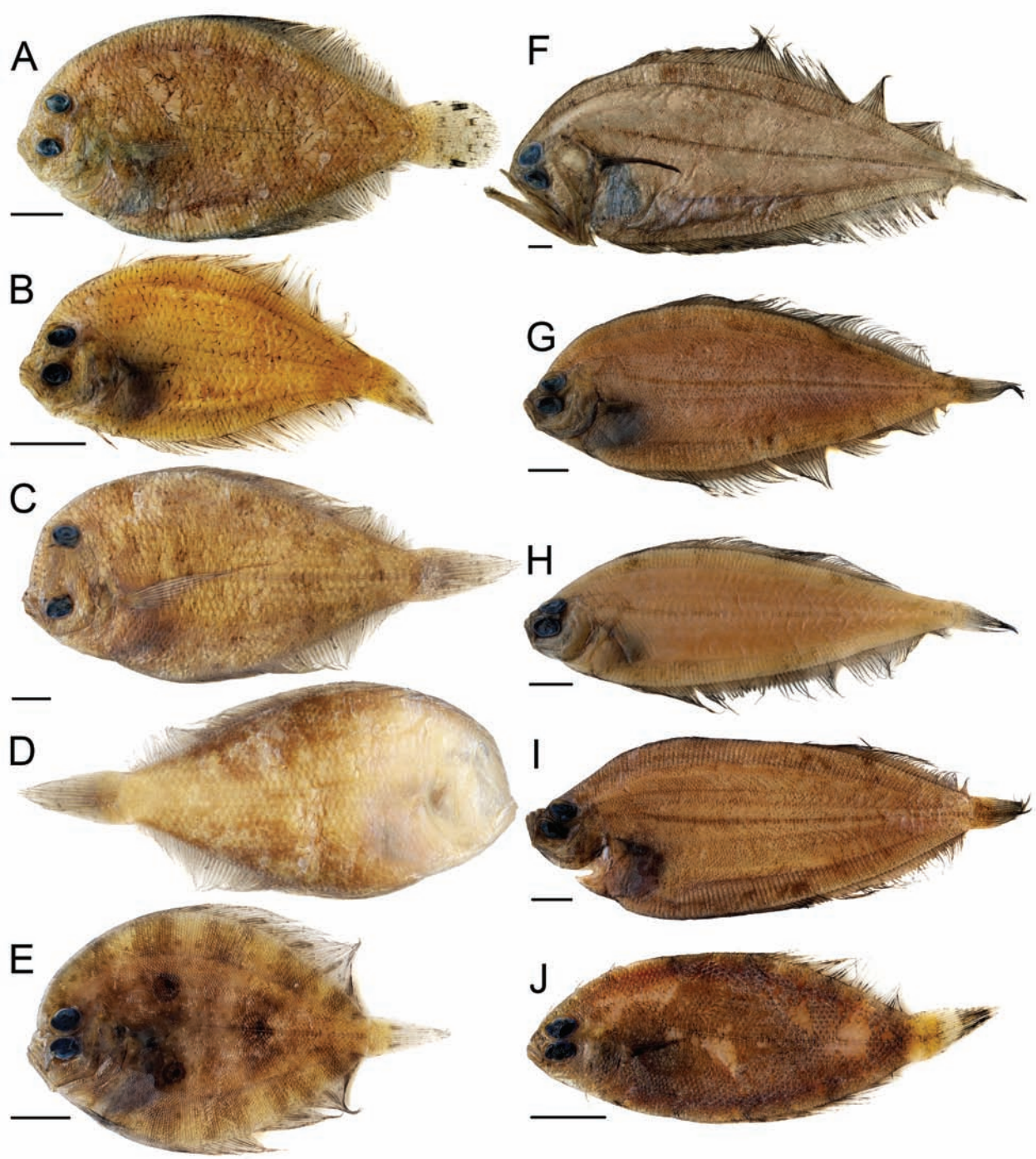

Fig. 2. A – *Engyprosopon grandisquama* (Temminck et Schlegel, 1846) ♂ 79.0 mm *SL*, ZIN 55655; B – *Engyprosopon latifrons* (Regan, 1908) ♂ 48.0 mm *SL*, ZIN 56038; C, D – *Engyprosopon maldivensis* (Regan, 1908) ♂ 104.1 mm *SL*, ZIN 55650; E – *Grammatobothus polyophthalmus* (Bleeker, 1865) 58.9 mm *SL*, ZIN 55707; F – *Kamoharaia megastoma* (Kamohara, 1936) ♀ 200.2 mm *SL*, ZIN 55720; G – *Laeops kitaharae* (Smith et Pope, 1906) 117.5 mm *SL*, ZIN 55797; H – *Laeops lanceolata* Franz, 1910 104.4 mm *SL*, ZIN 55800; I – *Laeops parviceps* Günther, 1880 112.2 mm *SL*, ZIN 55795; J – *Psettina iijimae* (Jordan et Starks, 1904) ♀ 54.6 mm *SL*, ZIN 55706; A–C, E–J – ocular side; D – blind side.

Distribution. Indo-Pacific, Hong Kong waters.

Material. 44 sp., 17.5–48.0 *SL* (2 females, 2 males, 40 juveniles); Nha Trang Bay, Vân Phong Bay; ZIN 55771 (sn 32), ZIN 55766 (sn 32, 70), ZIN 55767 (sn 33), ZIN 55768 (sn 40), ZIN 55769 (sn 36, 52), ZIN 55770 (sn 32, 60), ZIN 55772 (sn 94), ZIN 56038 (sn 38), ZIN 56096 (sn 116). *D* 73–89, *A* 56–67, *ll* 35–41, *sp.br.* 5–7, *vert.* 10+24–26 (19 radiographs).

Remarks. Our specimens (17.5–48.0 mm *SL*) are juveniles, therefore they have uniserial teeth on upper jaw and rostral spines present only in largest males.

Engyprosopon maldivensis (Regan, 1908)
(Figs 2C, D; Table 7)

Scaeops maldivensis Regan 1908:234 (type locality: Maldives).

Engyprosopon maldivensis: Norman 1934:216–217 (eight specimens, Maldives, synonymy, description, distribution, illustration). – Amaoka et al. 1993:393–397 (13 specimens, Coral Sea, revision of the genus, key, synonymy, diagnosis, description, counts and measurements, sexual demorphism, photographs). – Amaoka et al. 2008:113 (in key).

Diagnostic characters. A strong rostral spine in males, absent or feeble in females. Gill rakers not serrate, less than 10 on lower limb. Teeth in upper jaw biserial. Pectoral fin on eyed side longer than head length. Caudal fin with no blotches or a pair of dark blotches on basal third between fourth and seventh rays from dorsal and ventral margins of fin. Blind side of males dark brown except pale yellowish-white head (Fig. 2D).

Distribution. Widespread in the Indo-West Pacific, from Maldive Islands to north and northwestern Australia and to southern Japan.

Material. 17 sp., 46.3–113.3 mm *SL* (1 female, 10 males, 6 juveniles); Nha Trang Bay; ZIN 55646 (sn 32), ZIN 55647 (sn 43), ZIN 55648 (sn 72), ZIN 55649 (sn 93), ZIN 55650 (sn 103), ZIN 55651 (sn 112), ZIN 55652 (sn 54). *D* 84–92, *A* 61–69, *ll* 39–53, *sp.br.* 9–11.

Remarks. The specimens examined here differ in dorsal and anal-fin ray counts (*D* 84–92, *A* 61–69) from *E. maldivensis* (*D* 77–84, *A* 55–63), but agree with *E. macroptera* (*D* 85–91, *A* 65–68), considered as a junior synonym of *E. maldivensis* with count differences between them regarded as geographic variation (Amaoka et al. 1993).

Genus *Grammatobothus* Norman, 1926

Mouth small. Lateral line equally developed on both sides of body (lateral line absent on blind side in all other bothid genera). Interorbital region concave, narrow in both sexes, neither rostral nor orbital spines. Anterior rays of dorsal fin somewhat prolonged in both sexes. Three noticeable blotches forming a triangle on eyed side.

Grammatobothus polyophthalmus (Bleeker, 1865)
(Fig. 2E)

Platophrys (Platophrys) polyophthalmus Bleeker 1865: 46 (type locality: Sumatra, Indonesia).

Grammatobothus polyophthalmus: Norman 1934:245–246 (eight specimens, Indian ocean, Malay Peninsula and Archipelago to Australia; synonymy, description, distribution, illustration). – Kyushin et al. 1982:213 (three specimens, South China Sea, counts, colour photographs). – Amaoka et al. 1992:259–262 (seven specimens, Japan, diagnosis, description, sexual dimorphism, photograph, illustrations). – Li and Wang 1995:214–217 (11 sp., China, synonymy, counts and measurements, illustration). – Ho et al. 2009:5–6 (one specimen, Taiwan, description, counts and measurements, colour photograph). – Matsunuma et al. 2011:230 (photographs).

Diagnostic characters. Body depth 1.5 to 1.8 times in *SL*. Dorsal-fin rays 77–86, second to tenth of them elongate.

Distribution. India and Sri Lanka to northern coast of Australia, most of Indo-Australian Archipelago, New Caledonia, and South China Sea to Ryukyu Islands.

Material. 2 sp., 50.1 and 58.9 mm *SL* (juveniles); Nha Trang Bay; ZIN 55707 (sn 32). *D* 77 and 80, *A* 61, *ll* 69 and 73, *sp.br.* 7 and 8.

Genus *Kamoharaia* Kuronuma, 1940

Monotypic genus. Mouth very large, upper jaw as long as head length or somewhat longer, extending to or well beyond rear edge of lower eye. Front tip of upper jaw strongly protruding beyond tip of snout, large canine teeth on anterior area of lower jaw, short gill rakers present.

Kamoharaia megastoma (Kamohara, 1936)
(Fig. 2F)

Chascanopsetta megastoma Kamohara 1936:308 (type locality: Mimase, Kochi Prefecture, Japan).

Kamoharaia megastoma: Amaoka 1969:216–220[152–156] (three specimens, Japan, diagnosis, description, illustration). – Masuda et al. 1984:350 (Japanese Archipelago, brief description, counts, colour photograph). – Shen 1993:192 (photograph).

Distribution. Indo-Australian Archipelago to Taiwan Province of China and southern Japan.

Material. 1 sp., 200.2 mm *SL* (female); Nha Trang Bay; ZIN 55720 (sn 120). *D* 110, *A* 85, *ll* 132, *sp.br.* 7.

Genus *Laeops* Günther, 1880

Mouth small, all upper-jaw teeth and all (or nearly all) lower-jaw teeth confined to blind side (teeth present on both sides of jaws in all other bothid genera). First pelvic-fin ray on eyed side on or near isthmus, first pelvic-fin ray on blind side opposite third or fourth ray of pelvic fin on eyed side. Lateral line absent on blind side.

In species studied first dorsal-fin ray above posterior nostril of blind side, first 2 dorsal-fin rays detached from remainder of fin, no dorsal-fin rays elongate.

Remarks. Validity, diagnoses and relations of *Laeops* species need revision. Counts and measurements of our specimens are very close. Species are tentatively identified according to currently accepted characters and to a separate study in progress.

Laeops kitaharae (Smith et Pope, 1906)
(Fig. 2G; Table 8)

Lambdopsetta kitaharae Smith et Pope 1906:496 (type locality: Kagoshima Bay, Kyūshū, Japan).

Laeops kitaharae: Norman 1934:258–259 (unique type specimen, Japan, description, illustration). – Chen and Weng 1965:29–30 (two specimens, Taiwan, counts, illustration). – Amaoka 1969:144–151[208–214] (extensive material, Japanese waters, diagnosis, counts and measurements, illustrations). – Masuda et al. 1984:350 (Japanese Archipelago, brief description, colour photograph). – Ohashi and Motomura 2011:93–94 (extensive material, Japanese waters, counts, colour photograph).

Diagnostic characters. Upper profile convex above and behind eyes. Body depth 2.2–2.7 in *SL*.

Distribution. From the Persian Gulf to Gulf of Thailand and Indonesia.

Material. 10 sp., *SL* 52.4–105.9 mm; Gulf of Tonkin, Nha Trang Bay, Vân Phong Bay; ZIN 55292 (sn 19), ZIN 55793 (sn 35), ZIN 55794 (sn 65), ZIN 55797 (sn 65), ZIN 55801 (sn 78), ZIN 55883 (sn 15), ZIN 55884 (sn 10), ZIN 56029 (sn 38), ZIN 56101 (sn 29). *D* 95–109, *A* 72–90, *ll* 86–96, *sp.br.* 5–6. Body depth 2.5–2.6 (average 2.55) in *SL*.

Laeops lanceolata Franz, 1910
(Fig. 2H; Table 8)

Laeops lanceolata Franz 1910:62 (type locality: Japan).

Laeops lanceolata: Norman 1934:259–260 (five specimens, Japan; synonymy, description, distribution, illustration). – Chen and Weng 1965:30–31 (two specimens, Taiwan, counts, illustration). – Li and Wang 1995:177–179 (17 specimens, Chinese waters, synonymy, counts and measurements, illustration).

Diagnostic characters. Upper profile convex above and behind eyes. Body depth 2.8–3.5 in SL.

Distribution. Known only from the Philippines.

Material. 12 sp. *SL* 67.7–117.8 mm; Nha Trang Bay; ZIN 55796 (sn 51), ZIN 55798 (sn 74), ZIN 55799 (sn 35), ZIN 55800 (sn 36), ZIN 56099 (sn 37), ZIN 56100 (sn 29). *D* 102–112, *A* 83–92, *ll* 88–103, *sp.br.* 5–7. Body depth 2.9–3.2 (average 3.1) in *SL*.

Laeops parviceps Günther, 1880
(Fig. 2I; Table 8)

Laeops parviceps Günther 1880:29 (type locality: New South Wales, Australia).

Laeops parviceps: Norman 1934:256–257 (one specimen, holotype, Arafura Sea, description, illustration). – Wu and Tang 1935:394–395 (one specimen, Hainan, counts and measurements). – Chen and Weng 1965:24–25 (three specimens, Taiwan, illustration). – Li and Wang 1995:175–177 (10 specimens, Chinese waters, key, synonymy, counts and measurements).

Diagnostic characters. Upper profile nearly straight above and behind eyes. Body depth 2.2–2.7 in *SL*.

Distribution. Arafura Sea, northern area of South China Sea, Taiwan Province of China.

Material. 2 sp., *SL* 84.7 and 111.2 mm; Gulf of Tonkin, Nha Trang Bay; ZIN 55102 (sn 8), ZIN 55795 (sn 102). *D* 101 and 103, *A* 78 and 81, *ll* 91 and 97, *sp.br.* 8. Body depth 2.6 in *SL*.

Genus *Psettina* Hubbs, 1915

Mouth of moderate size. Interorbital region narrow in both sexes and at all sizes. Scales on eyed side with long ctenii.

Psettina iijimae (Jordan et Starks, 1904)
(Fig. 2J; Table 9)

Engyprosopon iijimae Jordan et Starks 1904:626 (type locality: Suruga Bay, Japan).

Psettina iijimae: Norman 1934:200–210 (one specimen, Japan, description, illustration). – Pertseva-Ostroumova 1965:186–191 (larva 2.8–16.7 mm, Gulf of Tonkin, descriptions, counts and measurements, illustrations). – Amaoka 1969:115–117 [179–181] (extensive material, Japan, synonymy, description, sexual dimorphism, illustrations). – Li and Wang 1995:166–168 (15 specimens, China, synonymy, counts and measurements, illustration). – Masuda et al. 1984:349 (Japanese Archipelago, brief description, counts, colour photograph). – Ohashi and Motomura 2011:94 (one specimen, Japan, counts, colour photograph).

Diagnostic characters. Dark spots or blotches along upper and lower edges of body include basal parts of dorsal and anal fins, a dark patch on distal part of pectoral fin, distal part of caudal fin with a broad blackish band. First gill arch with 4 to 6 gill rakers on lower limb, lateral-line scales 53 to 61.

Distribution. Known from southern Indonesia to southern Japan.

Material. 13 sp., 46.2–82.3 mm *SL* (females and males); Gulf of Tonkin, Nha Trang Bay; ZIN 55697 (sn 11), ZIN 55704 (sn 32), ZIN 55705 (sn 36), ZIN 55706 (sn 115), ZIN 55904 (sn 9), ZIN 55906 (sn 12), ZIN 56013 (sn 38), ZIN 56014 (sn 35), ZIN 56015 (sn 37). *D* 85–94, *A* 64–76, *ll* 45–60, *sp.br.* 6–9.

Family Paralichthyidae Regan, 1910
(Map 3)

No fin spines. Eyes on left side of head. Pelvic fins short-based, subequal and subsymmetrical in position.

Genus *Pseudorhombus* Bleeker, 1862

Dorsal, anal and pectoral fin on blind side with simple rays, caudal-fin rays 17. Lateral line with distinct supratemporal branch. Scales small or of moderate size, 58 to 100 in lateral line.

Pseudorhombus elevatus Ogilby, 1912
(Fig. 3A; Table 10)

Pseudorhombus elevatus Ogilby 1912:45 (type locality: Queensland, Australia).

Pseudorhombus elevatus: Norman 1934:107–108 (26 specimens, Persian Gulf, coasts of India and Burma Nhatrang Bay; synonymy, description, distribution, illustration). – Chen and Weng 1965:44–45 (four specimens, Taiwan, description, counts, illustration). – Amaoka 1971:24–25 (one specimen, Gulf of Tonkin, counts and measurements, description, illustration). – Liew et al. 1988:51, 60–70 (larva 3.6–10.0 mm, Australia, counts and measurements, description, illustrations). – Shen 1993:804 (photograph). – Li and Wang 1995:141–143 (19 specimens, China, Hainan, counts and measurements, illustration).

Diagnostic characters. A line connecting base of first dorsal-fin ray and posterior nostril on eyed side crosses its posteriormost part. Origin of dorsal fin just above or slightly in advance of anterior nostril on blind side, anterior rays not prolonged. Upper profile with a distinct notch in front of upper eye. Gill rakers pointed, longer than broad. Body depth 1.7 to 2 times in *SL*. Scales ctenoid on eyed side, cycloid on blind side. A distinct large blotch at junction of straight and curved parts of lateral line, no ocelli.

Distribution. Known from the Red Sea throughout the Indo-Australian Archipelago, northward to China and southward to northeastern Australia.

Material. 2 sp., 54.7 mm *SL* (juvenile) and 66.5 mm *SL* (male); Vân Phong Bay; ZIN 55530 (sn 96), ZIN 55531 (sn 97). *D* 64 and 66, *A* 50 and 54, *ll* 63, *sp.br.* 12 and 15.

Pseudorhombus javanicus (Bleeker, 1853)
(Fig. 3B; Table 10)

Rhombus javanicus Bleeker 1853:502 (type locality: Jakarta, Java, Indonesia).

Pseudorhombus javanicus: Wu 1932:82–83 (three specimens, Hong-Kong, description, counts and measurements). – Norman 1934:109–110 (ten specimens, East coast of India, Malay Peninsula and Archipelago, Nha Trang Bay, Hong Kong, Hainan, synonymy, description, distribution, illustration). – Wu and Tang 1935:392 (four specimens, Hainan). – Kyushin et al. 1982:261 (one specimen, South China Sea, brief description, counts, photograph). – Li and Wang 1995:131–134 (five specimens, China, Hainan, counts and measurements, illustration). – Matsunuma et al. 2011:228 (photograph).

Diagnostic characters. A line connecting base of first dorsal-fin ray and posterior nostril on eyed side crosses its posteriormost part. Anterior dorsal-fin rays not prolonged. Upper profile of head round, evenly convex, without distinct notch. Body depth 1.7 to 2 times in *SL*. Gill rakers pointed, longer than broad. Scales on eyed side ctenoid on eyed side, cy-

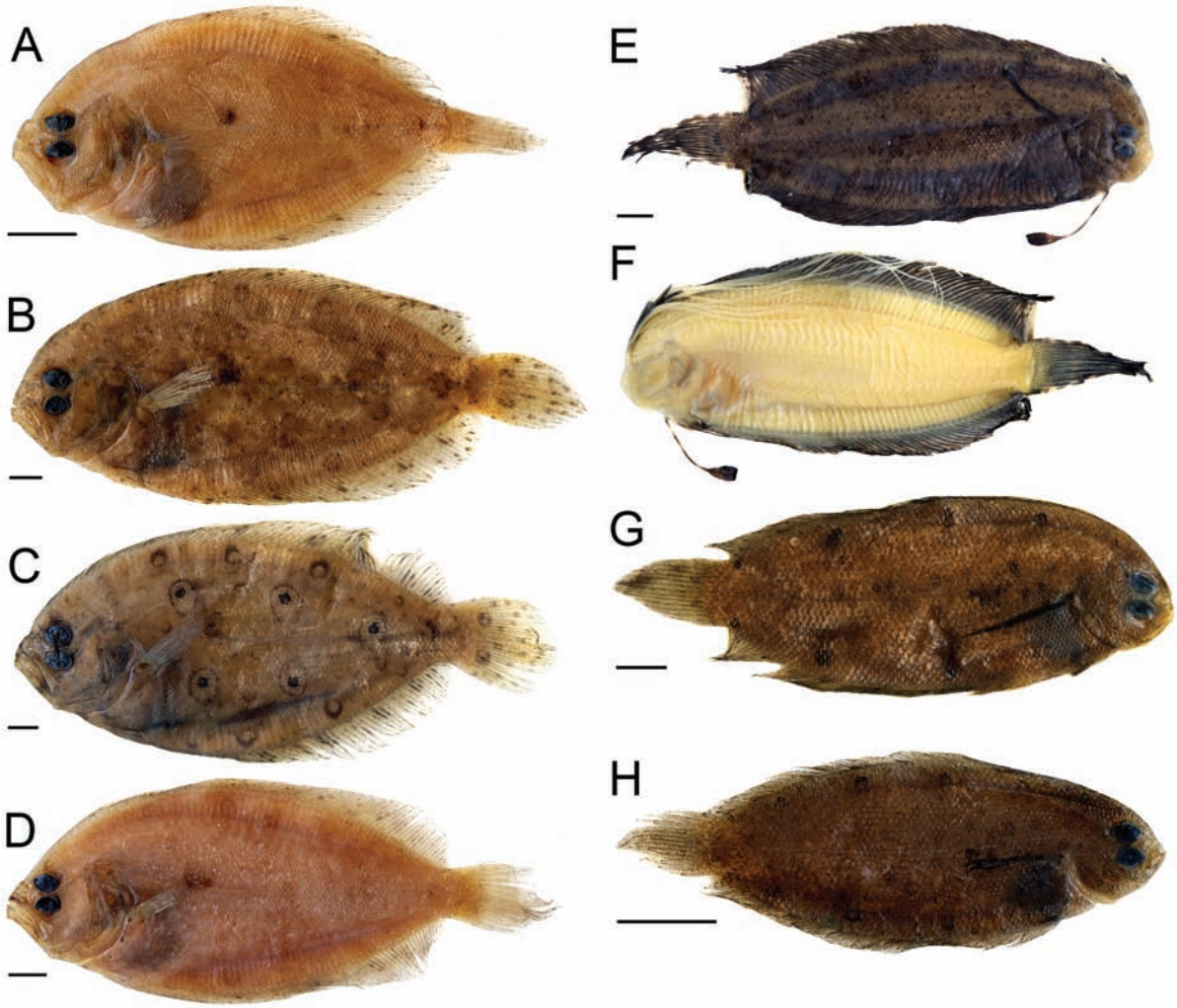

Fig. 3. A – *Pseudorhombus elevatus* Ogilby, 1912 ♂ 66.5 mm *SL*, ZIN 55531; B – *Pseudorhombus javanicus* (Bleeker, 1853) ♀ 149.7 mm *SL*, ZIN 55527; C – *Pseudorhombus oculocirris* Amaoka, 1969 ♀ 142.8 mm *SL*, ZIN 55532; D – *Pseudorhombus oligodon* (Bleeker, 1854) ♂ 116.7 mm *SL*, ZIN 55526; E, F – *Samaris cristatus* Gray, 1831 ♂ 120.4 mm *SL*, ZIN 55557; G – *Samariscus filipectoralis* Shen, 1982 ♂ 90.9 mm *SL*, ZIN 55548; H – *Samariscus luzonensis* Fowler, 1934 ♂ 50.7 mm *SL*, ZIN 55550. A–E – ocular side; F – blind side.

cloid on blind side. A distinct, large dark blotch at junction of straight and curved parts of lateral line and a smaller blotch on middle of straight section of lateral line, many dark rings scattered on body.

Distribution. Known from the east coast of India eastward to western New Guinea and to southern China.

Material. 7 sp., 124.5–149.7 mm *SL* (3 females, 4 males); Nha Trang Bay; ZIN 55527 (sn 124), ZIN 55528 (sn 126), ZIN 55529 (sn 124), ZIN 55644 (sn 114). *D* 72–76 *A* 54–56 *ll* 67–76 *sp.br.* 14–16.

Pseudorhombus oculocirris Amaoka, 1969

(Fig. 3C; Table 10)

Pseudorhombus oculocirris Amaoka 1969:94[30] (type locality: Mimase, Kochi, Japan).

Pseudorhombus oculocirris: Masuda et al. 1984:347 (Japanese Archipelago, brief description, counts, colour photograph). – Amaoka et al. 2007:43–45 (one specimen, counts, measurements, description, colour photograph). – Ohashi and Motomura 2011:81–82 (five specimens, Japan, counts and measurement, colour photograph).

Diagnostic characters. A line connecting base of first dorsal-fin ray and posterior nostril on eyed side crosses posteriormost part of maxilla. Upper profile with a distinct notch in front of upper eye. Anterior dorsal-fin rays elongated. Gill rakers pointed, longer than broad. Scales ctenoid on eyed side, cycloid on blind side. Tentacle on the lower eye. Two ocelli above and below lateral line and one ocellus on posterior third of straight section of lateral line, many dark rings and spots scattered on body and median fins.

Distribution. Previously known from Kyushu Island, Japan.

Material. 3 sp., 134.2–144.0 mm *SL* (3 females); Nha Trang Bay; ZIN 55532 (sn 63), ZIN 55533 (sn 110), ZIN 55645 (sn 114). *D* 69–72, *A* 51–54, *ll* 75 and 82, *sp.br.* 15–19.

Measurements (% of SL): head length 24.6–25.6 (25.1); body depth 48.0–49.5 (48.7); snout length 6.7–7.6 (7.0); upper eye diameter 5.3–6.2 (5.8); lower eye diameter 5.3–6.2 (5.8); interorbital width 0.6–0.7 (0.7); upper jaw length (o) 11.7–12.5 (12.1); upper jaw length (b) 11.6–12.5 (12.0); lower jaw length (o) 14.3–15.9 (15.3); lower jaw length (b) 14.8–16.7 (15.7); depth of caudal peduncle 12.6–13.8 (13.1); pectoral-fin length (o) 15.7–18.2 (17.0); pectoral-fin length (b) 11.7–11.8 (11.7); pelvic-fin length (o) 7.9–8.8 (8.4); pelvic-fin length (b) 8.8–9.5 (9.2); base length of pelvic fin (o) 2.8–3.0 (2.9); base length of pelvic fin (b) 2.5–3.1 (2.8); length of longest dorsal-fin ray 10.4–12.4 (11.7); length of longest anal-fin ray 11.1–12.5 (11.6); length of midcaudal-fin ray 16.2–21.5 (19.4).

Pseudorhombus oligodon (Bleeker, 1854)
(Fig. 3D; Table 10)

Rhombus oligodon Bleeker 1854:419 (type locality: Nagasaki, Japan).

Pseudorhombus oligodon: Wu 1932:80–82 (five specimens, Hong-Kong, Hainan, counts and measurements). – Norman 1934:99–100 (four specimens, China, Hong Kong; synonymy, description, distribution, illustration). – Wu and Tang 1935:391 (two specimens, Hainan). – Amaoka 1969:28–30[92–94] (12 specimens, Japan, counts and measurements, description, illustration). – Chen and Weng 1965:38–39 (two specimens, Taiwan, description, counts, illustration). – Amaoka 1971:22 (nine specimens, Gulf of Tonkin, description, counts and measurements). – Li and Wang 1995:128–130 (18 specimens, China, Hainan, counts and measurements, illustration). – Masuda et al. 1984:347 (Japanese Archipelago, brief description, counts, colour photograph). – Shen 1984:134 pl., 1993:804 (photographs). – Ohashi and Motomura 2011:82 (five specimens, Japan, counts and measurement, colour photograph).

Diagnostic characters. A line connecting base of first dorsal-fin ray and posterior nostril on eyed side crosses maxilla. Upper profile of head distinctly notched in front of upper eye. Body depth 2.1 to 2.3 times in *SL*. Pelvic fin on eyed side without distinct black spot. Gill rakers pointed, longer than broad. Scales ctenoid on both sides of body. A dark blotch at junction between straight and curved portions of lateral line, two dark spots at boundary of opercle and trunk below base of pectoral fins.

Distribution. Known from South China Sea to Japan.

Material. 9 sp., 65.4–175.5 mm *SL* (1 female, 2 males, 6 juveniles): Gulf of Tonkin, Nha Trang Bay, Vân Phong Bay; ZIN 55523 (sn 100), ZIN 55524 (sn 96), ZIN 55525 (sn 95), ZIN 55526 (sn 45), ZIN 55895 (sn 16), ZIN 56024 (sn 44). *D* 76–80 *A* 60–62 *ll* 84–89 *sp.br.* 8–10.

Family Samaridae Jordan et Goss, 1889
(Map 4)

No fin spines. Eyes on right side of head. Pelvic fins symmetrical, short-based. Margin of preopercle free and distinct, not embedded in skin. Pectoral fin on eyed side present, no pectoral fin on blind side.

Genus *Samaris* Gray, 1831

Anteriormost dorsal-fin rays and rays of pelvic fin on eyed side elongate. Pectoral-fin rays on eyed side less than 5, 6–7 paired parapophyses of abdominal vertebrae.

Samaris cristatus Gray, 1831
(Figs 3E, F; Table 11)

Samaris cristatus Gray 1831:5 (type locality: China).

Samaris cristatus: Norman 1928:44–45 (six specimens, Indian Ocean, description, counts). – Wu 1932:118–120 (two specimens, Hong-Kong, counts and measurements). – Norman 1934:404 (15 specimens, Indo-Pacific; synonymy, description, distribution, illustration). – Chen and Weng 1965:28–29 (Taiwan, description, counts and measurements, illustration). – Pertseva-Ostroumova 1965:201–203 (larva 6.4 and 8.7 mm, Gulf of Tonkin, counts, illustration). – Amaoka 1971:30–31 (one speci-

men, Gulf of Tonkin, counts and measurements, illustration). – Kyushin et al. 1982:265 (one specimen, South China Sea, colour photograph). – Masuda et al. 1984:354 (Japanese Archipelago, brief description, counts, colour photograph). – Quéro and Maugé 1989:108 (in key). – Li and Wang 1995:269–272 (30 specimens, China, synonymy, counts and measurements, illustration). – Matsunuma et al. 2011:232 (photograph). – Ohashi and Motomura 2011:101 (one specimen, Japan, counts, photograph). – Voronina and Suzumoto 2017 (in key, number of parapophyses).

Diagnostic characters. At least 12 anteriormost dorsal-fin rays and rays of pelvic fin on eyed side elongate and filamentous, about 4 or 5 times head length. All caudal-fin rays unbranched. Caudal peduncle without spines.

Distribution. Known throughout the Indian Ocean, to Taiwan Province of China, South China Sea, Philippines, Indonesia, northern Australia, Great Barrier Reef, and New Caledonia.

Material. 27 sp., 42.2–126.7 mm *SL* (9 females 12 males, 6 juveniles); Gulf of Tonkin, Nha Trang Bay; ZIN 55101 (sn 8), ZIN 55551 (sn 36), ZIN 55552 (sn 32), ZIN 55553 (sn 57), ZIN 55554 (sn 75), ZIN 55555 (sn 117), ZIN 55556 (sn 79), ZIN 55557 (sn 80), ZIN 55558 (sn 88), ZIN 55559 (sn 97), ZIN 55560 (sn 108), ZIN 55561 (sn 119), ZIN 55562 (sn 115), ZIN 55900 (sn 27), ZIN 56025 (sn 39). *D* 74–86, *A* 53–58, *ll* 61–89, *sp.br.* 6–11.

Genus *Samariscus* Gilbert, 1905

Anterior dorsal-fin rays and rays of pelvic fin on eyed side not elongate. Pectoral fin on eyed side with 4 or 5 rays, 5 paired parapophyses of abdominal vertebrae.

Remarks. Original descriptions of many *Samariscus* species are based on one or two specimens. Diagnoses and relations of species need revision. Ranges of variation of counts are very close or overlapping. Specimens in our material were tentatively identified on the basis of accepted characters.

Samariscus filipectoralis Shen, 1982
(Fig. 3G; Table 11)

Samariscus filipectoralis Shen 1982:210 (type locality: Taiwan).

Samariscus filipectoralis: Quéro and Maugé 1989:114 (in key of *Samariscus*). – Kawai et al. 2011:65–66 (two specimens, Taiwan, counts in comparative material). – Li and Wang 1995:278–279 (synonymy, photographs).

Diagnostic characters. Five pectoral-fin rays with the first ray elongated and filamentous, slightly less than twice the head. Dorsal-fin rays 71–77, caudal vertebrae 28–30, lateral-line scales 52–56. Body depth 2.4 in body length, head length about 4.5 in body length.

Distribution. Known from Taiwan.

Material. 1 sp., male, 90.9 mm *SL*; Nha Trang Bay; ZIN 55548 (sn 120), *D* 79, *A* 55, *P* 5, *ll* 58, *sp.br.* 7, *vert.* 9+29.

Samariscus luzonensis Fowler, 1934
(Fig. 3H; Table 11)

Samariscus luzonensis Fowler 1934:343 (type locality: Luzon Island, Philippines).

Samariscus luzonensis: Ochiai and Amaoka 1962 (in key). – Voronina and Suzumoto 2017 (in key, number of parapophyses).

Diagnostic characters. Four pectoral-fin rays, pectoral fin about same length as head length. Dorsal-fin rays about 68, caudal vertebrae 28, lateral-line scales about 50. Body depth 2.5 to 3.2 in length, head length 4.6 in body length.

Distribution. Known from west coast of Luzon, Philippines.

Material. 7 sp. (male 50.7 mm *SL*, 6 sp. 32.3–52.6 mm *SL*); Gulf of Tonkin, Nha Trang Bay, Vân Phong Bay; ZIN 55549 (sn 32), ZIN 55550 (96), ZIN 55792 (sn 36), ZIN 55901 (sn 18), ZIN 55902 (sn 10), ZIN 55903 (sn 23), ZIN 56026 (sn 38). *D* 68–81, *A* 49–56, *P* 4, *ll* 56–58, *sp.br.* 6–7, *vert.* 9+28–29 (four radiographs).

Family Soleidae Bonaparte, 1833
(Map 5)

No fin spines. Eyes on right side of head. Pelvic fins present, sometimes asymmetrical. Preopercle without free margin, embedded in skin. Pectoral fins sometimes absent, when present, right usually longer than left. Eyed-side lips not fringed with labial papillae.

Genus *Aesopia* Kaup, 1858

Monotypic genus. First ray of dorsal fin enlarged and free. Caudal fin joined to dorsal and anal fins. Pectoral fins present. Head and body with numerous dark cross bands. Scales cycloid.

Aesopia cornuta Kaup, 1858
(Figs 4A, B; Table 12)

Aesopia cornuta Kaup 1858:98 (type locality: India).

Aesopia cornuta: Wu and Tang 1935:395–397 (three specimens, Hainan, description, counts and measurements). – Ochiai 1963:60–64 (15 specimens, Japan, synonymy, count and measurements, illustrations). – Chen and Weng 1965:44–45 (app. 13 specimens, Taiwan, descriptions, counts, illustration). – Masuda et al. 1984:355 (Japanese Archipelago, brief description, counts, colour photograph). – Li and Wang 1995:322–325 (ten specimens, China, Hainan, synonymy, counts and measurements, illustration). – Ohashi and Motomura 2011:101–103 (nine specimens, Japan, counts, colour photograph).

Distribution. Indo-Pacific from South Africa to Japan and Australia.

Material. 8 sp., 67.0–181.2 mm *SL*; Nha Trang Bay, Phan Thiết; ZIN 55761 (sn 61), ZIN 55762 (sn 75), ZIN 55763 (sn 119), ZIN 55764 (sn 107), ZIN 55765 (sn 121), ZIN 56027 (sn 38). *D* 74–78, *A* 57–67, *ll* 100–113.

Genus *Aseraggodes* Kaup, 1858

Caudal fin separate from dorsal and anal fins. Pectoral fins absent. Scale ctenoid on both sides.

Aseraggodes dubius Weber, 1913
(Fig. 4C; Table 12)

Aseraggodes dubius Weber 1913:438 (type locality: Java Sea).

Aseraggodes dubius: Randall and Desoutter-Meniger 2007:310–311 (key, diagnosis, description, ten specimens, South China Sea, Hong Kong, southern Luzon, counts and measurements, photograph).

Diagnostic characters. Short caudal peduncle present. First dorsal-fin ray not prolonged. Pelvic fins not attached and not joined by membrane to genital papilla. Lateral line on ocular side of head without branches, lateral-line scales 64–87. Vertebrae 36–39. Head not very obtuse. Dorsal-fin rays 71–79, anal-fin rays 50–54, all unbranched. One to two rows of tiny teeth on ocular side of upper jaw.

Distribution. Gulf of Carpentaria and Indonesia to Gulf of Thailand Java Sea.

Material. 10 sp., *SL* 60.6–92.5 mm *SL*; Gulf of Tonkin, Nha Trang Bay; ZIN 55698 (sn 7), ZIN 55699 (sn 1), ZIN 55775 (sn 31), ZIN 55776 (sn 117), ZIN 55881 (sn 9), ZIN 55882 (sn 10). *D* 71–75, *A* 48–53, *ll* 66–82.

Genus *Brachirus* Swainson, 1839

Caudal fin joined to dorsal and anal fins. Body oval. No bony process on snout. Pectoral fins present. Opercular openings of both sides not restricted, confluent in front of pelvic fins.

Brachirus orientalis (Bloch et Schneider, 1801)
(Fig. 4D; Table 12)

Pleuronectes orientalis Bloch et Schneider 1801:157 (type locality: India).

Synaptura orientalis: Chen and Weng 1965:37 (five specimens, Taiwan, counts, description). – Shen 1984:138 (photograph). – Masuda et al. 1984:355 (Japanese Archipelago, brief description, counts, colour photograph).

Brachirus orientalis: Wu and Tang 1935:395 (ten specimens, Hainan). – Li and Wang 1995:305–307 (16 specimens, China, counts and measurements, illustration). – Desoutter et al. 2001:325–327 (nomenclatural notes). – Matsunuma et al. 2011:233 (photographs).

Diagnostic characters. Eyes separated by narrow scaly interorbital space, eyes not pedunculate, pectoral fins well developed on both sides of body.

Distribution. Sri Lanka, Ceylon, China, Thailand, Vietnam.

Material. 10 sp., 68.8–139.3 mm *SL*; Nha Trang Bay; ZIN 55779 (sn 71), ZIN 55780 (sn 118). *D* 57–67, *A* 45–50, *ll* 70–92, *vert.* 9+26–27 (five radiographs).

Genus *Dagetichthys* Stauch et Blanc, 1964

Body very elongate. Caudal fin joined to dorsal and anal fins. Bony process on snout present. Pectoral fins present.

Dagetichthys commersonnii (Lacepède, 1802)
(Fig. 4E)

Pleuronectes commersonnii Lacepède 1802:599, 654 (type locality: southwestern Indian Ocean).

Dagetichthys commersonii: Munroe and Desoutter 2001:273–277 (authorship, identity, nomenclatural notes). – Vachon et al. 2007:405–416 (30 specimens, India, Pakistan, Thailand, Vietnam, Singapore, Borneo, Malasia, Sumatra, genus revision, cladogram, key, diagnosis, description, counts and measurements, photographs).

Diagnostic characters. Dorsal-fin rays 70–83, anal-fin rays 59–65, caudal-fin rays 12, lateral-line scales 124–172. Dorsal, anal and caudal fins black towards edges of both sides and with a conspicuous

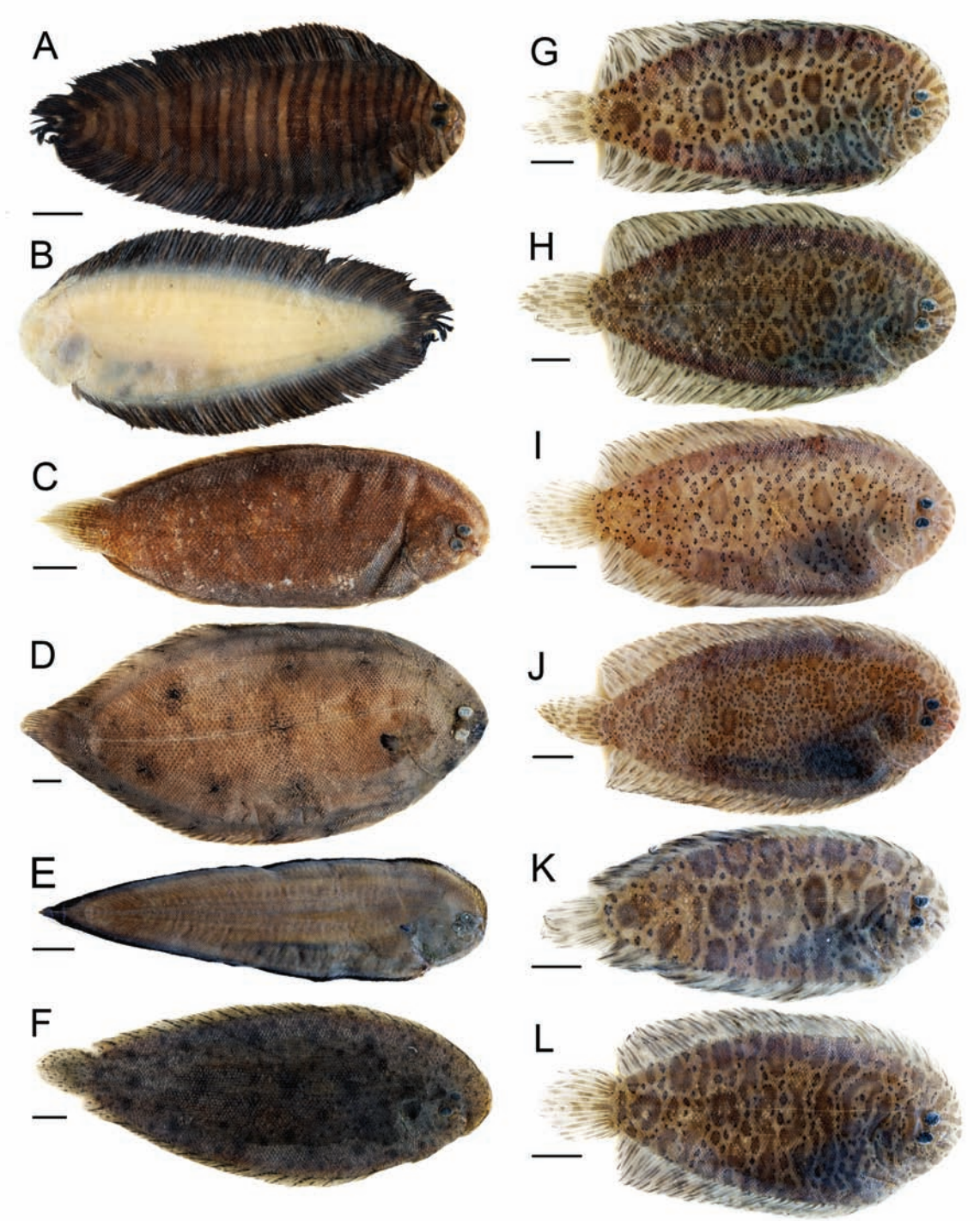

Fig. 4. A, B – *Aesopia cornuta* Kaup, 1858 75.2 mm *SL*, ZIN 55762; C – *Aseraggodes dubius* Weber, 1913 92.5 mm *SL*, ZIN 55776; D – *Brachirus orientalis* (Bloch et Schneider 1801) 139.3 mm *SL*, ZIN 55779; E – *Dagetichthys commersonnii* (Lacepède, 1802) 99.4 mm *SL*, ZIN 55043; F – *Heteromycteris japonicus* (Temminck et Schlegel, 1846) 120.2 mm *SL*, unregistered; G – *Liachirus melanospilus* (Bleeker, 1854) 81.6 mm *SL*, ZIN 55788; H – *Liachirus melanospilus* (Bleeker, 1854) 90.0 mm *SL*, ZIN 55788; I – *Liachirus melanospilus* (Bleeker, 1854) 77.3 mm *SL*, ZIN 55798; J – *Liachirus melanospilus* (Bleeker, 1854) 86.2 mm *SL*, ZIN 55798; K – *Liachirus melanospilus* (Bleeker, 1854) 69.1 mm *SL*, ZIN 55855; L – *Liachirus melanospilus* (Bleeker, 1854) 69.7 mm *SL*, ZIN 55855. A, C–L – ocular side; B – blind side.

white margin, right pectoral fin dusky. Lower lip of ocular side fringed. No cirri around eyes and nostrils, no white spots. Scales ctenoid on eyed side, cycloid on blind side.

Distribution. Northwestern part of Indo-West Pacific area, including Gulf of Thailand, Borneo, Indonesia, westward to India and Pakistan.

Material. 2 sp., 99.4 and 102.2 mm *SL*; off Hồ Cốc; ZIN 55043 (sn 123). *D* 72 and 78, *A* 62 and 63, *C* 12, *ll* 96 and 107, epicranial complex 5–5-2 (two radiographs).

Remarks. We consider smaller number of lateral-line scales in our two specimens, 96 and 107 vs 124–172 (Vachon et al. 2007) as geographic or individual variation.

Genus *Heteromycteris* Kaup, 1858

Branchial septum perforated (branchial septum entire in all other soleid genera). Snout forming distinct hook. Caudal fin separate from dorsal and anal fins. Pectoral fins rudimentary or absent.

Heteromycteris japonicus (Temminck et Schlegel, 1846)

(Fig. 4F)

Achirus japonicus Temminck et Schlegel 1846:186 (type locality: Japan).

Heteromycteris japonicus: Wu and Tang 1935:397 (two specimens, Hainan). – Ochiai 1963:15–16 (134 specimens, Japan, key, diagnosis, synonymy, osteology, counts and measurements, illustrations). – Masuda et al. 1984:354 (Japanese Archipelago, brief description, counts, colour photograph). – Ohashi and Motomura 2011:106 (extensive material, Japan, counts, colour photographs).

Diagnostic characters. Posterior nostril of eyed side placed close to anterior edge of lower eye. A spoon-like papilla in anterior nasal tube on blind side.

Distribution. Northwest Pacific, Korea and Japan, including the Ryukyu Islands to the Yellow Sea and the East China Sea, Gulf of Tonkin China.

Material. 1 sp., 120.2 mm *SL*; Phú Quốc Island (sn 125); unregistered. *D* 78, *A* 55, *ll* 94.

Genus *Liachirus* Günther, 1862

Monotypic genus. Caudal fin separated from dorsal and anal fins. Pectoral fins absent. Scales cycloid on both sides. Dorsal-fin rays 59–62, lateral-line scales 57–65. Eyed side with scattered darker dots and blotches of very variable size and colour (Figs 4G–L), blind side pale.

Liachirus melanospilos (Bleeker, 1854)

(Figs 4G–L; Table 12)

Achirus melanospilus Bleeker 1854:257 (type locality: Manado, Sulawesi Celebes, Indonesia).

Liachirus melanospilos: Wu 1932:133 (one specimen, Hainan). – Ochiai 1963:23–25 (seven specimens, Japan, synonymy, description, counts and measurements, illustrations). – Chen and Weng 1965:33–35 (five specimens, Taiwan, counts, illustration). – Masuda et al. 1984:354 (Japanese Archipelago, brief description, counts, colour photograph). – Li and Wang 1995:298–299 (16 specimens, Taiwan, synonymy, counts and measurements). – Matsunuma et al. 2011:234 (photograph).

Distribution. Indo-West Pacific, including South China Sea, southern Japan and Australia.

Material. 47 sp., 54.6–108.0 mm *SL*; Nha Trang Bay, Phan Thiết, Phú Quốc Island; ZIN 55786 (sn 32, 46, 48), ZIN 55788 (sn 32, 57, 58, 59, 60, 68, 69), ZIN 55789 (sn 81, 82, 86), ZIN 55790 (sn 110, 121), ZIN 55791 (sn 125), ZIN 55855 (sn 126), ZIN 56028 (sn 116). *D* 58–68, *A* 43–50, *ll* 67–86.

Genus *Pardachirus* Günther, 1862

Dorsal and anal fins with a venom glandula pore at base of each fin ray (no pores in all other soleid genera). Caudal fin separated from dorsal and anal fins. Pectoral fins absent.

Pardachirus pavoninus (Lacepède, 1802)

(Fig. 5A; Table 12)

Achirus pavoninus Lacepède 1802:658, 660 (type locality: probably Indonesia).

Pardachirus pavoninus: Ochiai 1963:35–38 (three specimens, Japanese waters, synonymy, counts and measurements, illustrations). – Chen and Weng 1965:35–36 (one specimen, Taiwan, counts, illustration). – Clark and George 1979:103–123 (genus review, key, diagnosis, description, counts, venom glands, distribution). – Kyushin et al. 1982:265 (one specimen, South China Sea, photograph). – Masuda et al. 1984:354 (Japanese Archipelago, brief description, counts, colour photograph). – Shen 1993:808 (photograph). – Li and Wang 1995:291–293 (seven specimens, China, synonymy, counts and measurements, illustration). – Randall 2005:617 (photograph). –

Randall and Johnson 2007:12 (revision of genus, key, diagnosis, synonymy, counts and measurements, description, photographs). – Matsunuma et al. 2011:234 (photograph). – Ohashi and Motomura 2011:107–108 (one specimen, Japan, counts, colour photograph).

Diagnostic characters. Dorsal-fin rays 62–73, lateral-line scales 77–99, vertebrae 38–41. Spots in various sizes and shapes, bordered by a dark rim and some with a blackish spot in center. Scales cycloid on both sides, no scales on dorsal and anal fins. Ocular-side pelvic fin attached to genital papilla.

Distribution. Widespread tropical Indo-West Pacific, including southern Japan, Philippines and Australia.

Material. 7 sp., 106.5–247.8 mm *SL*; Nha Trang Bay; ZIN 55781 (sn 49), ZIN 55782 (sn 54), ZIN 55783 (sn 57), ZIN 55784 (sn 80), ZIN 55785 (sn 119). *D* 62–68, *A* 50–58, *ll* 78–91.

Genus *Solea* Quensel, 1806

Caudal fin separate from dorsal and anal fins. Pectoral fins well developed. Anterior nasal tube on eyed side short. Body and head without transverse wavy lines. Deep black blotch on distal part of pectoral fins on eyed side.

Solea ovata Richardson, 1846
(Fig. 5B)

Solea ovata Richardson 1846:279 (type locality: China).

Solea ovata: Wu 1932:122–123 (two specimens, Hainan, description, counts and measurements). – Wu and Tang 1935:395 (three specimens, Hainan). – Shen 1993:809 (photograph). – Li and Wang 1995:286–288 (20 specimens, China, Hainan, counts and measurements, synonymy, illustration). – Vachon et al. 2008:9–26 (172 specimens, China, India, Malaysia, Indonesia, Thailand, Philippines, Australia, Hong Kong genus revision, key, diagnosis, description, counts and measurements, photographs).

Diagnostic characters. Body ovate, its depth about 2 times in *SL*. Pectoral fin on eyed side about twice as long as that on blind side. Caudal vertebrae 23–26. Scales ctenoid on both sides. Colour olive or brown with spots and black blotches on eyed side.

Distribution. Widespread throughout northwestern Indo-West Pacific area including the northern China Sea, Gulf of Thailand, Philippines, and southward to Indonesia.

Material. 1 sp., 46.1 mm *SL*; Gulf of Tonkin; ZIN 55910 (sn 26). *D* 61, *A* 48, *ll* 106.

Genus *Soleichthys* Bleeker, 1860

Anterior nasal tube on eyed side long, reaching to or beyond midpoint of lower eye. Caudal fin separate from dorsal and anal fins. Pectoral fins present.

Soleichthys tubiferus (Peters, 1876)
(Figs 5C–E)

Solea tubifera Peters 1876:444 (type locality: Île aux Fouquets, 8 kilometers east of Mahébourg, Mauritius, Mascarenes, southwestern Indian Ocean).

Soleichthys tubifera: Fricke 1999:574–575 (two specimens, Réunion, Mauritius, redescription, taxonomy, synonymy, counts and measurements), Fricke et al. 2009:115.

Soleichthys tubiferus: Muchhala and Munroe 2004:57 (genus review, comparative notes).

Diagnostic characters. Readily distinguished from congeners by unique ocular-side colouration – uniformly greyish brown with numerous dark spots and blotches, no crossbands. Blind side whitish. Eyed-side pectoral fin longer, darkly pigmented, two dorsalmost ocular-side pectoral-fin rays elongated, nearly equal in length, scales are only on proximal one-third of the lengths of three dorsalmost rays (Fig. 5D). Dorsal, anal and caudal fins dusky darkly pigmented with black spots, edge of fins white. Caudal fin-ray tips white on both sides. Mouth, isthmus and inner opercular lining black. No cirri on lips. Scale ctenoid on both sides.

Distribution. Previously known only from Mauritius, Réunion.

Material. 1 sp., 133.7 mm *SL*; Nha Trang Bay; ZIN 55773 (sn 118). *D* 79, *A* 70, *ll* 111, *vert*. 9+36, *P* 9 (ocular side), 7 (blind side), *V* 5, *C* 16, epicranial complex 2–1-1.

Measurements (% of *SL*): predorsal length 6.7, body depth 34.8, pectoral-fin length 9.1 (ocular side), 2.3 (blind side), pelvic-fin length 5.1 (ocular side), 4.9 (blind side), caudal-fin length 10.6, head length 18.0, head width 22.1, postorbital head length 9.6, snout length 4.9, eye diameter 4.9, upper jaw length 5.5; shortest distance between the edge of the dorsal eye and base of the dorsal-fin rays 2.1; depth of caudal peduncle 6.4.

Genus *Zebrias* Jordan et Snyder, 1900

Caudal fin joined to dorsal and anal fins. Pectoral fins present. Opercular membrane usually on both

sides of body joined nearly to distal tips of upper rays of pectoral fins and forming continuous membranous connection with gill opening. Head and body with numerous dark cross bands. First dorsal-fin ray not enlarged. Scales rough, distinctly ctenoid.

Remarks. Genus taxonomy is questionable at present, species diagnoses are ambiguous, ranges of count variation are very close or overlapping. Specimens of our material were tentatively identified on the basis of accepted characters.

Zebrias crossolepis Zheng et Chang, 1965
(Fig. 5F; Table 12)

Zebrias crossolepis Zheng et Chang 1965:271 (type locality: China).

Zebrias crossolepis: Li and Wang 1995:315–317 (ten specimens, China, counts and measurements, illustration). – Shen 1993:809 (photograph).

Diagnostic characters. Eyes contiguous, no tentacles. Dorsal and anal fins only partially joined

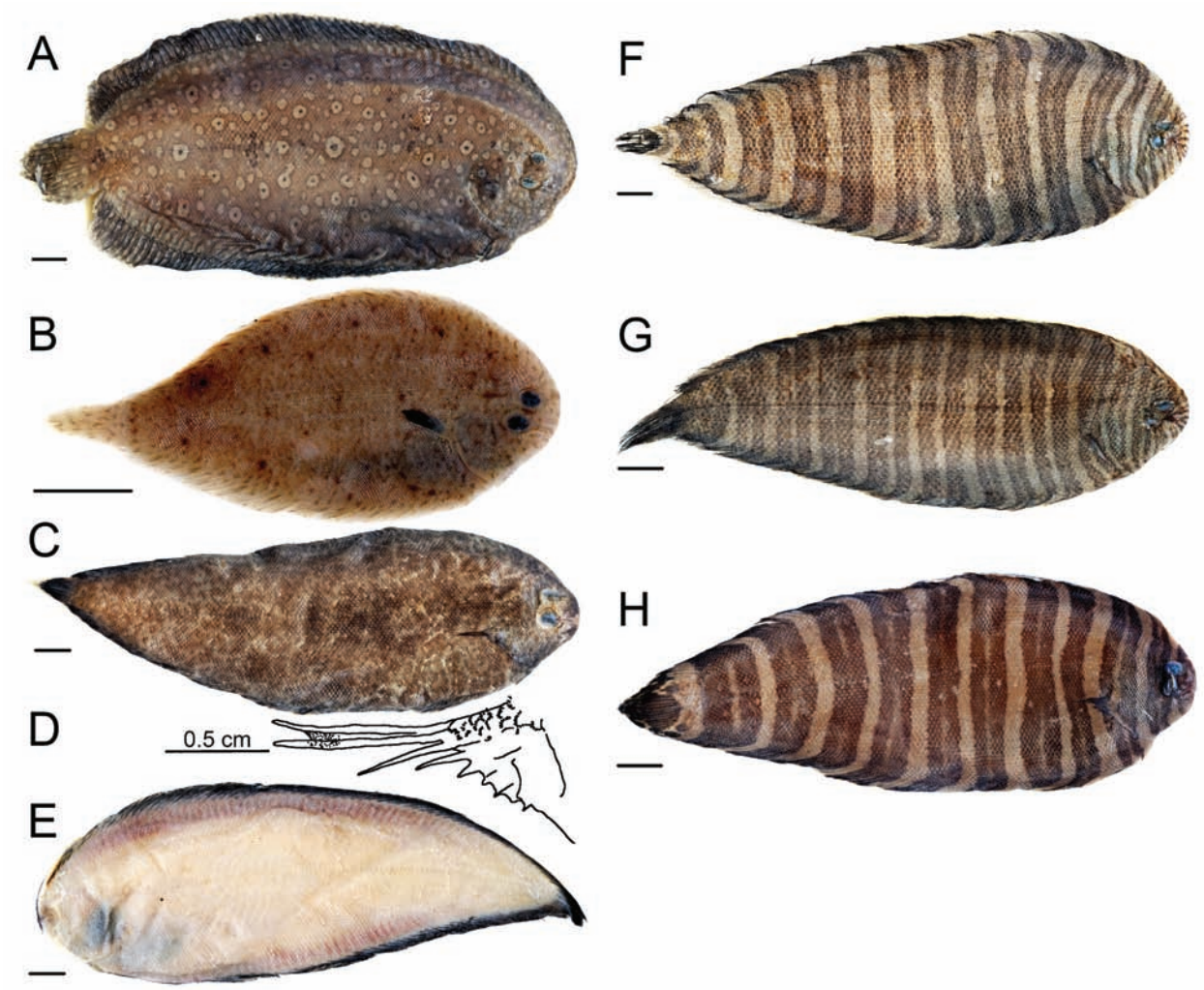

Fig. 5. A – *Pardachirus pavoninus* (Lacepède, 1802) 247.8 mm *SL*, ZIN 55784; B – *Solea ovata* Richardson, 1846 46.1 mm *SL*, ZIN 55910; C, D, E – *Soleichthys tubiferus* (Peters, 1876) 139.3 mm *SL*, ZIN 55773; F – *Zebrias crossolepis* Zheng et Chang, 1965 142.4 mm *SL*, ZIN 55639; G – *Zebrias lucapensis* Seigel et Adamson, 1985 115.1 mm *SL*, ZIN 55774; H – *Zebrias quagga* (Kaup, 1858) 117.5 mm *SL*, unregistered. A–C, F–H – ocular side; D – diagram of the ocular side pectoral fin; E – blind side.

with caudal fin. Nine paired dark brown cross bands continued onto fins, where they bend posteriorly. Posterior half of caudal fin dark with few bright whitish spots.

Distribution. Known from Guangdong, China.

Material. 17 sp., 34.5–142.4 mm *SL*; Nha Trang Bay, Phan Thiết; ZIN 55639 (sn 121), ZIN 55777 (sn 67), ZIN 55778 (sn 76). *D* 67–74, *A* 56–62, *ll* 77–85, *vert*. 9+34–35 (ten radiographs).

Zebrias lucapensis Seigel et Adamson, 1985
(Fig. 5G; Table 12)

Zebrias lucapensis Seigel et Adamson 1985:13 (type locality: Philippines).

Diagnostic characters. Eyes contiguous, no tentacles. Dorsal and anal fins only partially joined with caudal fin. Eyed side with 16–18 narrow mostly unpaired dark brown cross bands. Proximal and distal part of caudal fin dark brown, no whitish spots.

Distribution. Known only from the Lingayen Gulf, Philippines.

Material. 5 sp., 94.7–115.5 mm *SL*; Nha Trang Bay, Phan Thiết; ZIN 55774 (sn 121). *D* 67–75, *A* 52–65, *ll* 74–79, *vert*. 9+34–35 (five radiographs).

Zebrias quagga (Kaup, 1858)
(Fig. 5H; Table 12)

Aesopia quagga Kaup 1858:98 (type locality: Mumbai, India).

Zebrias quagga: Wu 1932:129–130 (one specimen, Hainan, description, counts and measurements). – Zheng and Chang 1965:271 (counts). – Chen and Weng 1965:42–44 (two specimens, Taiwan, description, counts, illustration). – Pertseva-Ostroumova 1965:204–205 (two larva 4.2 and 4.4 мм, Gulf of Tonkin, description, counts and measurements, illustration). – Shen 1993:809 (photograph). – Li and Wang 1995:312–313 (ten specimens, synonymy, counts and measurements, illustration). – Matsunuma et al. 2011:234 (photograph).

Diagnostic characters. Eyes contiguous, each eye with a short tentacle. Dorsal and anal fins completely joined with caudal fin. Eyed side with 11–12 brown single or double crossbands, slightly wider than interspaces, body pattern continued onto dorsal and anal fins, caudal fin cream with elongate black blotches.

Distribution. Indo-West Pacific, including Red Sea, Persian Gulf, Malaysia, Thailand, China and Australia.

Material. 5 sp., 52.5–125.8 mm *SL*; Gulf of Tonkin, Nha Trang Bay; unregistered (sn 30, 46), ZIN 37045 (sn 17), ZIN 40931 (sn 4), ZIN 56097 (sn 116). *D* 66 and 70, *A* 55 and 57, *ll* 92 and 95, *vert*. 9+33 (one radiograph).

Remarks. There is no any mention of eye tentacles, presently accepted as main diagnostic character, in the original description of holotype of *Zebrias quagga* from India (Kaup 1858). Tentacles on eyes have been described for the first time in non-type specimens of *Zebrias quagga* from China (Günther 1862). Tentacles are described in some specimens of *Zebrias zebra* (Bloch 1787) from India (Day 1878). Diagnoses of species *Zebrias quagga* and *Zebrias zebra* are thus uncertain and re-study of holotypes and re-description of species are required.

Family Cynoglossidae Jordan, 1888
(Map 6)

No fin spines. Eyes on left side of body. Pectoral fins absent. Usually only right pelvic fin present. Posterior margin of preopercle strongly attached to opercle, without free margin and covered with skin and scales.

Subfamily Symphurinae Ochiai, 1963

Monotypic subfamily. No lateral line on eyed side of body; mouth terminal, snout not hooked over mouth.

Genus *Symphurus* Rafinesque, 1810

Symphurus microrhynchus (Weber, 1913)
(Fig. 6A; Table 13)

Aphoristia microrhynchus Weber 1913:444 (type locality: Java Sea).

Symphurus microrhynchus: Weber and de Beaufort 1929:209, 211 (new combination, redescription of holotype, counts, figure, in key). – Munroe 1992:361 (epicranial complex, counts, comparison with congeners). – Munroe and Marsh 1997:191–197 (extensive material including two specimens from Nha Trang Bay, re-description, synonymy, diagnosis, counts and measurements, distribution).

Diagnostic characters. Epicranial complex 1–2–2–2–2, caudal-fin rays 12, 16–18 scales on head posterior to lower orbit, darkly-pigmented melanophores in dermis at bases of anteriormost dorsal-fin

Fig. 6. A – *Symphurus microrhynchus* (Weber, 1913) 54.0 mm *SL*, ZIN 55730; B – *Cynoglossus arel* (Bloch et Schneider, 1801) 177.0 mm *SL*, ZIN 55602; C – *Cynoglossus itinus* (Snyder, 1909) 117.0 mm *SL*, ZIN 55821; D – *Cynoglossus kopsi* (Bleeker, 1851) 119.0 mm *SL*, ZIN 55827; E – *Cynoglossus nanhaiensis* Wang, Munroe et Kong, 2016 125.0 mm *SL*, ZIN 55853; F – *Cynoglossus puncticeps* (Richardson, 1846) 115.0 mm *SL*, ZIN 55854; G – *Cynoglossus quadrilineatus* (Bleeker, 1851) 14.8 mm *SL*, ZIN 55041; H – *Paraplagusia bilineata* (Bloch, 1787) 198.5 mm *SL*, ZIN 55851; I – *Paraplagusia bilineata* (Bloch, 1787) 115.5 mm *SL*, ZIN 55850; J – *Paraplagusia japonica* (Temminck et Schlegel, 1842) 216.0 mm *SL*, ZIN 55601.

rays, and with only dorsalmost aspect of peritoneum darkly pigmented.

Distribution. Tropical Indo-Pacific including coastal waters off Tumbatu Island, Zanzibar, Tanzania, Vietnam, Indonesia, northern Australia, Papua New Guinea, and eastward to Tuomotu Island and Moorea, French Polynesia.

Material. 21 sp., 47.0–60.0 mm *SL*; Nha Trang Bay, Vân Phong Bay; ZIN 55723 (sn 48), ZIN 55724 (sn 49), ZIN 55725 (sn 50), ZIN 55726 (sn 53), ZIN 55727 (sn 52), ZIN 55728 (sn 62), ZIN 55729 (sn 78), ZIN 55730 (sn 100), ZIN 56095 (sn 78). *D* 81–95, *A* 67–79, *C* 12, *vert.* 9–10+36–38 (15 radiographs).

Remarks. *Symphurus microrhynchus* is considered widespread in the Indo-West Pacific (Munroe and Marsh 1997). However, molecular data for different 'populations' previously identified as this species indicate that as many as five different species, each with a restricted distribution, are possibly present (Lee et al. unpublished data, cited in Munroe 2015 p. 36).

Subfamily Cynoglossinae Jordan, 1888

Two or 3 lateral lines on eyed side of body, mouth inferior, front part of snout produced into rostral hook covering mouth.

Genus *Cynoglossus* Hamilton, 1822

Lips on eyed side of head not fringed with labial papillae.

Cynoglossus arel (Bloch et Schneider, 1801)
(Fig. 6B; Table 14)

Pleuronectes arel Bloch et Schneider 1801:159 (type locality: Tranquebar, east coast of Madras).

Cynoglossus arel: Menon 1977:60–64 (26 specimens, China, Indonesia, Thailand, Burma, India, Pakistan, Persian Gulf, revision of the genus, synonymy, diagnosis, counts and measurements, illustration, photograph). – Masuda et al. 1984:356 (Japanese Archipelago, brief description, counts, colour photograph).

Cynoglossus (Cynoglossoides) arel: Li and Wang 1995: 341–342 (synonymy, summary).

Diagnostic characters. Two lateral lines (dorsal and medial) on eyed side, no lateral line on blind side. Usually two nostrils on eyed side. Eyes not contiguous, not pedunculate. Dorsal-fin rays 116–130, anal rays 85–98, caudal-fin rays usually 10, vertebrae 54–55. Scales ctenoid on eyed side, cycloid on blind side, midlateral-line scales 56–70.

Distribution. Indo-West Pacific from Red Sea and western coast of India to Indonesia, China (including Taiwan Province), southern Japan, and the Philippines.

Material. 27 sp., 115.0–265.0 mm *SL*; Gulf of Tonkin, Nha Trang Bay, Vân Phong Bay; ZIN 55100 (sn 20), ZIN 55602 (sn 40), ZIN 55603 (sn 48), ZIN 55604 (sn 49), ZIN 55605 (sn 50), ZIN 55606 (sn 78), ZIN 55607 (sn 100), ZIN 55608 (sn 77), ZIN 55609 (sn 114), ZIN 55610 (sn 122), ZIN 55889 (sn 23), ZIN 55890 (sn 21), ZIN 55891 (sn 3), ZIN 56020 (sn 44), ZIN 56021 (sn 50). *D* 111–131, *A* 85–106, *ll* 60–80, *C* 9–10, *vert.* 9–10+45–50.

Cynoglossus itinus (Snyder, 1909)
(Fig. 6C; Table 14)

Trulla itina Snyder 1909:609 (type locality: Naha market, Okinawa Island, Japan).

Cynoglossus itinus: Ochiai 1963:79–82 (58 specimens, Japan, synonymy, key, diagnosis, counts and measurements, illustration). – Menon 1977:48–49 (seven specimens, Japan, revision of the genus, synonymy, diagnosis, counts and measurements, illustration, photograph). – Masuda et al. 1984:356 (Japanese Archipelago, brief description, counts, colour photograph). – Uyeda and Sasaki 2000:401 (40 specimens, Japan, description of early ontogeny, measurements). – Ohashi and Motomura 2011:112 (one specimen, Japan, counts, colour photograph).

Cynoglossus (Trulla) itinus: Li and Wang 1995:378–379 (11 specimens, Hainan, synonymy, counts and measurements, illustration).

Diagnostic characters. Three lateral lines on eyed side, no lateral line on blind side. One nostril on eyed side. Dorsal-fin rays 102–103, anal-fin rays 83–86, caudal-fin rays usually 8, vertebrae 9+41–43. Scales ctenoid on both sides, midlateral-line scales 76–80.

Distribution. Japan and Hong Kong. Indo-West Pacific: eastern India to China and Japan.

Material. 11 sp., 70.0–128.0 mm *SL*; Gulf of Tonkin, Nha Trang Bay, Phan Thiết; ZIN 55821 (sn 29), ZIN 55822 (sn 63), ZIN 55823 (sn 81), ZIN 55824 (sn 121), ZIN 55888 (sn 17). *D* 106–111, *A* 85–87, *ll* 73–81, *C* 8–9, *vert.* 9+43–44.

Cynoglossus kopsii (Bleeker, 1851)
(Fig. 6D; Table 14)

Plagusia kopsii Bleeker 1851b:494 (type locality: Rio in Bintang Island, southeast of Singapore).

Cynoglossus kopsii: Menon 1977:42–45 (43 specimens, China, Philippine, Indonesia, Thailand, Persian Gulf, Madagascar, Maldives, revision of the genus, synonymy, diagnosis, counts and measurements, illustration, photograph). – Yokogawa et al. 2008:122, 124–125 (in comparison, one specimen from Vietnam).

Cynoglossus (Cynoglossoides) kopsii: Li and Wang 1995:348–349 (synonymy).

Diagnostic characters. Usually two lateral lines (dorsal and medial) on eyed side of body, no lateral line on blind side. Two nostrils on ocular side. Eyes contiguous, not pedunculate. Dorsal-fin rays 103–115, anal-fin rays 80–91, caudal fin-rays usually 10, vertebrae 9+41–46. Scales ctenoid on both sides, midlateral-line scales 57–72.

Distribution. From Indo-Australian Archipelago to Philippines and Taiwan and westward to seas of India and Persian Gulf.

Material. 27 sp., 58.0–135.0 mm *SL*; Nha Trang Bay, Phú Quốc Island, Vân Phong Bay; ZIN 55825 (sn 32), ZIN 55826 (sn 43), ZIN 55827 (sn 45), ZIN 55828 (sn 48), ZIN 55829 (sn 49), ZIN 55830 (sn 55), ZIN 55831 (sn 63), ZIN 55832 (sn 66), ZIN 55833 (sn 73), ZIN 55834 (sn 87), ZIN 55835 (sn 93), ZIN 55836 (sn 101), ZIN 55837 (sn 104), ZIN 55838 (sn 127). *D* 103–115, *A* 82–90, *ll* 65–77, *C* 9–10, *vert.* 9–10+43–47.

Cynoglossus nanhaiensis
Wang, Munroe et Kong, 2016
(Fig. 6E; Table 14)

Cynoglossus nanhaiensis Wang, Munroe et Kong 2016: 132 (type locality: Sanya, Hainan).

Diagnostic characters. Three lateral lines on eyed side of body, no lateral line on blind side. Two nostrils on eyed side. Eyes not contiguous. Dorsal-fin rays 99–108, anal-fin rays 77–82, caudal-fin rays 8, vertebrae 49–51. Scales ctenoid on both sides of body, midlateral-line scales 64–73, 11–12 scales between lateral lines, lateral-line scales with conspicuously black tips posteriorly. Small, irregular, dark blotches forming a series of narrow, interrupted, longitudinal stripes, two rounded, conspicuously pigmented spots on posterior one-third of eyed side of body.

Distribution. China (Sanya and Lingshui, Hainan Province; Zhanjiang, Guangdong Province), Vietnam (Gulf of Tonkin, Phan Thiet)

Material. 20 sp., 97.5–155.2 mm *SL*; Nha Trang Bay, Phan Thiết, Phú Quốc Island; ZIN 55839 (sn 34), ZIN 55840 (sn 54), ZIN 55841 (sn 70), ZIN 55842 (sn 81), ZIN 55843 (sn 83), ZIN 55844 (sn 106), ZIN 55845 (sn 121), ZIN 55846 (sn 125), ZIN 55852 (sn 114), ZIN 55853 (sn 126). *D* 101–107, *A* 79–83, *C* 8, *ll* 75–81, *vert.* 9–10+41–42.

***Cynoglossus puncticeps* (Richardson, 1846)**
(Fig. 6F; Table 14)

Plagusia puncticeps Richardson 1846:280 (type locality: China).

Cynoglossus puncticeps: Wu and Tang 1935:397 (13 specimens, Hainan). – Chen and Weng 1965:54(91) (two specimens, Taiwan). – Menon 1977:75–79 (87 specimens, China, Philippine, Singapore, Thailand, Indonesia, India, Pakistan, revision of the genus, synonymy, diagnosis, counts and measurements, illustration, photograph).

Cynoglossus (Cynoglossoides) puncticeps: Li and Wang 1995:351–353 (20 specimens, Hainan, synonymy, counts and measurements, illustration).

Cynoglossus puncticeps immaculata Pellegrin and Chevey 1940:154 (one specimen, Vietnam, counts, brief description).

Diagnostic characters. Two lateral lines (dorsal and medial) on eyed side of body, no lateral line on blind side. Two nostrils on ocular side. Eyes not contiguous. Rostral hook comparatively short, extending only to point between verticals through anterior nostril and just anterior to anterior margin of fixed eye. Eyed side with dark blotches forming irregular cross bands, eyed-side lower jaw with low, broadly rounded fleshy ridge. Dorsal-fin rays 90–100, anal-fin rays 72–78, caudal-fin rays usually 10, vertebrae 9+35–40. Scales ctenoid on both sides of body, midlateral-line scales 78–99, more than 14 (16–19) scales between lateral lines.

Distribution. Widespread in Indo-West Pacific throughout most of northern part of area from Gulf of Thailand to Taiwan Province of China and southern China, southwards to northwestern and central coasts of northern Australia and New Guinea, and eastward to the Philippines.

Material. 13 sp., 71.3–116.5 mm *SL*: Gulf of Tonkin, Hồ Cốc, Phan Thiết, Phú Quốc; ZIN 55042 (sn 123), ZIN 55096 (sn 25), ZIN 55847 (sn 121), ZIN 55848 (sn 125), ZIN 55854 (sn 126), ZIN 55886 (sn 26), ZIN 55887 (sn 9). *D* 100–104, *A* 79–82, *ll* 87–103, *vert.* 10+38–41.

***Cynoglossus quadrilineatus* (Bleeker, 1851)**
(Fig. 6G; Table 14)

Plagusia quadrilineata Bleeker 1851a:412 (type locality: Batavia, Sumatra, Mentok, Bangka Island)

Cynoglossus quadrilineatus: Kottelat 2013b:764 (new combination, nomenclatural notes)

Arelia bilineata (Lacepède 1802): Ochiai 1963:76–79 (89 specimens, Japan, synonymy, description, counts and measurements, illustrations). – Masuda et al. 1984: pl. 320 (Japanese Archipelago, brief description, counts, colour photograph). – Ohashi and Motomura 2011:109, 111 (one specimen, Japan, counts and measurement, colour photograph).

Arelia bilineata?: Pertseva-Ostroumova 1965: (10 larva 3.7–7.9 mm, Gulf of Tonkin, measurements, description, illustrations).

Cynoglossus bilineatus (Lacepède 1802): Menon 1977:36 (24 specimens, Japan, Philippines, Indonesia, Thailand, India, Pakistan, Australia, Burma, Singapore, revision of the genus, synonymy, diagnosis, counts and measurements, illustration, photograph). – Kyushin et al. 1982:268 (one specimen, South China Sea, photograph). – Matsunuma et al. 2011:235 (photograph).

Cynoglossus (*Arelia*) *bilineatus* (Lacepède 1802): Li and Wang 1995:355–357 (14 specimens, Hainan, synonymy, counts and measurements, illustration).

Diagnostic characters. Two lateral lines (dorsal and medial) on eyed and blind sides of body. Two nostrils on ocular side. Eyes distinctly separate. Dorsal-fin rays 107–113, anal-fin rays 80–88, caudal-fin rays 12, vertebrae 9+42–44. Scales ctenoid

on ocular side, cycloid on blind side, midlateral-line scales 88–96.

Distribution. Southern Japan, Western Pacific, South China Sea, Indian Ocean.

Material. 2 sp., 13.4 and 14.8 mm *SL*; Hồ Cốc; ZIN 55041 (sn 123). *D* 106 and 108, *A* 85 and 88, *ll* 89 and 95, *vert.* 9+43–44.

Genus *Paraplagusia* Bleeker, 1865

Lips on eyed side distinctly fringed with labial papillae.

Paraplagusia bilineata (Bloch, 1787)

(Figs 6H, I; Table 15)

Pleuronectes bilineatus Bloch 1787:121 (type locality: Chinese waters, Tranquebar).

Paraplagusia bilineata: Wu and Tang 1935:397 (seven specimens, Hainan, Samah, notes). – Chen and Weng 1965:46–47 (three specimens, Taiwan, counts, illustration). – Masuda et al. 1984:355 (Japanese Archipelago, brief description, counts, colour photograph). – Chapleau and Renaud 1993:801–802 (151 specimens, Chinese waters, Australia, Borneo, Indonesia, Indian Ocean, in key, comparison, diagnosis, counts and measurements, photograph, illustration). – Li and Wang 1995:326–328 (ten specimens, Hainan, synonymy, counts and measurements, illustration). – Kottelat 2013b:763–764 (nomenclatural notes).

Diagnostic characters. Usually two lateral lines on ocular side. Labial papillae branched. Eyed side of body pale uniformly brown with ocelli. Dorsal-fin rays 105–115, anal-fin rays 81–88, caudal vertebrae 40–44. Scale ctenoid on both sides.

Distribution. Indo-West Pacific: from Red Sea, East Africa, South Africa east to Philippines and New Guinea, north to southern Japan, south to Queensland (Australia).

Material. 4 sp., 115.0–198.5 mm *SL*; Nha Trang Bay, Phan Thiết; ZIN 55849 (sn 48), ZIN 55850 (sn 49), ZIN 55851 (sn 121), ZIN 56019 (sn 48). *D* 100–103, *A* 80–83, *ll* 90–119, *vert.* 10+40–41.

Remarks. Number of dorsal-fin rays (100–103) and colour of specimens (dark or light but without distinct ocelli, Fig. 6 H, I) differ from characters states (105–115 and with ocelli) pointed out for *Paraplagusia bilineata* (Chapleau, Renaud 1993). Our specimens were tentatively identified on the basis of two lateral lines on ocular side, branched labial papillae, ctenoid scale on both sides, 40–41 caudal vertebrae.

Paraplagusia japonica (Temminck et Schlegel, 1846)

(Fig. 6J; Table 15)

Plagusia japonica Temminck et Schlegel 1846:187 (type locality: Nagasaki Bay, Japan).

Paraplagusia japonica: Wu and Tang 1935:397 (one specimen, Hainan, Hoihow). – Ochiai 1963:72–75 (50 specimens, Japanese waters, synonymy, diagnosis, count and measurements, illustrations). – Chen and Weng 1965:49 (one specimen, illustration). – Masuda et al. 1984:355 (Japanese Archipelago, brief description, counts, colour photograph). – Chapleau and Renaud 1993:801 (10 specimens, Japan, in key, comparison, diagnosis, counts and measurements, photograph, illustration). – Ohashi and Motomura 2011:114 (two specimens, Japan, counts, photographs).

Paraplagusia (Rhinoplagusia) japonica: Li and Wang 1995:330 (11 specimens, China, counts and measurements, illustration).

Diagnostic characters. Three lateral lines on ocular side. Labial papillae numerous, branched. Dorsal-fin rays 109–113, anal-fin rays 85–89, caudal vertebrae 41–44. Scale ctenoid on ocular side, cycloid on blind side. Eyed side of body dark brown with black speckles of various sizes, unpaired fins uniformly black with paler edges.

Distribution. Western Pacific, from Japan to Papua New Guinea.

Material. 2 sp., 197.0 and 216.0 mm *SL*; Nha Trang Bay; ZIN 55601 (sn 42). *D* 108 and 109, *A* 84 and 86, *ll* 111 and 119, *vert.* 9+42.

DISCUSSION

Description of 646 specimens of 47 species in 28 genera from six families extends our knowledge about Indo-Pacific flatfishes. Most of the material (562 specimens of 46 species in 27 genera) was collected off Southern Vietnam during 2005–2010, smaller part (84 specimens 16 species in 13 genera) – in the Gulf of Tonkin during July-September 1961. Bothids, soleids and cynoglossids are the main representatives of collection (Fig. 7) that is typical for Indo-Pacific flatfish fauna. Common inhabitants of South China Sea, *Brachypleura novaezeelandiae* (Citharidae), *Arnoglossus polyspilus, Engyprosopon grandisquama* and *E. latifrons* (Bothidae), *Liachirus melanospilos* (Soleidae), *Samaris cristatus* (Samaridae) and *Cynoglossus* (Cynoglossidae) are most numerous species in our material.

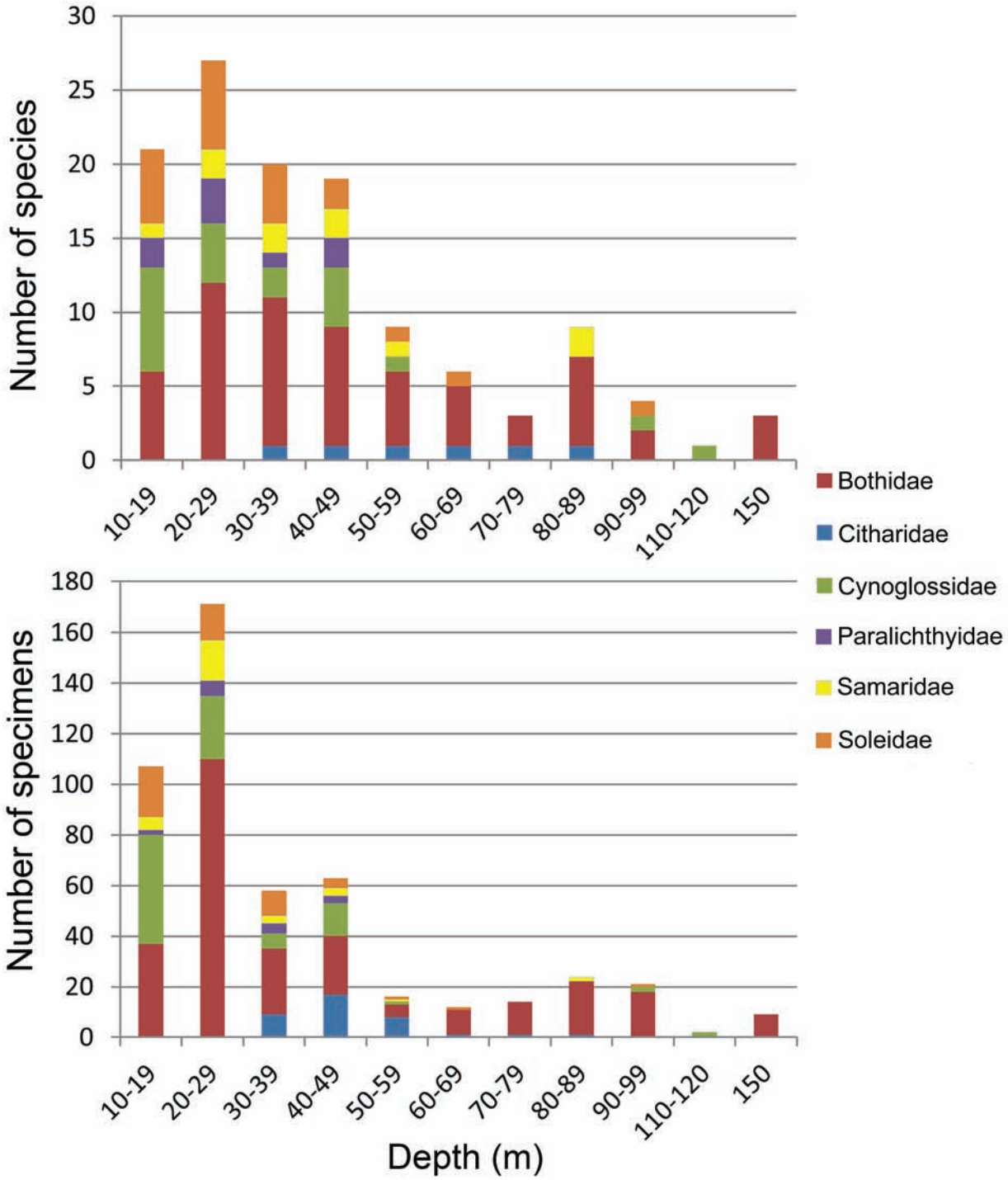

Fig. 7. Frequency distribution of 47 species of flatfishes caught off Vietnam.

Our material adds 15 species to the list of 82 ones previously reported from Vietnam. Two of these species are new for South China Sea and records of their presence in Nha Trang Bay considerably expand previously known ranges. In particular, our specimen of *Soleichthys tubiferus* (Soleidae) is the third documented record of this species, two specimens have been previously recorded from Madagascar. *Pseudorhombus oculocirris* (Paralichthyidae) was earlier known only from Japan. Findings of this species off Vietnam are not occasional, specimens have been caught on March 2005 and June 2009. Seven species (*Chascanopsetta lugubris*, *Engyprosopon maldivensis*, *Kamoharaia megastoma*, *Zebrias lucapensis*, *Symphurus microrhynchus*, *Cynoglossus kopsi*, *Paraplagusia japonica*) are found off Vietnam for the first time. Four species (*Samariscus filipectoralis*, *Samariscus luzonensis*, *Aseraggodes dubius*, *Zebrias crossolepis*) are absent in the previous regional checklists due to difficulty of their identification, uncertain diagnoses with closely related species, incompleteness of descriptions, essential need of genus revision and lack of photographs. Two species (*Arnoglossus macrolophus* and *Cynoglossus quadrilineatus*) are formally new for South China Sea and Vietnam due to nomenclatural changes of *Arnoglossus tapeinosoma* and *Cynoglossus bilineatus* accordingly.

Climatic and hydrological conditions in the northern and southern parts of Vietnam are considerably different. There is monsoon climate with extremely uneven rainfall and variable temperature, unsteady water flow and tidal patterns in Gulf of Tonkin. These differences determine heterogeneity of the marine biota of Vietnam with the small number of stenohaline and stenotherm species in Gulf of Tonkin (Besednov 1968; Gur'yanova 1972). Such effects are known for some groups of animals including fish. There are 46 species from Nha Trang Bay and only 16 species from Gulf of Tonkin in our material (Table 16). However, 30 species not found in Gulf of Tonkin are earlier recorded in northern Vietnam and to north to Taiwan and Japan (Besednov 1968; Nguyen 1999; Chen and Weng 1965; Li and Wang 1995; Ohashi and Motomura 2011). Thus flatfish fauna of Northern and Southern Vietnam is similar. Our findings confirm known widespread distribution of the Indo-Pacific flatfishes and characterize species as eurythermal and euryhaline.

All specimens, including those obtained from local fishermen, have been collected from depths ranging from about seven to 150 m, with maximal number of species and specimens caught to a depth of 50 m. Soleids and cynoglossids occur to this depth, whereas bothids occur to a 150 m depth (Fig. 7). However this difference of their distribution can be related to salinity gradient as well as to depth. Besides, our findings of *Chascanopsetta* and *Kamoharaia megastoma* (Bothidae), previously known only from 400 m, show the rather wide range of flatfish habitation depth.

Psettodids, poecilopsettids and pleuronectids are not found in our material. Poecilopsettids are rather rare and pleuronectids are not typical for this region although they are reported for Vietnam (Nguyen 1999). The remarkable absence of *Psettodes erumei*, a common species with widespread Indo-Pacific distribution, is difficult to explain.

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Table 1. List of the flatfish sampling stations. Coordinates and trawl numbers are given accordingly to the originals of the expedition routes.

Sampling number (sn)	Latitude (N)	Longitude (E)	Depth (m)	Date	Trawl	Locality
1	17°40.09	106°45.05	36.0–39.0	15.07.1961	16	Gulf of Tonkin
2	17°48.05	109°06.09	88.0	26.07.1961	23	-"-
3	17°59.09	106°53	55.0	15.07.1961	34	-"-
4	18°20	106°20	31.0	14.07.1961	35	-"-
5	18°20	106°42.03	51.0	15.07.1961	36	-"-
6	18°26	107°47	77.0	29.07.1961	39	-"-
7	18°40	107°30	66.0	01.09.1961	44	-"-
8	18°40	106°04	32.0	14.07.1961	48	-"-
9	19°21.08	106°02.09	26.0	27.08.1961	64	-"-
10	20°01	108°50	50.0	07.07.1961	75	-"-
11	20°00	108°31	61.0	07.07.1961	76	-"-
12	20°00	107°49.05	50.0	08.07.1961	78	-"-
13	20°03	107°39.08	27.0	08.07.1961	79	-"-
14	20°00	107°07	29.0	08.07.1961	80	-"-
15	19°50	106°17	27.0	09.07.1961	82	-"-
16	20°00	106°30	25.0	09.07.1961	83	-"-
17	20°20	107°18	26.0–28.0	06.07.1961	86	-"-
18	20°19	108°05	49.0	06.07.1961	88	-"-
19	20°20	108°46	45.0	07.07.1961	90	-"-
20	20°20	109°07	20.0	07.07.1961	91	-"-
21	20°40	108°45	37.0	04.07.1961	95	-"-
22	20°41	108°03	42.0–43.0	05.07.1961	97	-"-
23	20°35.08	107°25.08	33.0	05.07.1961	100	-"-
24	21°00	107°57.08	30.0	03.07.1961	101	-"-
25	20°41	106°43		25.06.1961		Đại Hợp (near Hải Phòng)
26	20°42	106°45		26.06.1961		Bàng La (near Hải Phòng)
27				July–September 1961		
28	12°11.329	109°23.944	*ca*.70.0	20.06.2005	1	Hon Dun Island
29	12°15.274	109°18.908	22.0–24.0	21.06.2005		Nha Trang Bay
30	12°15.261	109°13.788	15.0–19.0	23.06.2005		-"-
31	12°10.764	109°13.698	8.0–11.0	23.06.2005		-"-
32	12°15.076	109°19.222	22.0–24.0	24.11.2005	1	-"-
33	12°14.515	109°13.500	15.0–20.0	24.11.2005	2	-"-
34	12°09.956	109°14.325	8.0–11.0	24.11.2005	3	-"-
35	12°11.255	109°23.193	59.0–80.0	26.11.2005	1	-"-
36	12°09.000	109°22.888	68.0–80.0	26.11.2005	2	-"-
37	12°06.321	109°23.411	77.0–80.0	26.11.2005	3	-"-
38	12°14.333	109°20.826	22.0–34.5	29.11.2005	1	-"-
39	12°06.807	109°19.788	42.0–47.5	29.11.2005	3	-"-
40	12°08.290	109°16.654	30.0–45.0	29.11.2005	4	-"-
41	12°08.820	109°24.501	90.0–95.0	04.12.2005	1	-"-
42	12°05.988	109°12.839	8.0–19.0	10.12.2005	1	-"-
43	12°07.068	109°16.068	12.8–18.8	10.12.2005	3	-"-

Table 1. *Continued.*

Sampling number (sn)	Latitude (N)	Longitude (E)	Depth (m)	Date	Trawl	Locality
44	12°10.082	109°14.424	18.0–20.0	10.12.2005	4	-“-
45	12°10.127	109°16.667	19.0–22.0	13.12.2005	1	-“-
46	12°07.824	109°13.804	11.0–22.0	13.12.2005	2	-“-
47	12°05.585	109°12.735	7.0–15.0	13.12.2005	3	-“-
48	12°20.255	109°18.302	15.8–19.8	17.12.2005	1	-“-
49	12°18.046	109°15.727	10.0–14.0	17.12.2005	2	-“-
50	12°15.538	109°14.515	10.0–15.0	17.12.2005	3	-“-
51	12°10.210	109°21.000	45.0–60.0	26.05.2006	1	-“-
52	12°08.480	109°17.080	25.5–36.5	26.05.2006	2	-“-
53	12°09.310	109°15.560	14.6–23.5	26.05.2006	3	-“-
54	12°20.917	109°20.917	30.0–40.0	29.05.2006	1	-“-
55	12°06.985	109°25.992	91.0–95.0	31.05.2006	1	-“-
56	12°10.025	109°23.940	55.0–79.0	31.05.2006	2	-“-
57	12°06.420	109°13.943	11.0–18.0	02.06.2006	2	-“-
58	12°16.376	109°17.574	20.0–33.0	06.06.2006	2	-“-
59	12°06.067	109°12.708	11.0–18.0	10.06.2006	1	-“-
60	12°08.069	109°14.988	11.8–19.8	10.06.2006	2	-“-
61	12°10.004	109°14.162	12.8–22.0	10.06.2006	3	-“-
62	12°19.980	109°19.987	27.5–33.0	12.06.2006	1	-“-
63	12°18.922	109°16.598	11.0–27.5	12.06.2006	2	-“-
64	12°14.656	109°17.818	20.0–36.5	12.06.2006	4	-“-
65	12°19.112	109°21.162	31.0–45.5	14.06.2006	1	-“-
66	12°14.440	109°17.371	20.0–23.5	14.06.2006	2	-“-
67	12°14.962	109°16.939	7.0–10.0	17.06.2006	2	-“-
68	12°05.056	109°13.095	10.0–18.0	19.06.2006	1	-“-
69	12°08.014	109°15.017	11.0–18.0	19.06.2006	2	-“-
70	12°14.502	109°17.016	14.0–20.0	19.06.2006	3	-“-
71	12°08.816	109°15.582	10.0–20.0	21.06.2006	3	-“-
72	12°19.007	109°16.986	18.8–23.5	23.06.2006	1-2	-“-
73	12°07.794	109°23.916	11.0–19.0	26.06.2006	1	-“-
74	12°14.709	109°18.471	23.0–33.0	26.06.2006	2	-“-
75	12°15.002	109°16.415	18.0–29.0	26.06.2006	3	-“-
76	12°34.780	109°27.283	29.0–44.0	30.06.2006	1	-“-
77	12°32.002	109°23.456	31.0–42.0	30.06.2006	2	Vân Phong Bay
78	12°34.118	109°24.971	20.0–29.0	30.06–01.07.2006	3	Vân Phong Bay
79	12°12.235	109°14.514	13.4–23.5	05.01.2007	3	Nha Trang Bay
80	12°14.714	109°19.015	16.2–29.0	09.01.2007	1	-“-
81	12°15.496	109°16.507	15.8–18.8	09.01.2007	2	-“-
82	12°19.012	109°18.525	22.0–29.0	11.01.2007	1	-“-
83	12°14.957	109°16.503	15.0–19.0	11.01.2007	2	-“-

Table 1. *Continued.*

Sampling number (sn)	Latitude (N)	Longitude (E)	Depth (m)	Date	Trawl	Locality
84	12°14.691	109°18.459	23.5–45.5	21.04.2007	1	-“-
85	12°18.045	109°16.502	16.2–18.8	21.04.2007	2	-“-
86	12°14.977	109°15.805	14.0–15.2	23.04.2007	4	-“-
87	12°04.840	109°24.036	88.0–95.0	25.04.2007	1	-“-
88	12°04.980	109°13.108	15.0–18.0	25.04.2007	3	-“-
89	12°15.485	109°16.884	17.0–27.5	02.05.2007	2	-“-
90	12°15.196	109°16.487	15.0–18.8	02.05.2007	3	-“-
91	12°12.690	109°20.166	23.5–45.5	08.05.2007	1	-“-
92	12°15.483	109°16.160	16.8–27.5	08.05.2007	3	-“-
93	12°35.934	109°27.798	29.0–44.0	12.05.2007	2	-“-
94	12°37.466	109°30.307	128.0–150.0	17.05.2007	1	Vân Phong Bay
95	12°33.677	109°25.058	20.0–38.0	17.05.2007	2	Vân Phong Bay
96	12°24.737	109°22.525	38.0–45.0	17.05.2007	3	Vân Phong Bay
97	12°15.423	109°14.960	15.0–23.5	21.05.2007	2	Nha Trang Bay
98	12°18.125	109°16.500	17.0–19.6	21.05.2007	3	-“-
99	12°15.117	109°13.126	11.0–18.0	21.05.2007	4	-“-
100	12°37.763	109°27.009	29.0–44.0	30.05–01.06.2007	2	-“-
101	12°29.972	109°30.018	97.0–119.0	30.05–01.06.2007	6	-“-
102	12°28.000	109°26.283	38.0–51.0	30.05–01.06.2007	8	-“-
103	12°07.000	109°14.000	11.0–19.8	08.06.2006	1	-“-
104	12°16.717	109°21.107	27.5–44.0	24.06.2007	2	-“-
105	12°15.687	109°16.975	19.6–36.5	24.06.2007	3	-“-
106	12°18.086	109°16.503	16.0–19.6	24.06.2007	4	-“-
107	12°19.424	109°25.998	62.0–91.0	23.03.2009	1	-“-
108	12°15.955	109°16.505	16.8–19.0	23.03.2009	3	-“-
109	12°13.544	109°21.497	40.0–60.0	26.03.2009	1	-“-
110	12°18.482	109°16.490	10.0–20.0	26.03.2009	3	-“-
111	12°15.314	109°16.705	10.0–20.0	27.03.2009	2	-“-
112	12°14.042	109°16.962	18.0–20.0	27.03.2009	3	-“-
113	12°15.111	109°16.036	16.0–22.0	27.03.2009	4	-“-
114	12°18.507	109°16.494	11.8–18.8	30.03.2009	1	-“-
115				2005		Nha Trang
116			<100	spring-summer 2005		Nha Trang, market
117				summer 2006		Nha Trang, market
118				winter 2006-2007		Nha Trang, market
119				spring-summer 2007		Nha Trang, market
120				spring 2009		Nha Trang, market
121				spring 2009		Phan Thiết, Mũi Né, market
122				spring 2011		Nha Trang, market
123	10°29	107°28		November 2010		off Hồ Cốc
124	10°14.051	103°55.948		18.11.2010	1, 3	Phú Quốc Island
125	10°15.051	103°53.188		20–21.11.2010	1	Phú Quốc Island
126	10°14.375	103°52.190		22–23.11.2010	1	Phú Quốc Island
127	10°14.523	103°53.322		22–23.11.2010	4	Phú Quốc Island

Table 2. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in *Brachypleura novaezeelandiae* of Vietnam.

Dorsal-fin rays							Anal-fin rays						Lateral-line scales			Gill rakers		
68	70	71	72	73	75	77	44	45	46	48	51	53	26	28	30	8	9	10
2	2	2	1	2	1	1	1	2	4	2	1	1	1	3	1	4	4	1

Table 3. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in *Arnoglossus* species of Vietnam.

	Dorsal-fin rays																									
	79	80	81	82	83	84	85	86	87	88	89	90	92	94	96	97	98	99	100	101	102	103	104	105	106	109
Arnoglossus aspilos	2	2	1	2	1	1	1	1	2			1														
Arnoglossus macrolophus			1				1		2	2	1	2	1	4	1	1										
Arnoglossus polyspilus																2	1	1	6	2	1	3	5	1	2	1

Table 3. *Continued.*

	Anal-fin rays																					
	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	79	80	81	82	83	85	
Arnoglossus aspilos	1	4	2	4	1			1	1													
Arnoglossus macrolophus						1	2	3	4	2	2		1		1							
Arnoglossus polyspilus												1	1	1	1	4	9	2	1	3	1	

Table 3. *Continued.*

	Lateral-line scales																			Gill rakers						
	44	45	46	47	48	49	50	51	54	55	56	58	59	60	61	62	63	64	65	5	6	7	8	9	10	11
Arnoglossus aspilos	1	4	2	1	2	3	1													1	1	1	3	5	3	
Arnoglossus macrolophus					1	1	1	1	1	2	1	1	2		2						3		1	2	5	2
Arnoglossus polyspilus													1	1	1	1	1	1	1		2	4	4	2		

Table 4. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in *Asterorhombus intermedius* of Vietnam.

Dorsal-fin rays			Anal-fin rays				Lateral-line scales			Gill rakers	
80	83	84	62	64	65	66	54	56	57	8	9
2	1	1	1	1	1	1	1	1	1	1	3

Table 5. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in *Bothus myriaster* of Vietnam.

Dorsal-fin rays												Anal-fin rays										Lateral-line scales										Gill rakers		
83	85	86	87	88	89	90	91	92	93	95	97	63	64	65	66	67	68	69	70	72	80	71	72	73	75	76	77	78	79	80	86	6	7	8
1	1	2	2	1	2	5	7	3	2	1	2	1	2	5	6	3	5	4	1	1	1	1	2	1	1	1	2	1	2	2	1	6	4	2

Table 6. Frequency distribution of dorsal-, anal-fin ray, lateral line scale and gill raker counts in *Crossorhombus azureus* of Vietnam.

Dorsal-fin rays										Anal-fin rays											
83	84	85	86	87	88	89	90	91	93	62	63	64	65	66	67	68	69	70	72	73	74
2	1	13	3	9	6	7	5	1	3	1	1	4	4	6	8	11	5	4	3	1	2

Table 6. *Continued.*

Lateral-line scales															Gill rakers				
45	46	47	49	50	54	55	56	57	58	59	60	61	62	63	65	5	6	7	8	9
3	5	3	2	3	2	7	3	4	3	1	1	2	4	1	1	10	17	6	2	1

Table 7. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in *Engyprosopon* species of Vietnam.

	Dorsal-fin rays																	
	73	75	76	77	78	79	80	81	82	83	84	86	87	88	89	90	92	93
Engyprosopon grandisquama									1		1	3	1	5	1	1	1	1
Engyprosopon latifrons	1	1	1	1	4	2	3	1	2	2	1				2			
Engyprosopon maldivensis											1	2	3	3	3	5	1	

Table 7. *Continued.*

	Anal-fin rays															
	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	72
Engyprosopon grandisquama						1	1	2	1	2	1	1	1	2	2	1
Engyprosopon latifrons	4	2	2	4	1	4	2			1		1				
Engyprosopon maldivensis						1		3	1	1	7	2	2	1		

Table 7. *Continued.*

	Lateral-line scales																Gill rakers					
	35	36	37	38	39	40	41	42	43	44	45	47	48	49	50	53	5	6	7	9	10	11
Engyprosopon grandisquama				1	1	1	1	1	3					1				1	5			
Engyprosopon latifrons	1	2	1	4	4	2	2										3	15	1			
Engyprosopon maldivensis					2				2	3	1	2	1	2	2	1				6	8	3

Table 8. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in *Laeops* species off Vietnam.

	Dorsal-fin rays													Anal-fin rays										
	95	99	100	101	102	103	105	106	108	109	110	111	112	72	78	79	81	82	83	85	87	88	89	90	92
Laeops kitaharae	2	1	2	1	1	1				1				2	1	1		1	2	1		1		1	
Laeops lanceolata					1		1	2	1	2	1	1	3						1		2	2	5	1	1
Laeops parviceps				1		1									1		1								

Table 8. *Continued.*

	Lateral-line scales										Gill rakers			
	86	88	90	91	96	97	99	100	102	103	5	6	7	8
Laeops kitaharae	2	1			1						1	3		
Laeops lanceolata		2	2		2	1	1	1	1	1	2	6	2	
Laeops parviceps				1		1								2

Table 9. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in *Psettina iijimae* of Vietnam.

Dorsal-fin rays							Anal-fin rays					Lateral-line scales					Gill rakers	
85	87	88	89	91	92	94	64	67	69	72	76	45	52	55	58	60	6	9
1	1	1	2	1	1	2	2	1	2	2	1	2	1	2	1	1	2	1

Table 10. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in *Pseudorhombus* species of Vietnam.

	Dorsal-fin rays												Anal-fin rays								
	64	66	69	70	72	74	75	76	77	78	79	80	50	51	52	54	55	56	60	61	62
Pseudorhombus elevatus	1	1											1			1					
Pseudorhombus javanicus					1	1	1	2								2	2	1			
Pseudorhombus oculocirris			1	1	1									1	1	1					
Pseudorhombus oligodon								1	1	2	2	2							2	3	3

Table 10. *Continued.*

	Lateral-line scales											Gill rakers								
	63	67	68	70	75	76	82	84	85	86	89	8	9	10	12	14	15	16	17	19
Pseudorhombus elevatus	2														1		1			
Pseudorhombus javanicus		1	2	1	1	1										3	1	1		
Pseudorhombus oculocirris					1		1										1		1	1
Pseudorhombus oligodon								2	2	1	1	3	2	2						

Table 11. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and gill raker counts in samarids of Vietnam.

	Dorsal-fin rays															Anal-fin rays							
	68	70	71	72	73	74	75	76	77	78	79	80	81	82	83	86	49	52	53	54	55	56	57	58
Samaris cristatus						2	1	3	1	3	4	2	1	4	1	1			3	3	4	2	9	2
Samariscus filipectoralis											1										1			
Samariscus lusonensis	1	1	1	1	1					1			1				1	1		1	2	2		

Table 11. *Continued.*

	Lateral-line scales																Gill rakers					
	56	57	58	61	68	70	71	72	74	75	79	80	83	84	87	89	6	7	8	9	10	11
Samaris cristatus				1	2	1	1	1	3	1	3	2	1	1	1	2	3	3	7	3	3	3
Samariscus filipectoralis			1															1				
Samariscus lusonensis	3	2	1														2	1				

Table 12. Frequency distribution of dorsal-, anal-fin ray and lateral-line scale counts in soleids off Vietnam.

	Dorsal-fin rays																						
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
Aesopia cornuta																		1	2	2	2	1	
Aseraggodes dubius															1	1	3	2	1				
Brachirus orientalis	1		1		1		1	3	2		1												
Dagetichthys commersonnii																1						1	
Heteromycteris japonicus																						1	
Liachirus melanospilos		2	2	2	8	3	7	11	3	3	1	1											
Pardachirus pavoninus						1			1		2	1											
Solea ovata					1																		
Soleichthys tubiferus																							1
Zebrias crossolepis											2	2	1	6	3			1					
Zebrias lucapensis											1			1	1		1		1				
Zebrias quagga										1				1									

Table 12. *Continued.*

	Anal-fin rays																							
	43	44	45	46	47	48	49	50	52	53	54	55	56	57	58	59	60	61	62	63	64	65	67	70
Aesopia cornuta														1				2	1	1	2		1	
Aseraggodes dubius						1		3	4	1														
Brachirus orientalis			2	2	3	1	1	1																
Dagetichthys commersonnii																			1	1				
Heteromycteris japonicus												1												
Liachirus melanospilos	2	5	4	11	9	8	2	2																
Pardachirus pavoninus								1	1	1	1				1									
Solea ovata						1																		
Soleichthys tubiferus																								1
Zebrias crossolepis													2	2	3	2	2	2	2					
Zebrias lucapensis									1						1		1			1		1		
Zebrias quagga												1		1										

Table 12. *Continued.*

	Lateral-line scales																				
	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Aesopia cornuta																					
Aseraggodes dubius	1					1				1			1		1		1				
Brachirus orientalis					2					1					3						1
Dagetichthys commersonnii																					
Heteromycteris japonicus																					
Liachirus melanospilos		2	1	3	2	2	3	1		3	4	3	1	2	4	1	1	1		1	1
Pardachirus pavoninus													1						1		
Solea ovata																					
Soleichthys tubiferus																					
Zebrias crossolepis												2	3	2	3	1	2		1	1	
Zebrias lucapensis									1	1				1							
Zebrias quagga																					

Table 12. *Continued.*

	Lateral-line scales														
	90	91	92	94	95	96	100	101	105	106	107	108	110	111	113
Aesopia cornuta							2	1	1			2	1		1
Aseraggodes dubius															
Brachirus orientalis	2		1												
Dagetichthys commersonnii						1					1				
Heteromycteris japonicus				1											
Liachirus melanospilos															
Pardachirus pavoninus		1													
Solea ovata										1					
Soleichthys tubiferus														1	
Zebrias crossolepis															
Zebrias lucapensis															
Zebrias quagga			1		1										

Table 13. Frequency distribution of dorsal-, anal-fin ray and vertebrae counts in *Symphurus microrhynchus* of Vietnam.

Dorsal-fin rays									Anal-fin rays								Vertebrae				
																	abdominal		caudal		
81	82	86	87	88	90	91	93	95	67	68	70	71	73	77	78	79	9	10	36	37	38
4	2	1	2	1	2	2	1	2	2	2	3	3	4	1	1	1	12	3	6	8	1

Table 14. Frequency distribution of dorsal-, anal-fin ray, lateral-line scale and vertebrae counts in *Cynoglossus* species of Vietnam.

	Dorsal-fin rays																			
	100	101	102	103	104	105	106	107	108	109	110	111	113	114	115	116	120	123	130	131
Cynoglossus arel												4	2	1	1	1	2	1	1	1
Cynoglossus itinus							2			1	1	1								
Cynoglossus kopsii				2	2	3	1	1	8					2	1					
Cynoglossus nanhaiensis	1	2	2	2	3	1		1												
Cynoglossus puncticeps	1		2		3															
Cynoglossus quadrilineatus							1		1											

Table 14. *Continued.*

	Anal-fin rays																
	79	80	81	82	83	84	85	86	87	88	89	90	91	93	98	102	106
Cynoglossus arel							1	1	4		3	1	2	1	1	1	1
Cynoglossus itinus							3	1	1								
Cynoglossus kopsii				3	4	2	2	3	3	2	1	1					
Cynoglossus nanhaiensis	3	3	4		2												
Cynoglossus puncticeps	2	3		1													
Cynoglossus quadrilineatus							1			1							

Table 14. *Continued.*

	Lateral-line scales																								
	60	62	63	65	66	67	68	69	70	73	74	75	76	77	78	79	80	81	87	89	90	93	95	100	101	103
Cynoglossus arel	2	2	3		1	2			2								1									
Cynoglossus itinus										1				1	1	1		1								
Cynoglossus kopsii				1	1	2	1	2		2	1	1		1												
Cynoglossus nanhaiensis												2	2	1	2	1		4								
Cynoglossus puncticeps																			1		2	1		1	2	2
Cynoglossus quadrilineatus																				1			1			

Table 14. *Continued.*

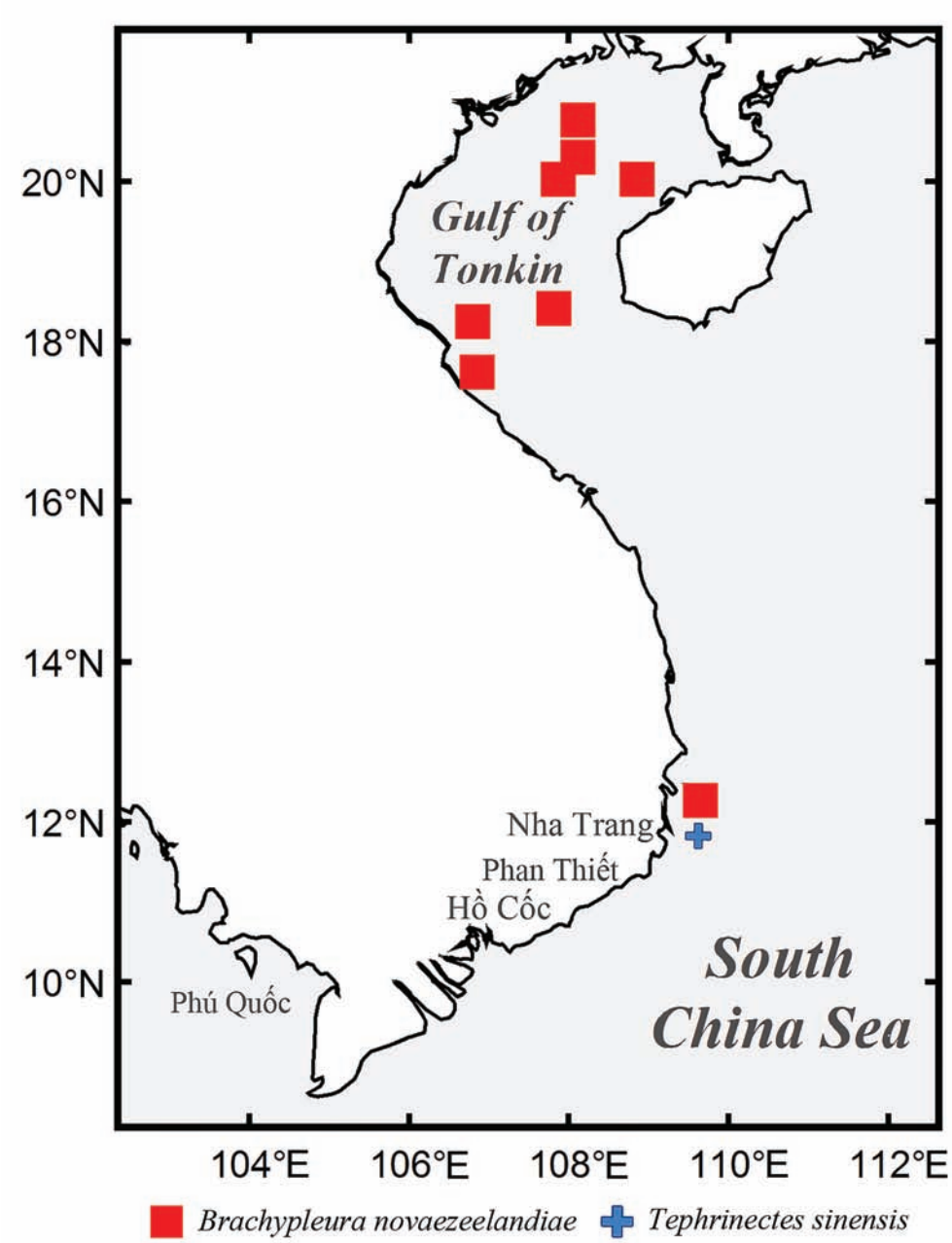
	Vertebrae													
	abdominal		caudal											
	9	10	38	39	40	41	42	43	44	45	46	47	50	
Cynoglossus arel	5	4								3	5		1	
Cynoglossus itinus	4							2	2					
Cynoglossus kopsii	3	4						2	1		2	2		
Cynoglossus nanhaiensis	5	6				3	8							
Cynoglossus puncticeps		6	2	2	1	1								
Cynoglossus quadrilineatus	2							1	1					

Table 15. Frequency distribution of dorsal-, anal-fin ray and lateral-line scale counts in *Paraplagusia* species of Vietnam.

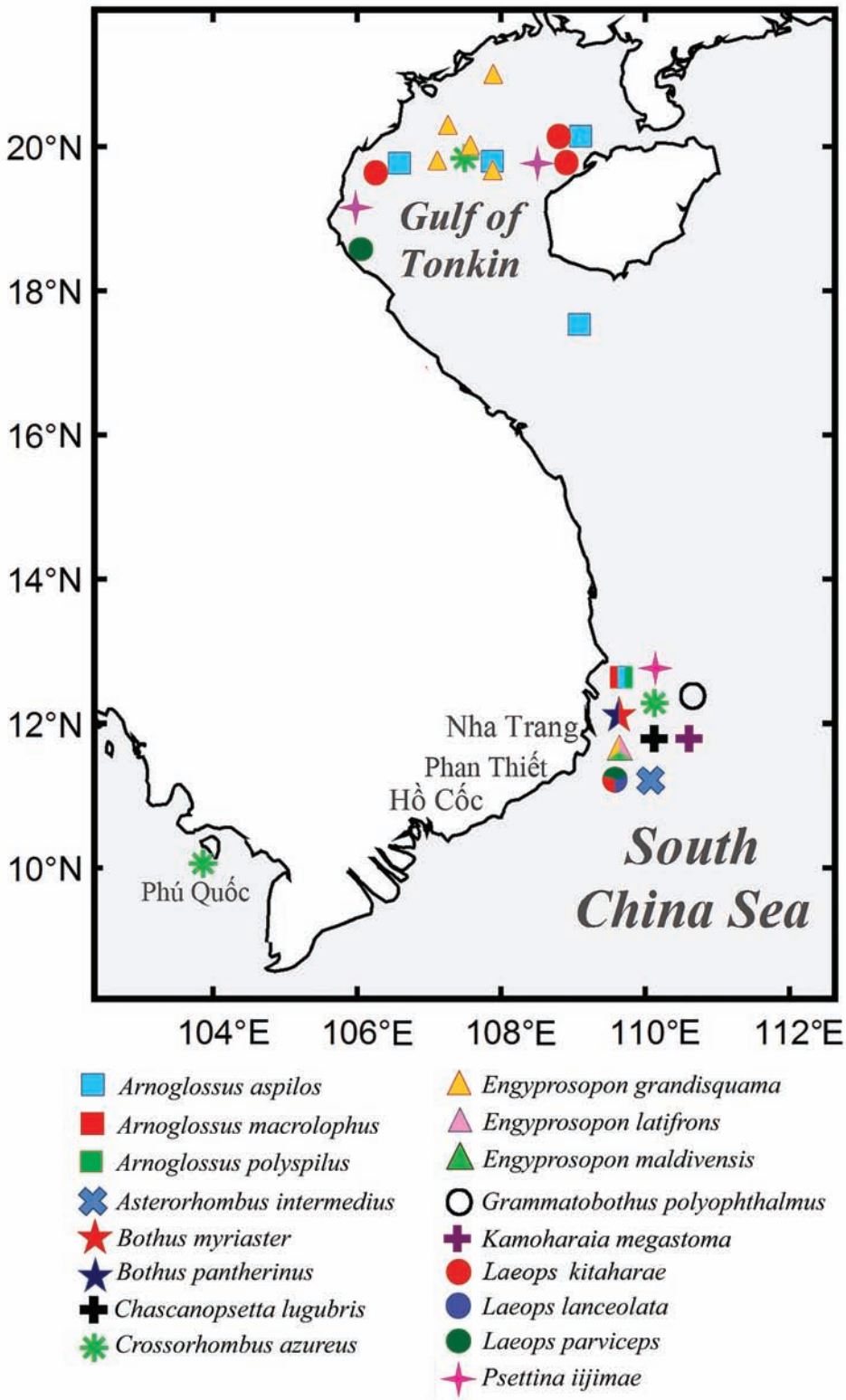
	Dorsal-fin rays				Anal-fin rays					Lateral-line scales					Vertebrae				
															abdominal		caudal		
	100	102	103	109	80	81	83	84	86	90	97	108	111	119	9	10	40	41	42
Paraplagusia bilineata	1	2	1		2	1	1			1	2	1				1	3	1	
Paraplagusia japonica				2				1	1				1	1	2				2

Table 16. Occurrences of flatfish species of Vietnam and in South China Sea. Bold species are new for the region. + –present study; B – Besednov 1968; K – Kwang-Tsao et al. 2008; M – Matsunuma 2011; Ng – Nguyen 1999; N – Ni and Kwok, 1999; R – Randall and Lim, 2000; S – Shen 1993; Va – Vidthayanon, 1999a; Vb – Vidthayanon, 1999b; W – Wang et al. 2016; * – species reported under another nominal name.

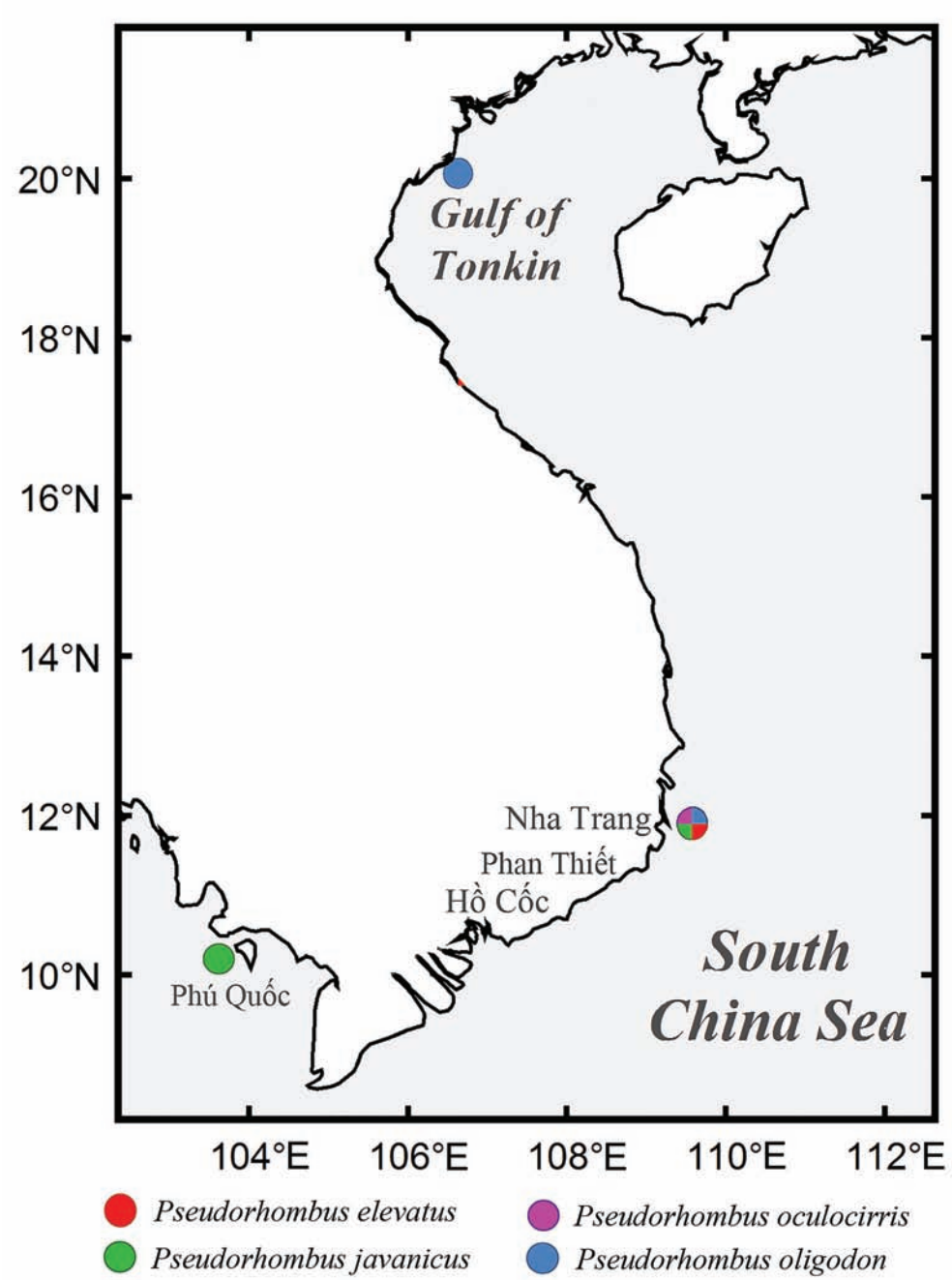
	Vietnam					South China Sea
	Northern part			Southern part		
Tephrinectes sinensis		B	Ng	+		N S R
Family Citharidae						
Brachypleura novaezeelandiae	+	B	Ng	+		M N Va Vb
Family Bothidae						
Arnoglossus aspilos	+			+	Ng	K R Va Vb
Arnoglossus macrolophus			Ng*	+		K M R S
Arnoglossus polyspilus		B		+		K R S
Asterorhombus intermedius		B	Ng	+		R
Bothus myriaster		B	Ng	+	Ng	K R N S
Bothus pantherinus			Ng	+	Ng	K R N S
Chascanopsetta lugubris				+		K R N S
Crossorhombus azureus	+	B	Ng	+		K N R
Engyprosopon grandisquama	+	B	Ng	+	Ng	K M N R S Va Vb
Engyprosopon latifrons			Ng	+		N
Engyprosopon maldivensis				+		K R
Grammatobothus polyophthalmus		B		+		M R Vb
Kamoharaia megastoma				+		K R S
Laeops kitaharae	+	B	Ng	+		K N R S
Laeops lanceolata			Ng	+		K
Laeops parviceps	+		Ng	+		K R Vb S
Psettina iijimae	+	B		+	Ng	K R S
Family Paralichthyidae						
Pseudorhombus elevatus		B	Ng	+		K M R S Va Vb
Pseudorhombus javanicus		B	Ng	+		M N
Pseudorhombus oculocirris				+		+
Pseudorhombus oligodon	+	B	Ng	+		K N R S
Family Samaridae						
Samaris cristatus	+	B	Ng	+		K M N R S Va Vb
Samariscus filipectoralis				+		K R S
Samariscus luzonensis	+			+		
Family Soleidae						
Aesopia cornuta		B	Ng	+	Ng	K N R S Va
Aseraggodes dubius	+			+		R Va
Brachirus orientalis		B	Ng	+	Ng	K M R Va
Dagetichthys commersonnii				+	Ng	R
Heteromycteris japonicus		B	Ng	+		N R
Liachirus melanospilus			Ng	+		K M N R Va
Pardachirus pavoninus		B	Ng	+	Ng	K M R Va
Solea ovata	+		Ng			K R
Soleichthys tubiferus				+		+
Zebrias crossolepis				+		K S
Zebrias lucapensis				+		R
Zebrias quagga	+	B	Ng	+		K M N R S
Family Cynoglossidae						
Symphurus microrhynchus				+		R
Cynoglossus arel	+		Ng	+	Ng	K M N R S Va Vb
Cynoglossus quadrilineatus		B*	Ng*	+	Ng*	M N R S Vb
Cynoglossus itinus	+		Ng	+		K N R S
Cynoglossus kopsi				+		K M N R S Va Vb
Cynoglossus nanhaiensis			W	+	W	W
Cynoglossus puncticeps	+	B	Ng	+	Ng	K N R S
Paraplagusia bilineata			Ng	+	Ng	K N R S
Paraplagusia japonica				+		N R



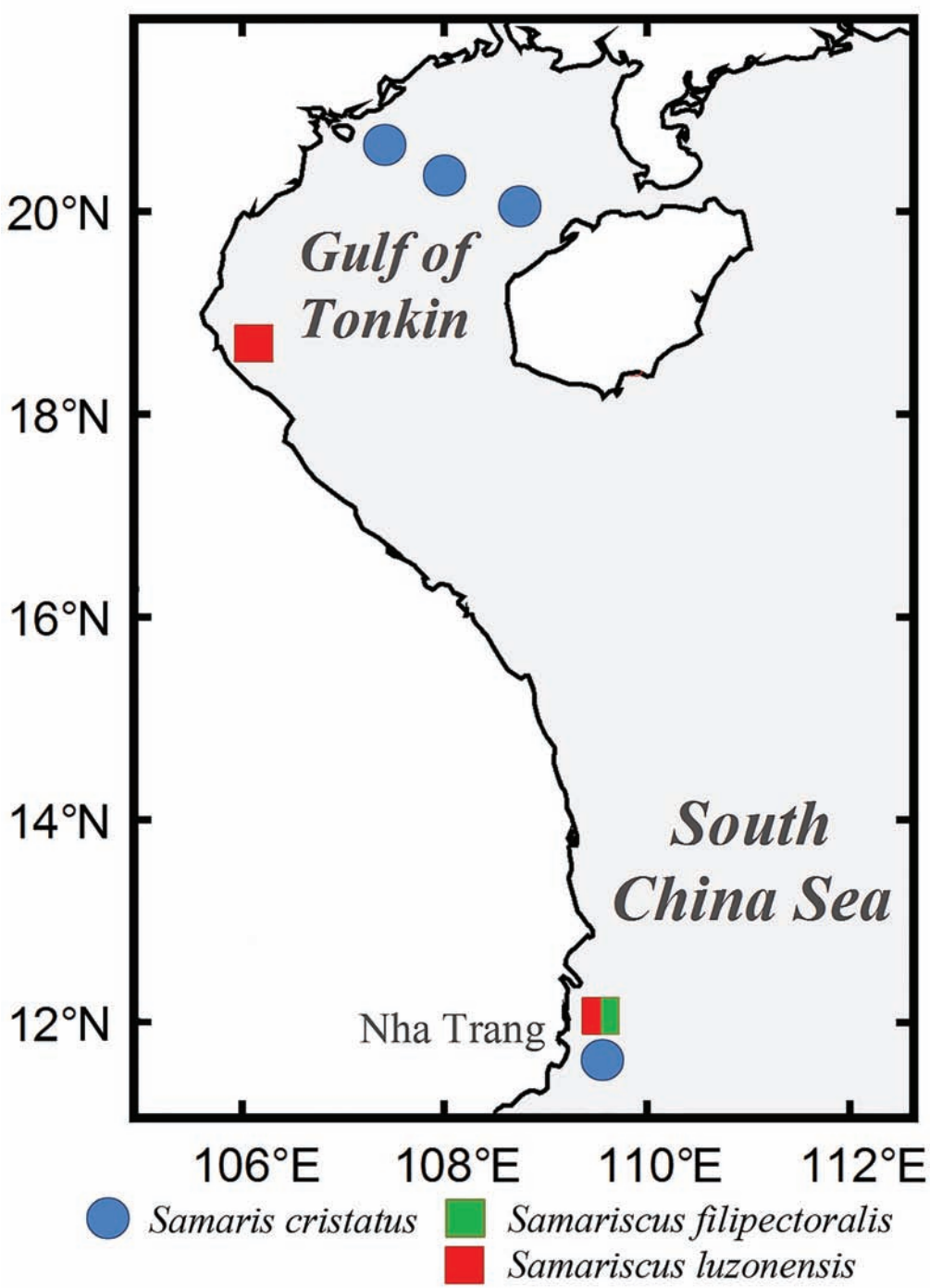
Map 1. Capture locations of *Brachypleura novaezeelandiae* Günther, 1862 and *Tephrinectes sinensis* (Lacepède, 1802) off Vietnam.



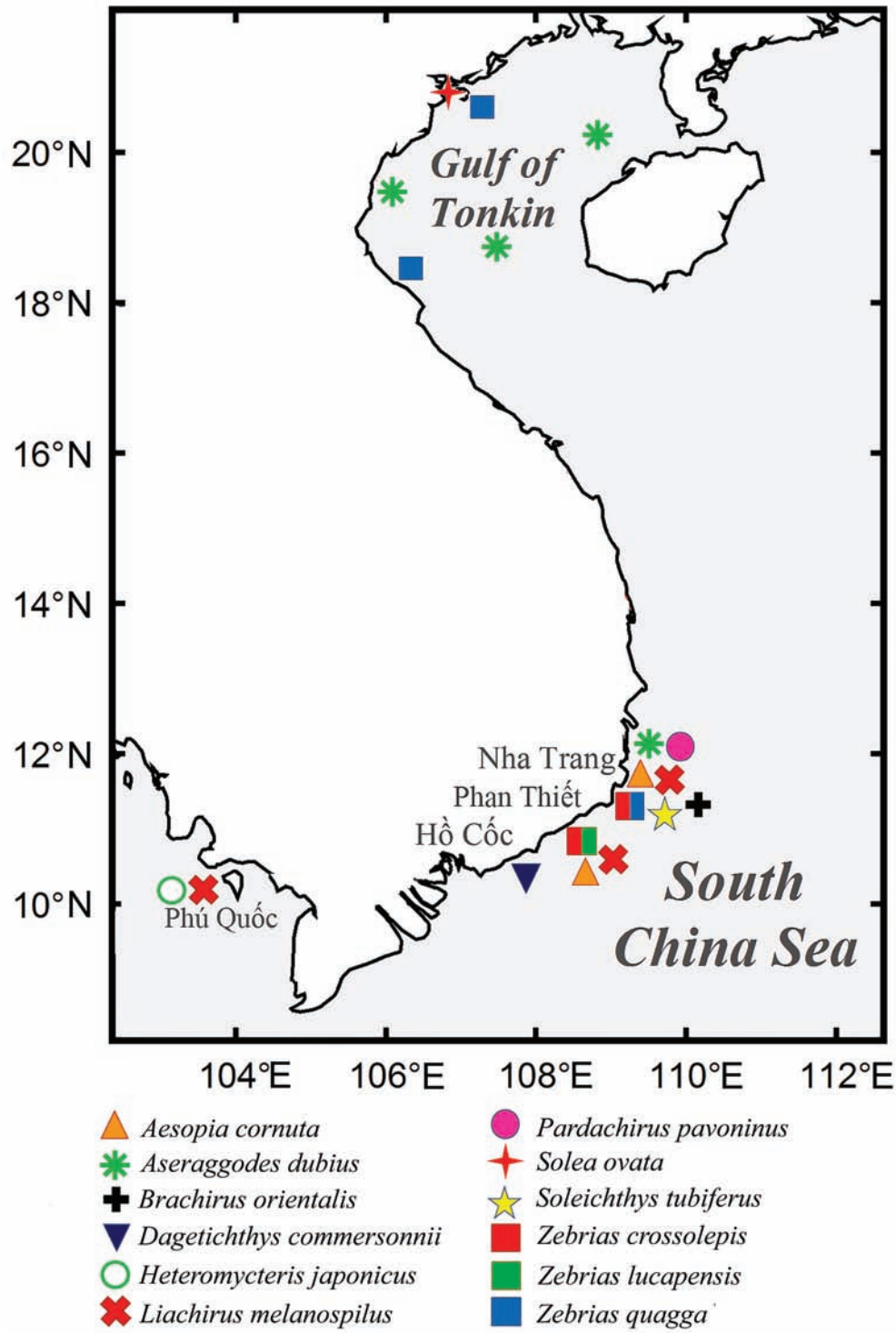
Map 2. Capture locations of bothids off Vietnam.



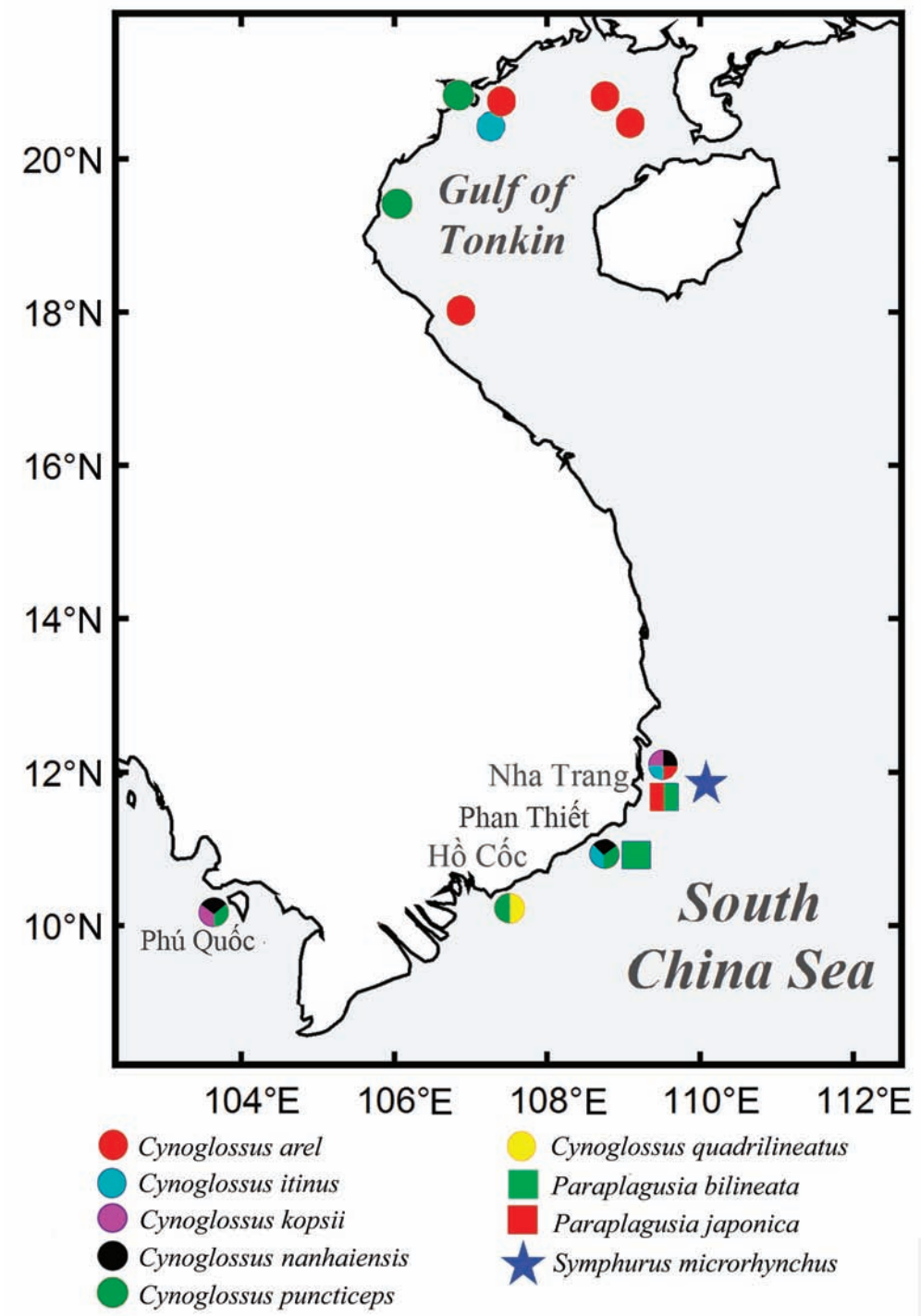
Map 3. Capture locations of paralichthyids off Vietnam.



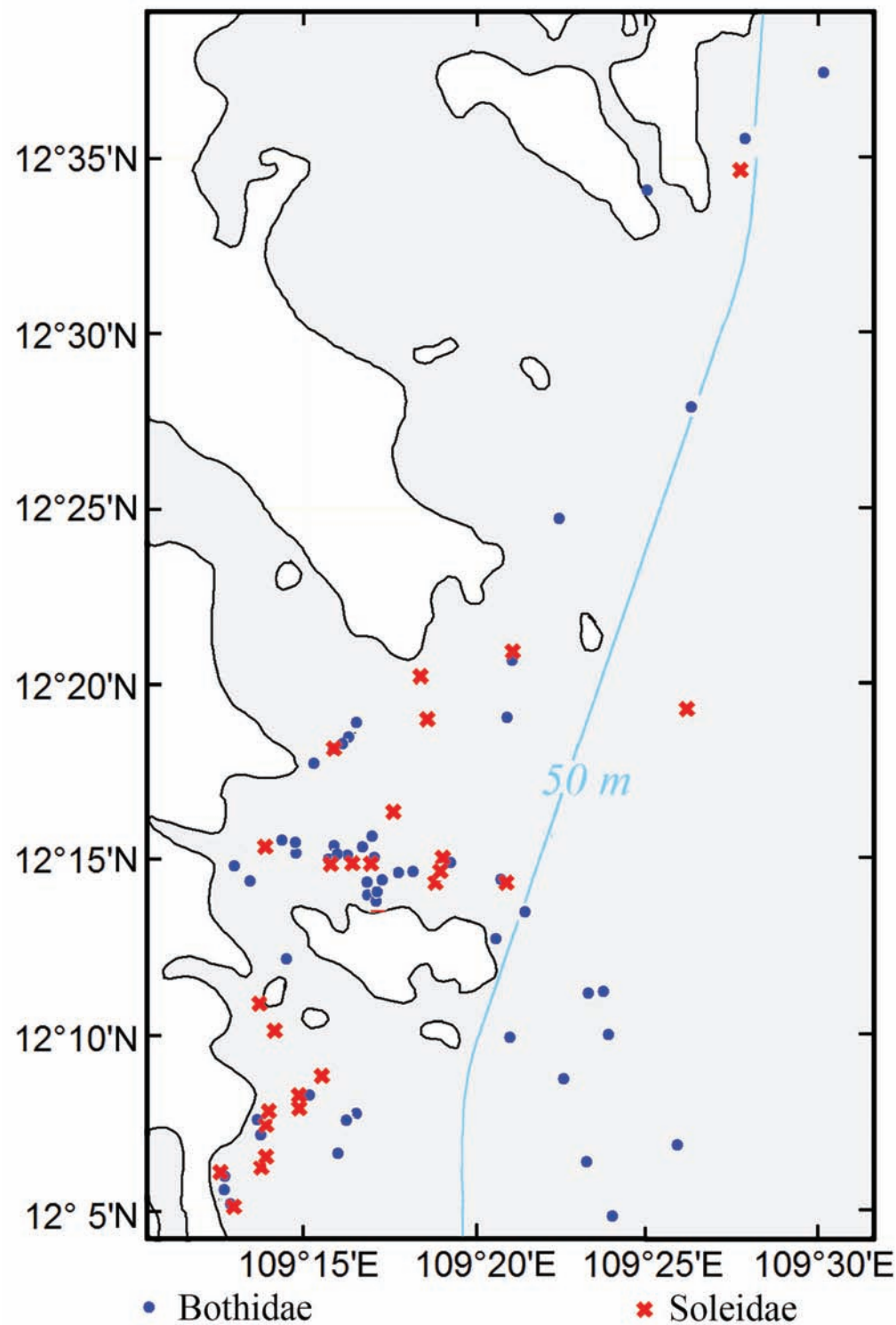
Map 4. Capture locations of samarids off Vietnam.



Map 5. Capture locations of soleids off Vietnam.



Map 6. Capture locations of cynoglossids off Vietnam.



Map 7. Capture locations of bothids and soleids in Nha Trang Bay.