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Preliminary checklist of fishes obtained from South Java Deep-Sea (SJADES) Biodiversity Expedition 2018

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Abstract. The South Java Deep-Sea (SJADES) Biodiversity Expedition 2018 was conducted between Indonesia and Singapore with the aim to investigate the deep-sea biodiversity in southern Java, Indonesia, in the eastern Indian Ocean. Examination of the fishes collected during the survey revealed 222 distinct taxa in 62 families. Of these, 54 species are known, two are recently described species, 83 were previously unreported from the area, and the status of the remaining 83 species is uncertain. This paper includes a complete list of these taxa with locality and voucher information for further investigations. Comments on the taxonomic status of each taxon are included, together with colour photographs of selected material taken shortly after collection. This paper contributes significantly to our knowledge of the poorly known deep-sea fishes in the South Java region.

Key words. Indian Ocean, Indonesia, marine fish, biodiversity, SJADES

INTRODUCTION

Most historical maritime studies of Indonesian waters were for navigational purposes, while more recent works have an emphasis on biodiversity, including ichthyological research. Ship-based scientific research on fishes in Indonesian territorial waters began in earnest with works of European explorers and naturalists in the early 19th century (Allen & Adrim, 2003; Nontji, 2009). Expeditions in which fishes were collected within Indonesian waters include La Physicienne (1817–1820), L'Uranie (1818–1819), La Coquille (1823), L'Astrolabe (1826–1829) and La Bonite (1836–1837), H. M. S. Curacoa (1873) and H. M. S. Challenger (1872–1876), the Siboga (1899–1900), the Snellius I (1929–1930), Baruna Expedition (1964), the Te Vega (1963, 1965) and the Alpha Helix cruises (1979), the Rumphius Expedition I–IV (1972–1980), the Corindon Expedition II–III (1982–1984), the Snellius II (1984–1985), the Karubar (1991) and the Anambas (2002) cruises (Peristiwady, 2012).

Perhaps the most dominant and prolific researcher of Indonesian fishes was Pieter Bleeker (1819–1878), who arrived in Java in 1842. In addition to his medical duties as an Army Officer with the Dutch Colonial Office, he pursued his interest in ichthyology. He conducted independent research on fishes from various localities throughout Indonesia until 1860. These efforts resulted in a large series of published works on the fish fauna of the Indo-Australian archipelago (Bleeker, 1862–1878). His scientific contributions remain the basic framework for the present-day knowledge of fishes from the Indonesian archipelago. Bleeker described 1,925 shallow-water marine and freshwater fish species and 520 fish genera; the majority of these were from Indonesia (Carpenter, 2007).

More recently, Froese et al. (1996) provided a checklist of 2,125 species of marine and brackish waters fishes in Indonesia based on published literature. Currently, 3,621 marine fish species are reported to occur in the territorial waters of Indonesia (Froese & Pauly, 2019), although the diversity is assumed to be higher because of the many newly described coral reef fishes based on studies led by Dr. Gerald Allen and colleagues in the past two decades (Allen & Adrim, 2003; Allen & Erdmann, 2012a; pers. obs.).

White et al. (2006) and Last et al. (2010) published two comprehensive books documenting the sharks and rays in Indonesia. Field guides or checklists on fish species in shallow waters or coral reef regions were provided by Kimura & Matsuura (2003), Iwatsuki et al. (2000), Matsuura & Peristiwady (2000), Allen & Erdmann (2009, 2012b), Batubara et al. (2017), and Sahetapy et al. (2018). White et al. (2013) provided a field guide to 873 species in 124 bony fish families collected from landing sites in Indonesia,

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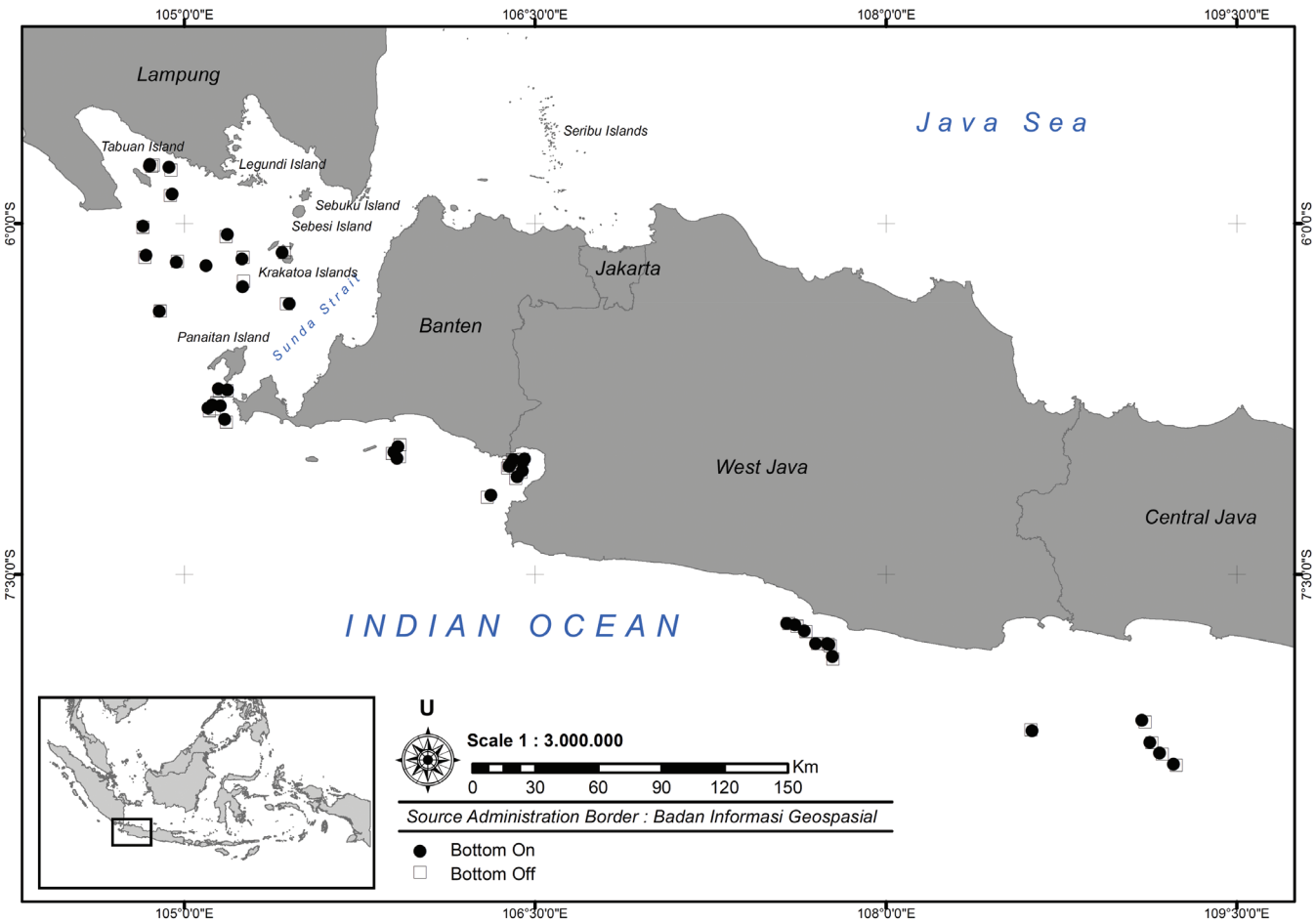

Fig. 1. Map of 43 SJADES stations with fish specimens collected.

based on a reference collection of almost 3,000 species mostly catalogued at the Museum Zoologicum Bogoriense in Cibinong, West Java.

Marine life, including fishes, from depths less than 200 m, is generally well studied for most parts of the globe, including Indonesia. However, data and information for deep-sea fishes, especially those from 200 m or deeper, are still limited. In recent years, several deep-sea demersal fish explorations have been conducted in Indonesian waters, namely (1) the Jetidonfish Project (1978–1981), (2) a joint survey between the Government of Indonesia and the FAO/SCSDEVPRO using the research vessel DR. *Fridtjof Nansen* (1980), and (3) a joint exploration between the Research Institute for Marine Fisheries (RIMF) of the Government of Indonesia and the Overseas Fishery Cooperation Foundation (OFCF) of Japan using RV *Baruna Jaya IV* (2004–2005). These exploratory cruises focused on the western half of Indonesia and covered the Indian Ocean sub-areas of Western Sumatra to the eastern Indian Ocean off Timor (Lohmeyer, 1982; Anonymous, 2006; Groeneveld & Koranteng, 2017). Deep-sea exploration is still needed to advance the understanding of Indonesian fisheries resources.

The sea off southern Java is a potential area for a high diversity of marine fishes, including deep-sea fishes. In 2004–2005, RIMF and OCFC successfully collected more than 301 species from the Indian Ocean, the southern region of Java Island through "The Japan-Indonesia Deep Sea Resources Joint Exploration Project". Deep-sea resources were collected from 200–1,000 m depth (White et al., 2013). From this collection, several revisionary taxonomic works have been published for various genera and families, including *Lepidotrigla* (Gomon & Kawai, 2018), Chaunacidae (Ho et al., 2015), deep-sea anglerfishes (Ho et al., 2016a), Lophiidae (Ho et al., 2016b), and *Peristedion* (Kawai, 2016).

This current checklist includes two newly described species from specimens collected during this survey (Larson et al., 2020; Matsunuma et al., 2020). The purposes of the present work are (1) to provide a complete checklist of fish species collected during the survey, (2) to document the species not yet reported to occur in Indonesian waters, to provide the reference depth ranges of each species together with their voucher information, and (3) to call to attention the status of many species that require taxonomic resolution.

MATERIAL AND METHODS

The study was conducted from March 23rd to April 5th, 2018, in the waters south of western Java from Sunda Strait to Cilacap (Fig. 1). Fishes were collected at depths of between 100 to 2,000 m using a beam trawl and Warèn dredge operated by the research vessel *Baruna Jaya VIII*. The sampling locations were selected on-site based on seabed

characteristics, and the coordinates of each location were recorded. Detailed information for each station is shown in Table 1 (see also Chim et al., 2021).

Specimens were tentatively identified in the field and selected specimens were photographed and documented. All specimens were preserved in 10% buffered formalin and deposited at the Reference Collection of Bitung Marine Biota Conservation, Indonesian Institute of Sciences, Bitung, North Sulawesi, Indonesia (LBRC), National Collection Indonesian Pisces (NCIP), Research Center for Oceanography, Indonesian Institute of Sciences, Jakarta, and at the Lee Kong Chian Natural History Museum, National University of Singapore, Singapore (ZRC).

The specimens were later carefully identified in the laboratory using various published literature. All specimens were identified to the specific, or lowest taxonomic rank possible. When an examined specimen possessed the diagnostic characters of a known species, but significant morphological differences were detected, "cf." was added before the specific name. If the examined specimens could not be identified to the specific level, but possessed characteristics distinct from any congener, a serial number was given.

The checklist (Table 2) is first arranged in phylogenetic order, and then alphabetically by family, following the most recent classifications (Betancur-R et al., 2017; Girard et al., 2020; van der Lann et al., 2021), and thereafter to the generic and specific levels alphabetically. The field numbers of voucher specimens were given as LBRC-F xxxx or NCIP xxxx; for those without a field number, the values of lot(s) or specimen(s) were given. Photographs of 120 species are shown (see Plates 1–16).

RESULTS AND DISCUSSION

A total of 222 morphospecies in 26 orders and 62 families have been identified to date. However, there may still be undetermined specimens awaiting further study as well as damaged specimens that are beyond morphological identification. All taxa with collection information (station number, station data, depth range, voucher numbers) are listed in Table 1. According to FishBase (Froese & Pauly, 2019), of the 222 morphospecies, two species were recently described, 54 species had been previously reported from Indonesia, whilst 83 species are reported here for the first time from Indonesia.

Forty species are tentatively assigned to a specific name preceded by a "cf.", and 43 morphospecies can only be identified to the generic level.

Fish diversity among the trawl operations. Among a total of 63 stations sampled, 44 were using beam trawl, nine were using benthic (Warèn) dredge, and 10 were using corers. Fish specimens were collected in 43 of these operations (Table 1), based on 37 trawls and six dredge hauls.

Of all sites sampled, stations CP33 and CP34 recorded the highest diversity of species (31 and 29 morphospecies, respectively), followed by CP12 (24 morphospecies), CP20 (19 morphospecies), CP23 (22 spp.), CP25 (19 spp.), CP27 (22 spp.) and CP38 (24 spp.). The remaining stations yielded between one and 18 species. The diversity of each haul was not related to the depth where the fishes were collected because the high and low diversity numbers were evenly distributed in various depths, except for those stations deeper than 1,078 m (e.g., CP13, CP14, CP40, CP53, and CP62) where fish diversity is expected to be naturally low.

Diversity at a higher systematic level. High diversity of deep-sea fishes occurred in orders such as Gadiformes (ca. 616 spp.), Stomiiformes (ca. 453 spp.), Ophidiiformes (ca. 545 spp.), Lophiiformes (ca. 386 spp.), and Anguilliformes (ca. 998 spp.) (data from Eschmeyer's Catalog of Fishes). In this study, we recognised 40 species in Gadiformes, 29 species in Perciformes, and 24 in Ophidiiformes, followed by Lophiiformes (18 spp.), Carangiformes (17 spp.), Anguilliformes (15 spp.), whereas between 1 to 12 species were reported from the remaining orders.

Comments on taxonomy

Order Myxiniformes. Two specimens of hagfish representing two different genera were collected from the same haul (CP47, 476–530 m). Both are new records for Indonesian waters. One of them is identified as *Myxine formosana*, a species so far known only from southwestern Taiwan (type locality) and the Philippines (Mincarone & McCosker, 2014, with tentative identification). The specimen has only minor differences from description in the literature. The other specimen is identified as *Eptatretus* sp. and requires further study to determine the species.

Chondrichthyes (chimeras, sharks, and rays). Four orders with five families and six species were recognised, including one chimera (*Chimaera* cf. *jordani*), three sharks (*Centrophorus moluccensis*, *Apristurus* sp., and *Bythaelurus* sp.), and two deepwater skates (*Sinobatis* cf. *borneensis* and *Notoraja* sp.). The diversity of chondrichthyes was surprisingly low during this survey and most species need further study.

Order Notacanthiformes. Two families with at least five species were recognised. There are not many species in this order worldwide, about 17 species in two families. Our specimens were collected from relatively shallow (CP56, 183–255 m) to quite deep (CP24, 1,044–1,068 m) stations. Although these belong to fairly common genera, the identification of most of our specimens are uncertain.

Order Anguilliformes. Five families with at least 15 species were recognised. All the species identified to species level are newly recorded in Indonesian waters, whereas other species are likely to be new to science. *Bathyuroconger* cf. *vicinus* is relatively common and can be found across a wide depth range, i.e., 312–1,268 m. This species is not included in Smith et al. (2018) and is awaiting further study. One specimen of

Table 1. List of collection stations, number of fish collected and associated information (see Chim et al., 2021, for more details). DW=Warèn dredge, CP=beam trawl.

Station	Locality	Depth (m)	Number of species	Coordinates (on bottom)	Coordinates (off bottom)
DW01	South of Rakata Island	100–104	1	6° 20.489′S, 105° 26.890′E	6° 20.431′S, 105° 26.214′E
CP02	Southwest of Rakata Island	257–281	10	6° 16.066′S, 105° 15.053′E	6° 14.668′S, 105° 15.256′E
CP03	West of Rakata Island	398–283	5	6° 08.941′S, 105° 14.817′E	6° 08.590′S, 105° 15.100′E
CP05	Northwest of Rakata Island	928–929	6	6° 02.737′S, 105° 11.107′E	6° 03.229′S, 105° 10.642′E
CP07	between Tabuan Island and Sumatra	379–409	20	5° 44.678′S, 104° 51.151′E	5° 44.917′S, 104° 52.061′E
CP08	between Tabuan Island and Sumatra	425–442	8	5° 45.126′S, 104° 51.080′E	5° 45.225′S, 104° 51.710′E
CP10	South of Umbar Bay, Sumatra	429–446	10	5° 45.399′S, 104° 56.098′E	5° 46.183′S, 104° 56.565′E
CP12	Southeast of Tabuan Island	615–698	24	5° 52.252′S, 104° 56.786′E	5° 52.728′S, 104° 56.422′E
CP13	between Sumatra & Java	1259–1268	5	6° 00.521′S, 104° 49.410′E	6° 00.828′S, 104° 49.428′E
CP14	between Sumatra & Java	1528–1539	5	6° 08.044′S, 104° 50.086′E	6° 08.518′S, 104° 49.879′E
DW16	Sea mount reef	92–103	3	6° 09.803′S, 104° 57.976′E	6° 09.606′S, 104° 58.208′E
CP18	between Sumatra & Java	1060–1073	8	6° 10.758′S, 105° 05.589′E	6° 11.587′S, 105° 05.735′E
DW19	South of Panaitan Island	182–172	1	6° 42.551′S, 105° 11.143′E	6° 42.762′S, 105° 10.967′E
CP20	South of Panaitan Island	325–362	19	6° 42.320′S, 105° 08.682′E	6° 42.879′S, 105° 09.018′E
CP22	South of Panaitan Island	864–870	15	6° 46.458′S, 105° 07.068′E	6° 47.450′S, 105° 07.613′E
CP23	South of Panaitan Island	559–571	22	6° 46.739′S, 105° 09.239′E	6° 45.924′S, 105° 08.360′E
CP24	South of Panaitan Island	1044–1068	16	6° 47.344′S, 105° 06.039′E	6° 47.914′S, 105° 06.485′E
CP25	South of Panaitan Island	876–937	19	6° 50.185′S, 105° 10.353′E	6° 50.923′S, 105° 10.776′E
CP26	East of Tinjil Island	517–727	5	6° 57.221′S, 105° 54.754′E	6° 56.664′S, 105° 55.315′E
CP27	East of Tinjil Island	481–557	22	6° 58.624′S, 105° 53.745′E	6° 58.937′S, 105° 53.363′E
CP28	East of Tinjil Island	957–1022	3	7° 00.194′S, 105° 54.624′E	6° 59.778′S, 105° 55.224′E
DW32	South of Tg. Boyongkareuceng	805–970	4	7° 42.583′S, 107° 34.535′E	7° 42.556′S, 107° 35.030′E
CP33	South of Tg. Boyongkareuceng	312–525	32	7° 42.912′S, 107° 36.559′E	7° 43.255′S, 107° 37.234′E
CP34	South of Tg. Boyongkareuceng	234–243	29	7° 44.464′S, 107° 39.018′E	7° 44.575′S, 107° 39.447′E
CP35	South of Tg. Boyongkareuceng	603–686	8	7° 47.677′S, 107° 41.904′E	7° 47.681′S, 107° 42.477′E
CP37	South of Cilacap	163–166	17	8° 07.462′S, 109° 05.639′E	8° 07.864′S, 109° 06.470′E
CP38	South of Cilacap	290–295	24	8° 13.038′S, 109° 07.689′E	8° 13.150′S, 109° 08.216′E
CP39	South of Cilacap	528–637	11	8° 15.885′S, 109° 10.163′E	8° 16.060′S, 109° 10.944′E
CP40	South of Cilacap	1078–1091	1	8° 18.642′S, 109° 13.767′E	8° 18.888′S, 109° 14.476′E
CP44	South of Cilacap	970–1013	7	8° 10.065′S, 108° 37.439′E	8° 09.802′S, 108° 37.145′E
DW46	South of Pameungpeuk	540–654	1	7° 47.716′S, 107° 44.896′E	7° 47.905′S, 107° 45.190′E
CP47	South of Pameungpeuk	476–530	8	7° 47.972′S, 107° 45.298′E	7° 48.257′S, 107° 45.706′E
CP48	South of Tg. Gedeh, Java	689–637	18	7° 51.120′S, 107° 46.245′E	7° 51.718′S, 107° 46.375′E
CP50	Pelabuhanratu Bay	383–425	11	7° 03.322′S, 106° 26.673′E	7° 03.762′S, 106° 26.334′E
CP51	Pelabuhanratu Bay	569–657	2	7° 04.874′S, 106° 25.396′E	7° 05.348′S, 106° 25.044′E
CP53	Pelabuhanratu Bay	1521–1714	2	7° 09.610′S, 106° 18.632′E	7° 10.184′S, 106° 17.714′E

Station	Locality	Depth (m)	Number of species	Coordinates (on bottom)	Coordinates (off bottom)
CP55	Pelabuhanratu Bay	378–379	4	7° 01.013′S, 106° 26.772′E	7° 01.116′S, 106° 26.421′E
CP56	Pelabuhanratu Bay	183–255	13	7° 00.299′S, 106° 27.247′E	7° 00.393′S, 106° 26.790′E
CP57	Pelabuhanratu Bay	223–269	1	7° 00.429′S, 106° 24.407′E	7° 00.455′S, 106° 24.198′E
CP58	Pelabuhanratu Bay	505–564	3	7° 01.692′S, 106° 23.558′E	7° 01.997′S, 106° 23.258′E
CP59	Pelabuhanratu Bay	579–659	3	7° 02.252′S, 106° 23.270′E	7° 02.668′S, 106° 22.981′E
CP62	Northwest of Panaitan Island	1623–1630	1	6° 22.449′S, 104° 53.654′E	6° 22.279′S, 104° 53.830′E
DW63	Between Anakrakatau and Rakata	208–250	1	6° 07.293′S, 105° 25.076′E	6° 07.277′S, 105° 25.725′E

Moringua sp. was taken at a depth of 864–870 m, which is much deeper than previous records for the family.

Order Alepocephaliformes. One family and five species were recognised. Most of the specimens were collected from fairly deep waters, except for *Alepocephalus bicolor*, which was taken at three stations with depths of 312–571 m. Although two species of *Rouleina* are provided a name, we feel they are different from currently recognised congeners.

Order Argentiniformes. Only one species, *Nansenia ardesiaca*, was collected in this survey. It is a fairly common pencil smelt species in the Indo-West Pacific region but has not been reported from Indonesian waters previously.

Order Stomiiformes. At least 12 species in three families were recognised. Most members in this order inhabit deep waters and are known to undertake vertical migration. All our specimens were collected from the mesopelagic zone, of which some were taken from deeper depths.

Order Ateleopodiformes. Only one species, *Ijimaia dofleini*, was collected and identified. Previously only known in the northwestern Pacific off Japan, Taiwan, and China, its distribution is now extended into the eastern Indian Ocean off Java.

Order Aulopiformes. Six species belonging to three families were recognised. Members of Chlorophthalmidae were collected from the relatively shallow waters, whereas *Bathypterois atricolor* and *Magnisudis indica* (see Ho et al., 2021, this volume) were collected from relatively deep waters and both represent first records for Indonesia.

Order Myctophiformes. Two families with 11 species were recognised. Members of this order exhibit vertical migration and all our specimens were collected from relatively shallow waters, except for one (*Lampanyctus* sp.) that was collected from depths of 1,521–1,714 m. Although fairly common worldwide, four species in Neoscopelidae appear to be first records for Indonesia.

Order Zeiformes. Two species in the family Zeniontidae were recognised and both are new records for Indonesia. However, the overall body shape of *Zenion japonicum* appears to be quite different from specimens collected in the western Pacific Ocean, and thus the Indonesian material requires further study.

Order Gadiformes. Three families with about 40 species were recognised, of which many are recorded for the first time in Indonesia. Members of Macrouridae represent the most speciose family in this survey. When identifying the specimens, many were given an existing name, but clear differences were observed between our material and published descriptions. Their taxonomy requires further investigation, and many may turn out to be undescribed.

Order Trachichthyiformes. Two families with three species were recognised. Two species are fairly common in the Indo-West Pacific region and one (*Hoplostethus* cf. *japonicus*) was identified provisionally.

Order Ophidiiformes. Two families with 24 species were recognised. Many are new records for Indonesia. However, they belong to ophidiid genera that are considered taxonomically challenging (e.g., *Monomitopus*), and assignment to species is tentative until more detailed studies are conducted.

Order Scombriformes. Two species in two families were recognised. Both are well known and common in the region.

Order Syngnathiformes. A single representative *Solenostomus paradoxus* was collected by the dredge at depths of 92–103 m. However, the species normally inhabits coral reef at depths of 4–35 m (based on information from Fishbase) and this rather deep record needs to be verified.

Order Gobiiformes. Two species of the family Gobiidae were recognised. One of them, *Platygobiopsis hadiatya*e, was recently described (Larson et al., 2020) based on a single specimen from this collection. The other species, *Obliquogobius yamadai*, represents a new record for Indonesia.

Order Carangiformes. Girard et al. (2020) reconstructed the phylogenetic relationship of Carangimorpha (sensu Betancur-R et al., 2013a, b; Campbell et al., 2013, 2019) by integrating morphological characters and DNA sequences

Table 2. List of fish species collected during survey, with station numbers, depth range, and voucher specimen reference numbers. + indicates first record, i.e., not recorded previously from Indonesia. Grey cells indicate species that are illustrated (see Plates 1–16).

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
Myxiniformes				
Myxinidae	*Eptatretus* sp.	CP47	476–530	1 spec.
	+*Myxine formosana*	CP47	476–530	1 spec.
Chimaeriformes				
Chimaeridae	*Chimaera* cf. *jordani* (Pl. 1A)	CP33	312–525	LBRC-F4667
Carcharhiniformes				
Scyliorhinidae	*Apristurus* sp. (Pl. 1B)	CP33	312–525	LBRC-F4713
	Bythaelurus sp. (embryo) (Pl. 1C, D)	CP33, CP39	312–637	
Squaliformes				
Centrophoridae	*Centrophorus moluccensis*	CP07	379–409	LBRC-F4500
Rajiformes				
	Sinobatis cf. *borneensis* (Pl. 1E, F)	CP33	312–525	LBRC-F4706
Arhynchobatidae	*Notoraja* sp. (Pl. 1G)	CP07	379–409	LBRC-F4481
Notacanthiformes				
Halosauridae	*Aldrovandia* cf. *affinis*	CP24	1044–1068	LBRC-F4629
	Aldrovandia sp.	CP24	1044–1068	NCIP 9014
	Halosaurus sp.	CP05, CP24, CP48	637–1068	LBRC-F4474, LBRC-F4629
Notacanthidae	+*Notacanthus abbotti*	CP56	183–255	LBRC-F4749
	Notacanthus cf. *abbotti* (Pl. 1H)	CP23	559–571	LBRC-F4618
Anguilliformes				
Colocongeridae	+*Coloconger raniceps* (Pl. 2A)	CP05, CP07, CP12, CP25	379–937	LBRC-F4471, LBRC-F4538, LBRC-F4643, LBRC-F4480
Congridae	*Ariosoma* sp.	CP38, CP39	290–637	LBRC-F4668
	+*Bathycongrus retrotinctus* (Pl. 2B)	CP02, CP20, CP56	183–281	LBRC-F4592
	Bathycongrus sp. 1	CP58	505–564	1 spec.
	Bathycongrus sp. 2	CP24	1044–1068	LBRC-F4638
	Bathyuroconger cf. *vicinus* (Pl. 2C)	CP12, CP13, CP22, CP24, CP25, CP33, CP47, CP48, CP59	312–1268	LBRC-F4544, LBRC-F4553, LBRC-F4560, LBRC-F4600, LBRC-F4632, LBRC-F4636, LBRC-F4639, LBRC-F4644, LBRC-F4647, NCIP9015
	+*Congriscus maldivensis*	CP03	379–409	LBRC-F4493, LBRC-F4503
	+*Gavialiceps taeniola*	CP23	559–571	LBRC-F4625
	+*Xenomystax trucidans*	CP12, CP23	559–698	LBRC-F4556, LBRC-F4624
Moringuidae	*Moringua* sp.	CP22	864–870	LBRC-F4752
Nettastomatidae	+*Nettastoma solitarium* (Pl. 2D)	CP50	383–425	1 spec.
Synaphobranchidae	+*Dysommina orientalis*	CP12	615–698	1 spec.

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
	+*Ilyophis brunneus*	CP14, CP18	1060–1539	LBRC-F4563, LBRC-F4574
	+*Synaphobranchus affinis* (Pl. 2E)	CP12, CP23, CP25, CP48	559–937	LBRC-F4551, LBRC-F4619, LBRC-F4645, LBRC-F4652
	Synaphobranchus cf. *oregoni* (Pl. 2F)	CP24, CP25, CP28, CP35, CP44	876–1068	LBRC-F4637, LBRC-F4646
Alepocephaliformes				
Alepocephalidae	*Alepocephalus bicolor* (Pl. 2G)	CP23, CP33, CP47	312–571	LBRC-F4617
	+*Leptoderma lubricum*	CP28, CP49	957–1531	2 spec.
	Rouleina cf. *attrita*	CP24, CP48	637–1068	LBRC-F4940
	Rouleina cf. *watasei*	CP18, CP44	1060–1073	LBRC-F4567, LBRC-F4568, LBRC-F4569
	+*Talismania brachycephala* (Pl. 2H)	CP24	1044–1068	LBRC-F4626
Argentiniformes				
Microstomatidae	+*Nansenia ardesiaca*	CP26, CP27	481–727	4 spec.
Stomiiformes				
Gonostomatidae	*Sigmops elongatus* (Pl. 3A)	CP27	481–557	LBRC-F4664
	+*Sigmops gracilis*	CP53	1521–1714	LBRC-F4781
Sternoptychidae	*Argyropelecus* cf. *affinis*	CP27	481–557	LBRC-F4657
	+*Polyipnus stereope* (Pl. 3B)	CP02, CP03, CP07, CP10, CP20, CP22, CP33	257–870	LBRC-F4466, LBRC-F4482, LBRC-F4504, LBRC-F4524, LBRC-F4588, LBRC-F4602, LBRC-F4710
	Sternoptyx sp.	CP24	1044–1068	LBRC-F4634
Stomiidae	+*Astronesthes lucifer*	CP10	429–446	LBRC-F4518
	Astronesthes sp. 1 (Pl. 3C)	CP08	425–442	LBRC-F4506
	Astronesthes sp. 2	CP47	476–530	LBRC-F4758
	Chauliodus sloani (Pl. 3D)	CP13, CP18, CP27, CP28, CP48, CP55	378–1268	LBRC-F4559, LBRC-F4566, LBRC-F4658, LBRC-F4666, LBRC-F4767, LBRC-F4786
	Malacosteus niger (Pl. 3E)	CP13	1259–1268	LBRC-F4562
	+*Stomias affinis* (Pl. 3F)	CP13, CP22	864–1268	LBRC-F4561, LBRC-F4604
	Stomias nebulosus	CP23	559–571	LBRC-F4610
Ateleopodiformes				
Ateleopodidae	+*Ijimaia dofleini* (Pl. 3G)	CP23	559–571	LBRC-F4622
Aulopiformes				
Chlorophthalmidae	+*Chlorophthalmus acutifrons* (Pl. 3H)	CP33, CP34	234–525	LBRC-F4684, LBRC-F4711
	Chlorophthalmus cf. *albatrossis* (Pl. 4A)	CP20, CP34, CP39	325–637	LBRC-F4584, LBRC-F4678
	Chlorophthalmus cf. *borealis* (Pl. 4B)	CP34, CP38	234–295	LBRC-F4680
	Chlorophthalmus nigromarginatus (Pl. 4C)	CP02, CP37	163–281	LBRC-F4455, LBRC-F4726

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
Ipnopidae	+*Bathypterois atricolor* (Pl. 4D)	CP22, CP24, CP25, CP48	637–1068	LBRC-F4605, LBRC-F4653, LBRC-F4763, NCIP9010
Paralepididae	+*Magnisudis indica*	CP25	876–937	LBRC-F4648
Myctophiformes				
Myctophidae	*Benthosema fibulatum* (Pl. 4E)	CP08	425–442	LBRC-F4507
	Diaphus sp.	CP33	312–525	LBRC-F4935
	Diaphus garmani (Pl. 4F)	CP07, CP08, CP23, CP27, CP39	379–637	LBRC-F4050, LBRC-F4488, LBRC-F4497, LBRC-F4507.2, LBRC-F4611, LBRC-F4661, LBRC-F4745
	+*Diaphus malayanus*	CP07	379–409	LBRC-F4490
	+*Diaphus problematicus*	CP07, CP08, CP10, CP20, CP27, CP34, CP50	234–557	LBRC-F4489, LBRC-F4512, LBRC-F4517, LBRC-F4522, LBRC-F4587-1, LBRC-F4660, LBRC-F4675, LBRC-F4776
	+*Diogenichthys atlanticus*	CP08	425–442	LBRC-F4507-1
	Lampanyctus sp.	CP53	1521–1714	LBRC-F4782
Neoscopelidae	+*Neoscopelus macrolepidotus* (Pl. 4G)	CP12, CP22, CP23, CP25, CP27	481–937	LBRC-F4535, LBRC-F4593, LBRC-F4612, LBRC-F4651
	+*Neoscopelus microchir* (Pl. 4H)	CP07, CP08, CP10, CP20, CP50	325–446	LBRC-F4478, LBRC-F4510, LBRC-F4516, LBRC-F4521, LBRC-F4581, LBRC-F4770, LBRC-F4771
	+*Neoscopelus porosus* (Pl. 5A)	CP10, CP12, CP22, CP27, CP33, CP48, CP59	312–870	LBRC-F4519, LBRC-F4534, LBRC-F4595
	+*Scopelengys tristis*	CP24	1044–1068	LBRC-F4633
Zeiformes				
Zeniontidae	+*Cyttomimus affinis* (Pl. 5B)	CP20	325–362	LBRC-F4580
	+*Zenion japonicum* (Pl. 5C)	CP38	290–295	LBRC-F4739
Gadiformes				
Bregmacerotidae	*Bregmaceros* cf. *japonicus* (Pl. 5D)	CP23	559–571	LBRC-F4609
	+*Bregmaceros pseudolanceolatus* (Pl. 5E)	DW01, DW63	100–250	LBRC-F4753
Macrouridae	*Bathygadus* sp.	CP14	1528–1539	LBRC-F4564
	Coelorinchus argus	CP07, CP10, CP50	379–446	LBRC-F4492, LBRC-F4514, LBRC-F4774
	Coelorinchus cf. *acanthiger*	CP35, CP48, CP56	183–689	3 spec.
	Coelorinchus cf. *innotabilis*	CP55	378–379	1 spec.
	Coelorinchus cf. *maculatus* (Pl. 5F)	CP07	379–409	LBRC-F4475
	+*Coelorinchus cingulatus*	CP33	312–525	LBRC-F4701
	+*Coelorinchus longissimus*	CP56	183–255	LBRC-F4795

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
	+*Coelorinchus smithi* (Pl. 5G)	CP12, CP23, CP26, CP27, CP33, CP39, CP50	312–698	LBRC-F4554, LBRC-F4621, LBRC-F4774
	+*Coelorinchus thurla*	CP07	379–409	LBRC-F4484, LBRC-F4485, LBRC-F4489
	+*Coelorinchus triocellatus* (Pl. 5H)	CP07	379–409	LBRC-F4479
	Coryphaenoides cf. *asper*	CP14	1528–1539	3 spec.
	+*Coryphaenoides macrolophus*	CP25	876–937	1 spec.
	+*Coryphaenoides microps*	CP05	928–929	LBRC-F4472
	Coryphaenoides sp.	CP14	1528–1539	LBRC-F4565
	Coryphaenoides tydemani	CP13, CP23, CP48	559–1268	LBRC-F4557, LBRC-F4558, LBRC-F4623
	+*Gadomus colletti* (Pl. 6A)	CP12, CP22, CP24, CP25, CP44, CP47	476–1068	LBRC-F4531, LBRC-F4550-2, LBRC-F4594, LBRC-F4606, LBRC-F4628, LBRC-F4635
	Hymenocephalus cf. *heterolepis*	CP27	481–557	6 spec.
	+*Hymenocephalus lethonemus*	CP27	481–557	LBRC-F4659-1
	+*Hymenocephalus longibarbis*	CP07, CP20	325–409	LBRC-F4498, LBRC-F4583-1
	Hymenocephalus nascens	CP20	325–362	LBRC-F4583-2
	+*Kuronezumia bubonis*	CP25	876–937	1 spec.
	Kuronezumia sp.	CP18	1060–1073	LBRC-F4570
	Kuronezumia cf. *leonis* (Pl. 6B)	CP33	312–525	LBRC-F4709
	Malacocephalus laevis (Pl. 6C)	CP07, CP10, CP20, CP23, CP27, CP35	325–686	LBRC-F4493, LBRC-F4515, LBRC-F4591, LBRC-F4620
	Mataeocephalus cf. *tenuicauda*	CP25	876–937	2 spec.
	Nezumia cf. *merretti*	CP50	383–425	LBRC-F4775
	Nezumia cf. *proxima*	CP27, CP62	481–1630	2 spec.
	Nezumia cf. *pudens*	no data	no data	1 spec.
	Nezumia sp. 1	CP55	378–379	1 spec.
	Nezumia sp. 2	CP14, CP18, CP49	1060–1539	5 spec.
	+*Nezumia spinose* (Pl. 6D)	CP12, CP18, CP22	615–1073	LBRC-F4532, LBRC-F4539, LBRC-F4546, LBRC-F4571, LBRC-F4572, LBRC-F4601
	+*Sphagemacrurus pumiliceps*	CP05	928–929	LBRC-F4468
	Ventrifossa cf. *sazonovi*	CP05	928–929	LBRC-F4467
	+*Ventrifossa longibarbata*	CP27, CP47	476–557	LBRC-F4659.2
	+*Ventrifossa misakia*	CP25, CP44	876–1013	2 spec.
	Ventrifossa nigrodorsalis	CP07	379–409	LBRC-F4491
	Ventrifossa petersonii	CP27	481–557	1 spec.

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
Moridae	+*Gadella jordani* (Pl. 6E)	CP08	425–442	LBRC-F4508
Trachichthyiformes				
Anoplogastridae	*Anoplogaster cornuta* (Pl. 6F)	CP18	1060–1073	LBRC-F4575
Trachichthyidae	*Hoplostethus melanopus* (Pl. 6G)	CP35, DW46	540–686	LBRC-F4669, LBRC-F4757
	Hoplostethus cf. *japonicus*	CP55	378–379	LBRC-F4785
Ophidiiformes				
Bythitidae	+*Grammonus robustus* (Pl. 6H)	CP20	325–362	LBRC-F4585
	+*Hastatobythites arafurensis*	CP50	383–425	LBRC-F4779
Ophidiidae	*Dicrolene* sp. 1	CP12, CP23, CP25, CP35, CP51	559–937	7 spec.
	+*Dicrolene tristis* (Pl. 7A)	CP05, CP12, CP22, CP25, CP33	312–929	LBRC-F4469, LBRC-F4470, LBRC-F4473, LBRC-F4530, LBRC-F4599
	+*Diplacanthopoma brunnea* (Pl. 7B)	CP12, CP22, CP23, CP39, CP51	528–698	LBRC-F4536, LBRC-F4615
	+*Glyptophidium argenteum* (Pl. 7C)	CP10, CP12, CP21, CP23, CP27, CP33, CP47	312–836	LBRC-F4523, LBRC-F4528, LBRC-F4529, LBRC-F4549, LBRC-F4550-1, LBRC-F4614
	+*Glyptophidium japonicum*	CP33	312–525	1 spec.
	+*Hoplobrotula armata* (Pl. 7D)	CP33, CP50	312–525	LBRC-F4707, LBRC-F4773
	+*Hoplobrotula badia*	CP12	615–698	LBRC-F4548
	Hoplobrotula sp. (Pl. 7E)	CP02, CP33, CP34	234–525	LBRC-F4458, LBRC-F4683, LBRC-F4708, LBRC-F4754
	+*Lamprogrammus niger*	CP35, CP40	603–1091	LBRC-F4750
	+*Luciobrotula bartschi*	CP24, CP48	637–1068	LBRC-F4631
	Monomitopus cf. *pallidus*	CP24	1044–1068	LBRC-F4627
	+*Monomitopus conjugator* (Pl. 7F)	CP12, CP22, CP23, CP33, CP44	312–1013	LBRC-F4533, LBRC-F4540, LBRC-F4542, LBRC-F4547, LBRC-F4596-1, LBRC-F4988
	Monomitopus longiceps	CP24, CP25	876–1068	LBRC-F4630, LBRC-F4989
	Monomitopus sp. 1 (Pl. 7G)	CP12, CP18, CP22, CP25, CP26, CP27, CP33, CP35, CP48, CP58	312–1073	LBRC-F4555, LBRC-F4573, LBRC-F4597
	Monomitopus sp. 2	CP25, CP39	528–937	LBRC-F4744
	Monomitopus sp. 3	CP27	481–557	1 spec.
	Monomitopus sp. 4	CP44	970–1013	1 spec.
	+*Neobythites andamanensis* (Pl. 7H)	CP02, CP07, CP08, CP10	257–446	LBRC-F4477, LBRC-F4511, LBRC-F4520, LBRC-F4756
	Neobythites cf. *malhaensis*	CP37	163–166	1 spec.

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
	Neobythites purus	CP10, CP20, CP50	312–727	LBRC-F4513, LBRC-F4586, LBRC-F4778, LBRC-F4964
	+*Neobythites unimaculatus*	CP56	183–255	LBRC-F4794
	Spectrunchulus sp. 1	CP33, CP39, CP47, CP48	312–689	4 spec.
Scombriformes				
Nomeidae	*Cubiceps whiteleggii*	CP07	379–409	LBRC-F4502
Trichiuridae	*Benthodesmus tenuis* (Pl. 8A)	CP12, CP48	615–698	LBRC-F4552
Syngnathiformes				
Solenostomidae	*Solenostomus paradoxus* (Pl. 8B)	DW16	92–103	1 spec.
Gobiiformes				
Gobiidae	+*Obliquagobius yamadai* (Pl. 8C)	CP34, CP37, CP38	163–295	LBRC-F4679, LBRC-F4737
	Platygobiopsis hadiatyae	DW19	172–182	1 spec. (holotype)
Carangiformes				
Bothidae	*Arnoglossus* sp.	CP34	234–243	LBRC-F4953(?)
	Chascanopsetta lugubris (Pl. 8D)	CP03, CP33, CP34	234–525	LBRC-F4465, LBRC-F4693
Cynoglossidae	*Cynoglossus* cf. *suyeni* (Pl. 8E)	CP34, CP37	163–243	LBRC-F4694, LBRC-F4725, LBRC-F4849, LBRC-F4956(?)
	Cynoglossus sp. 1	CP33	312–525	
	Symphurus bathyspilus (Pl. 8F)	CP07, CP20	325–409	LBRC-F4501, LBRC-F4589
	Symphurus cf. *thermophiles* (Pl. 8G)	CP34, CP56	183–243	LBRC-F4692, LBRC-F4790
	+*Symphurus hondoensis*	CP48	637–689	
	+*Symphurus strictus* (Pl. 8H)	CP23	559–571	LBRC-F4613
	Symphurus sp. 1	CP12, CP27, CP34	234–698	LBRC-F4543, LBRC-F4663, LBRC-F4956(?)
Poecilopsettidae	*Nematops macrochirus* (Pl. 9A)	CP34, CP38	234–295	LBRC-F4690, LBRC-F4742, LBRC-F4962
	+*Nematops microstoma*	CP33, CP34	234–525	LBRC-F4957, LBRC-F4962
	Poecilopsetta colorata (Pl. 9B)	CP38	290–295	LBRC-F4740
	+*Poecilopsetta plinthus* (Pl. 9C)	CP37	163–166	LBRC-F4724
	Poecilopsetta praelonga (Pl. 9D)	CP02	257–281	LBRC-F4459
	Poelioseptta sp. 1 (Pl. 9E)	CP34, CP38, CP39	528–637	LBRC-F4691, LBRC-F4741
Samaridae	*Samariscus sunieri* (Pl. 9F)	CP34, CP56	183–255	LBRC-F4695, LBRC-F4789
Soleidae	*Aseraggodes cyaneus* (Pl. 9G)	CP37, CP56	163–255	LBRC-F4727, LBRC-F4791, LBRC-F4792
Gobiesociformes				
Gobiesocidae	*Kopua* sp. (Pl. 9H)	CP38	290–295	LBRC-F4736

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
Lophiiformes				
Chaucanidae	+*Chaunax apus* (Pl. 10A)	CP12, CP27, CP39	528–698	LBRC-F4527, LBRC-F4746
	Chaunax penicillatus (Pl. 10B)	CP20, CP26, CP48	325–727	LBRC-F4578-1, LBRC-F4656, LBRC-F4769
	Chaunax gomoni (Pl. 10C)	DW32, CP33, CP34	234–977	LBRC-F4677, LBRC-F4983
Lophiidae	*Lophiodes naresi* (Pl. 10D)	CP38	290–295	LBRC-F4732
	Lophiodes triradiatus (Pl. 10E)	CP12, CP35, CP48	603–698	LBRC-F4537, LBRC-F4670, LBRC-F4764, LBRC-F4942
Ogcocephalidae	*Coelophrys micropa* (Pl. 10F)	CP44, CP48	637–1013	LBRC-F4768
	Halicmetus cf. *westraliensis* (Pl. 10G)	CP12, CP39	528–698	LBRC-F4525, LBRC-F4748
	+*Halicmetus niger*	CP25	876–937	LBRC-F4649
	+*Halicmetus reticulatus* (Pl. 10H)	CP07	379–409	LBRC-F4476
	+*Halicmetus ruber* (Pl. 11A)	CP22, CP58	505–870	LBRC-F4603
	Halieutaea cf. *stellata* (Pl. 11B)	DW32	234–243	LBRC-F4699
	Halieutaea stellata (Pl. 11C)	DW32	234–243	LBRC-F4714
	+*Halieutopsis bathyoreos*	CP25	876–937	LBRC-F4650
	+*Halieutopsis nasutus* (Pl. 11D)	CP12, CP23	559–698	LBRC-F4526, LBRC-F4608-1
	Halieutopsis sp.	CP23	559–571	LBRC-F4608-2
	Malthopsis cf. *annulifera* (Pl. 11E)	CP03	283–398	LBRC-F4936
	Malthopsis cf. *kobayashii* (Pl. 11F)	CP37	163–166	LBRC-F4719
	+*Malthopsis mitrigera* (Pl. 11G)	CP39	528–637	LBRC-F4747
Tetraodontiformes				
Tetraodontidae	*Tylerius spinosissimus* (Pl. 11H)	CP38	290–295	1 spec.
Triacanthodidae	*Atrophacanthus japonicus*	CP33	312–525	LBRC-F4702
	+*Bathyphylax bombifrons* (Pl. 12A)	DW32	805–977	1 spec.
	Halimochirurgus alcocki (Pl. 12B)	CP38, CP56	183–295	LBRC-F4743, LBRC-F4796, LBRC-F4953
	+*Macrorhamphosodes uradoi* (Pl. 12C)	CP34	234–243	LBRC-F4676
	Paratriacanthodes cf. *retrospinis*	CP33, CP34	234–525	LBRC-F4673, LBRC-F4950
	Tydemania navigatoris	CP33	312–525	LBRC-F4703
Acropomatiformes				
Bathyclupeidae	+*Neobathyclupea malayana*	CP12, CP27, CP48	481–698	LBRC-F4541, LBRC-F4545, LBRC-F4762
Champsodontidae	*Champsodon longipinnis* (Pl. 12D)	CP02	257–281	LBRC-F4452, LBRC-F4454
	Champsodon nudivittis (Pl. 12E)	CP37	163–166	1 lot
	Champsodon sp. 1 (Pl. 12F)	CP34, CP37, CP38	163–295	LBRC-F4674, LBRC-F4721
	Champsodon sp. 2	CP37	163–166	LBRC-F4722
Epigonidae	*Epigonus* sp. 1 (Pl. 12G)	CP22, CP23	559–870	LBRC-F4598, LBRC-F4616

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
Howellidae	+*Howella zina* (Pl. 12H)	CP23, CP59	559–659	LBRC-F4607, LBRC-F4799
Malakichthyidae	*Malakichthys elegans* (Pl. 13A)	CP33, CP38	290–525	LBRC-F4705, LBRC-F4735
	Malakichthys cf. *gracilis*	CP38	290–295	2 spec.
Synagropidae	+*Parascombrops serratospinosus*	CP03, CP38	283–398	LBRC-F4462, LBRC-F4463, LBRC-F4464
	+*Parascombrops yamanouei* (Pl. 13B)	CP34, CP37, CP56	166–255	LBRC-F4686, LBRC-F4723, LBRC-F4787
	Synagrops japonicus (Pl. 13C)	CP34, CP38	234–295	LBRC-F4685
Perciformes				
Callionymidae	*Foetorepus* cf. *kamoharai* (Pl. 13D)	CP38	290–295	LBRC-F4730
	Foetorepus sp. 1 (Pl. 13E)	CP34, CP38	234–295	LBRC-F4681, LBRC-F4738
	Repomucenus sp. 1 (Pl. 13F)	CP34	234–243	LBRC-F4682
Cepolidae	*Owstonia* cf. *totomiensis* (Pl. 13G)	CP38	290–295	LBRC-F4731
Hoplichthyidae	*Hoplichthys* sp. 1 (Pl. 13H)	CP34	234–243	LBRC-F4688, LBRC-F4689
	Hoplichthys sp. 2 (Pl. 14A)	CP37	163–166	LBRC-F4728
Nemipteridae	+*Parascolopsis rufomaculatus* (Pl. 14B)	CP37	163–166	LBRC-F4718
Percophidae	*Bembrops* cf. *caudimacula* (Pl. 14C)	CP02, CP34, CP38, CP56	183–295	LBRC-F4453, LBRC-F4687, LBRC-F4793, LBRC-F4948
	Bembrops cf. *curvatura* (Pl. 14D)	CP20, CP33	312–525	LBRC-F4582, LBRC-F4712
Peristediidae	+*Peristedion riversandersoni* (Pl. 14E)	CP33, CP33	183–525	LBRC-F4704, LBRC-F4772
	Peristedion liorhynchus (Pl. 14F)	CP08, CP34	234–442	LBRC-F4667, LBRC-F4697
	Satyrichthys clavilapis (Pl. 14G)	CP07, CP33, CP34	234–525	LBRC-F4483, LBRC-F4698
	Satyrichthys moluccense	CP02	257–281	2 spec.
	+*Scalicus hians*	CP50	383–425	LBRC-F4777
	Scalicus orientalis (Pl. 14H)	CP20, CP24	325–1068	LBRC-F4579, NCIP9011
Priacanthidae	*Priacanthus macracanthus* (Pl. 15A)	CP37, CP38	163–295	LBRC-F4734
Scorpaenidae	+*Idiastion pacificum*	CP26	517–727	LBRC-F4654
Sebastidae	*Sebastolobus* cf. *macrochir* (Pl. 15B)	CP20, CP27, CP33, CP57	223–557	LBRC-F4577, LBRC-F4662, LBRC-F4700, LBRC-F4949
Serranidae	*Chelidoperca flavolineata* (Pl. 15C)	CP37	163–166	LBRC-F4715, LBRC-F4867, LBRC-F4968, LBRC-F4969, LBRC-F4970, LBRC-F4971, LBRC-F4972, LBRC-F4973, LBRC-F4974, LBRC-F4975, LBRC-F4976, LBRC-F4977, LBRC-F4978, LBRC-F4979, NCIP9018, NCIP9019
	Pseudanthias cf. *pleurotaenia* (Pl. 15D)	DW16	92–103	
	Pseudanthias fasciatus (Pl. 15E)	DW16	92–103	
Setarchidae	*Lioscorpius longiceps* (Pl. 15F)	CP20, CP34, CP38	234–362	LBRC-F4576, LBRC-F4672, LBRC-F4729
	Setarches guentheri (Pl. 15G)	CP20	325–362	LBRC-F4590

Order/family	Taxa	Station	Depth range (m)	LBRC-F number
	Setarches longimanus (Pl. 15H)	CP37, CP38	163–295	LBRC-F4716, LBRC-F4717
Triglidae	*Lepidotrigla macracaina* (Pl. 16A)	CP37	163–166	LBRC-F4720
	Lepidotrigla spiloptera (Pl. 16B)	CP34	234–243	LBRC-F4696
Uranoscopidae	*Uranoscopus* sp. 1 (Pl. 16C, D)	CP37, CP38	163–295	LBRC-F4733
	Uranoscopus sp. 2	CP56	183–255	LBRC-F4797
	Xenocephalus sp.	CP02	257–281	LBRC-F4755

from ultraconserved element loci (UCEs) and suggested the taxonomic unit Carangimorpha as a separate order. They used Carangiformes as the tentative OTU which included all flatfishes [as Order Pleuronectiformes in Betancur-R et al. (2017) and Harrington et al. (2016)]. Here we follow Girard et al.'s (2020) definition of Carangiformes. Five families with 17 species of flatfishes were recognised. Many in Poecilopsettidae and Cynoglossidae are new records from Indonesia, while some are likely undescribed species which need further study.

Order Gobiesociformes. Only a single species in *Kopua* was recognised, which may represent an unnamed species.

Order Lophiiformes. Three families with 18 species were recognised. Many of them were recorded by Ho et al. (2015, 2016b), whereas many in Ogcocephalidae are new records for Indonesia or may represent undescribed species.

Order Tetraodontiformes. Seven species in two families were recognised. Two of them, *Bathyphylax bombifrons* and *Macrorhamphosodes uradoi*, are new records for Indonesia.

Order Acropomatiformes. At least 12 species belonging to six families are recognised. All members were previously included in the order Perciformes. Based on our material from this study, the geographical ranges of three species, namely *Neobathyclupea malayana*, *Parascombrops serratospinosus*, and *Parascombrops yamanouei*, are now extended from the western Pacific Ocean into the eastern Indian Ocean.

Order Perciformes. Broadly speaking, 29 species in 13 families were recognised from this order, including members of the order Scorpaeniformes following Betancur-R et al. (2013a). *Chelidoperca flavolineata* was described as new recently (Matsunuma et al., 2020) and five are new records for Indonesia, whereas the other species need further study.

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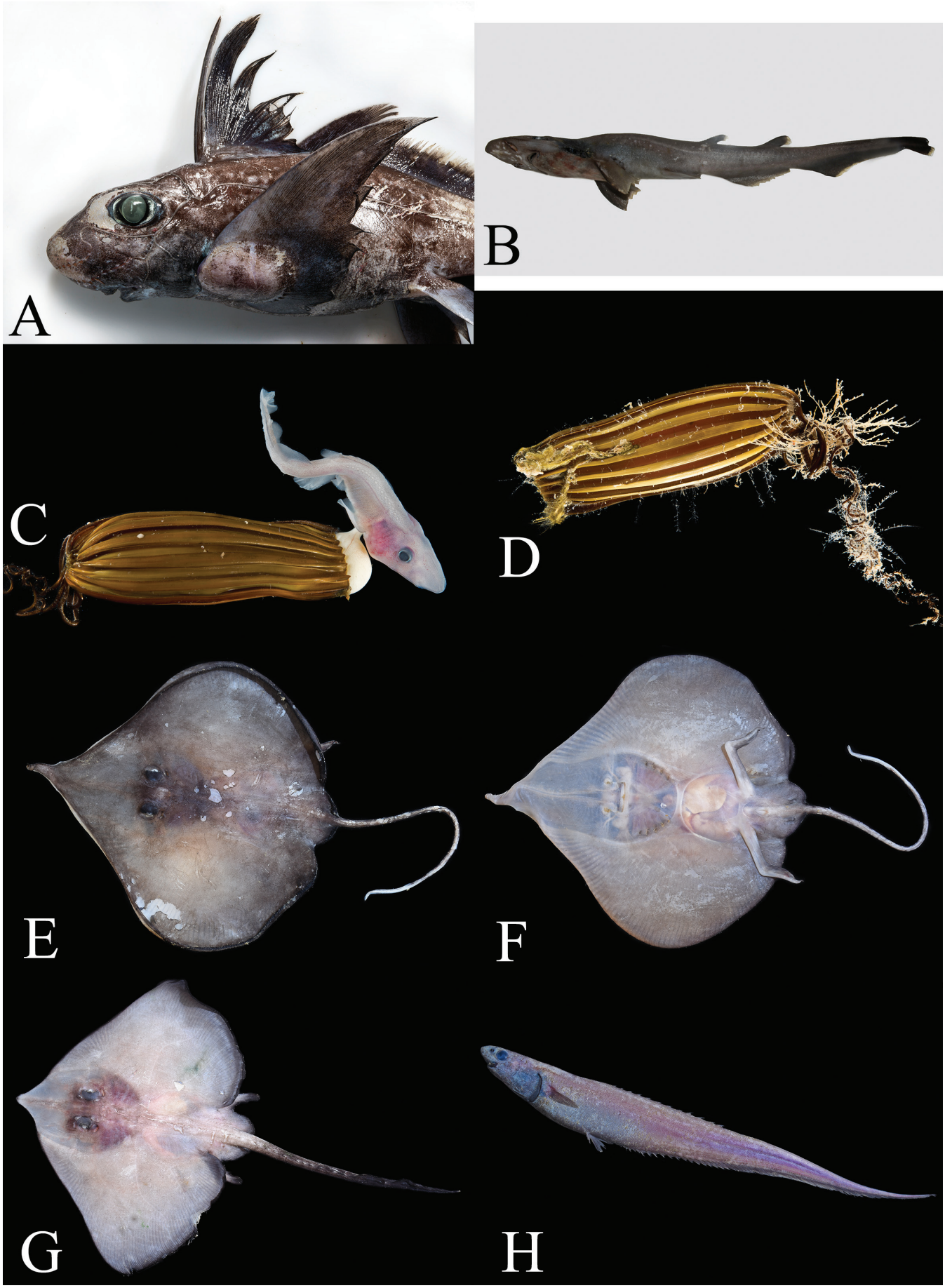

Plate 1. A, *Chimaera* cf. *jordani*, LBRC-F4667, CP33. B, *Apristurus* sp., LBRC-F4713, CP33. C, *Bythaelurus* sp., CP39. D, *Bythaelurus* sp., CP33. E, F, *Sinobatis* cf. *borneensis*, LBRC-F4706, CP33. G, *Notoraja* sp., LBRC-F4481, CP07. H, *Notacanthus* cf. *abbotti*, LBRC-F4618, CP23.

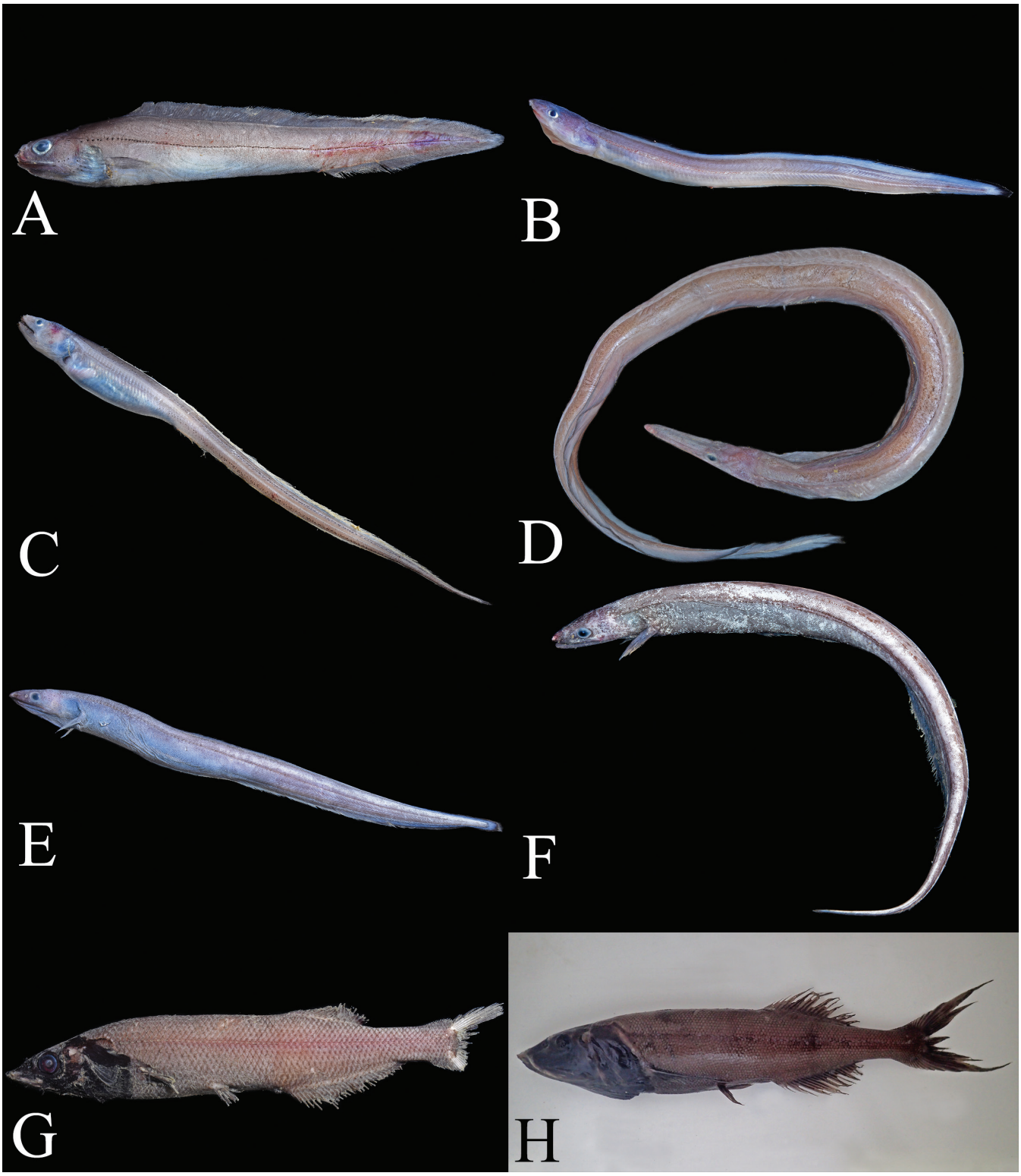

Plate 2. A. *Coloconger raniceps*, LBRC-F4480, CP07. B, *Bathycongrus retrotinctus*, LBRC-F4592, CP20. C, *Bathyuroconger* cf. *vicinus*, LBRC-F4600, CP22. D, *Nettastoma solitarium*, CP50. E, *Synaphobranchus affinis*, LBRC-F4619, CP23. F, *Synaphobranchus* cf. *oregoni*, CP25. G, *Alepocephalus bicolor*, LBRC-F4617, CP23. H, *Talismania brachycephala*, LBRC-F4626, CP29.

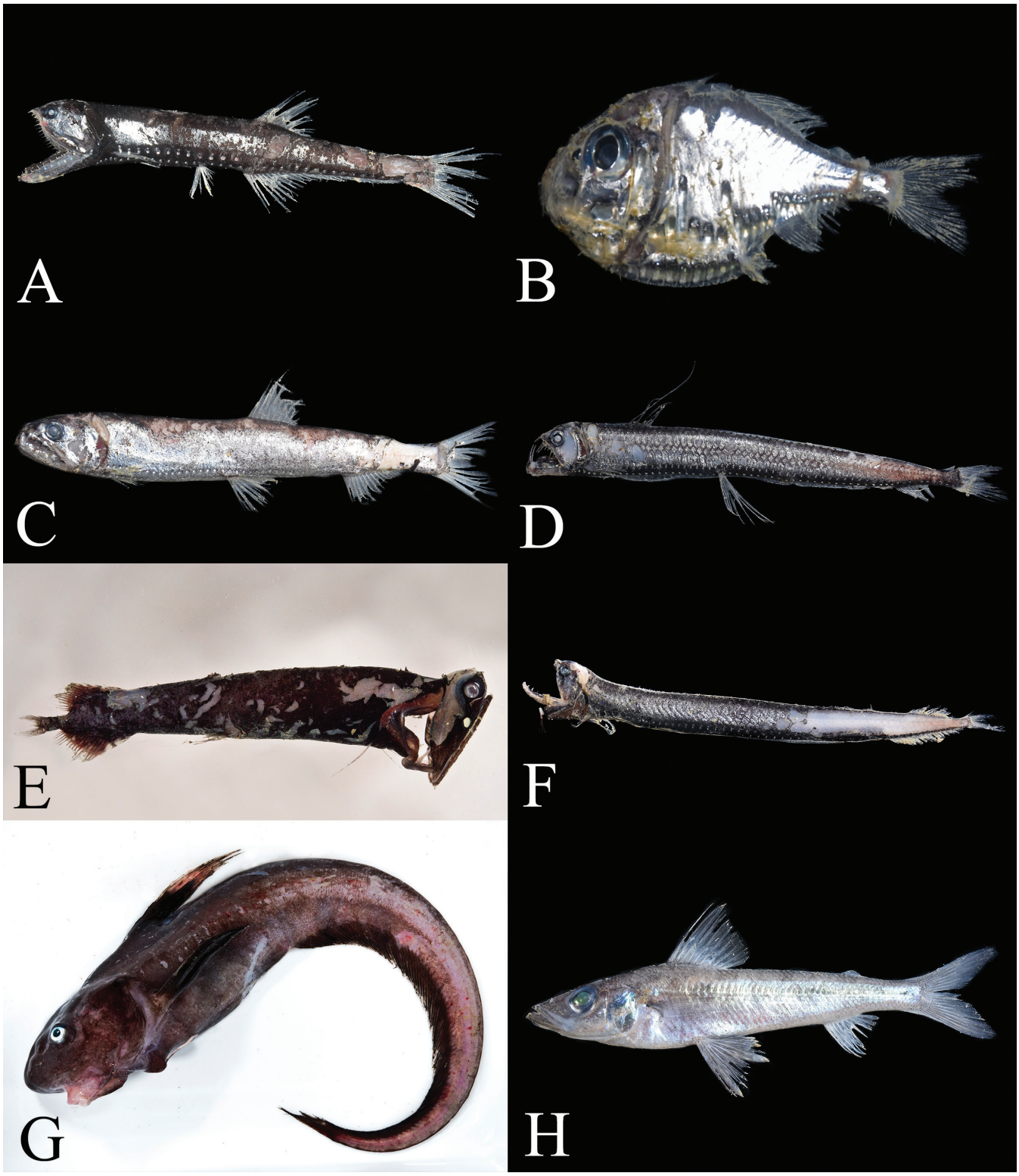

Plate 3. A, *Sigmops elongatus*, LBRC-F4664, CP27B. B, *Polyipnus stereope*, LBRC-F4602, CP22. C, *Astronesthes* sp. 1, LBRC-F4758, CP47. D, *Chauliodus sloani*, LBRC-F4566, CP28. E, *Malacosteus niger*, LBRC-F4562, CP13. F, *Stomias affinis*, LBRC-F4604, CP22. G, *Ijimaia dofleini*, LBRC-F4622, CP23. H, *Chlorophthalmus acutifrons*, LBRC-F4684, CP34.

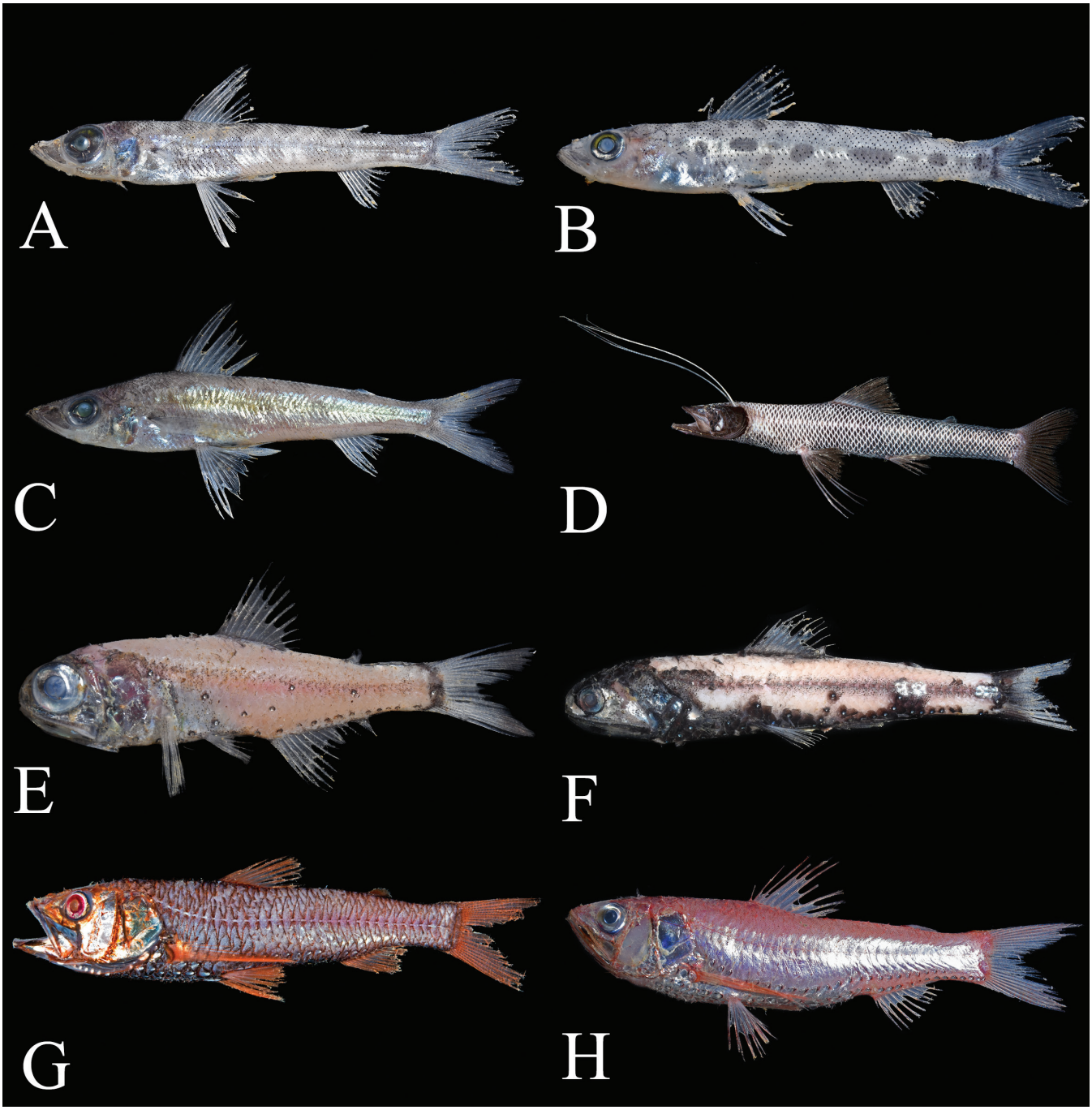

Plate 4. A, *Chlorophthalmus* cf. *albatrossis*, LBRC-F4678, CP34. B, *Chlorophthalmus* cf. *borealis*, LBRC-F4680, CP34. C, *Chlorophthalmus nigromarginatus*, LBRC-F4726, CP37. D, *Bathypterois atricolor*, LBRC-F4653, CP25. E, *Benthosema fibulatum*, LBRC-F4507, CP08. F, *Diaphus garmani*, LBRC-F4745, CP39. G, *Neoscopelus macrolepidotus*, LBRC-F4651, CP25. H, *Neoscopelus microchir*, LBRC-F4581, CP20.

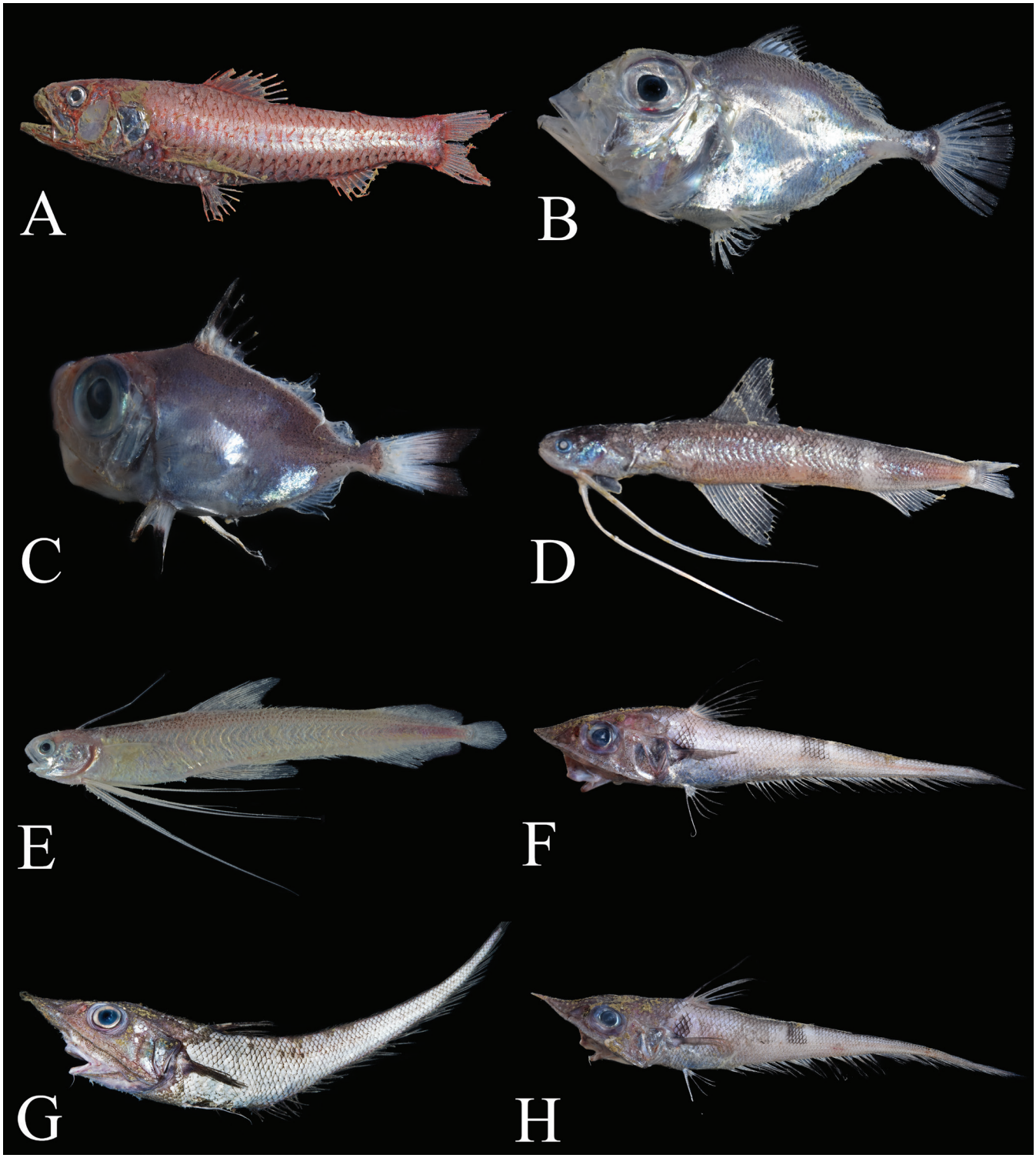

Plate 5. A, *Neoscopelus porosus*, LBRC-F4534, CP12. B, *Cyttomimus affinis*, LBRC-F4580, CP20. C, *Zenion japonicum*, LBRC-F4739, CP38. D, *Bregmaceros* cf. *japonicus*, LBRC-F4609, CP23. E, *Bregmaceros pseudolanceolatus*, LBRC-F4573, DW63. F, *Coelorinchus* cf. *maculatus*, LBRC-F4475, CP07. G, *Coelorinchus smithi*, CP26. H, *Coelorinchus triocellatus*, LBRC-F4479, CP07.

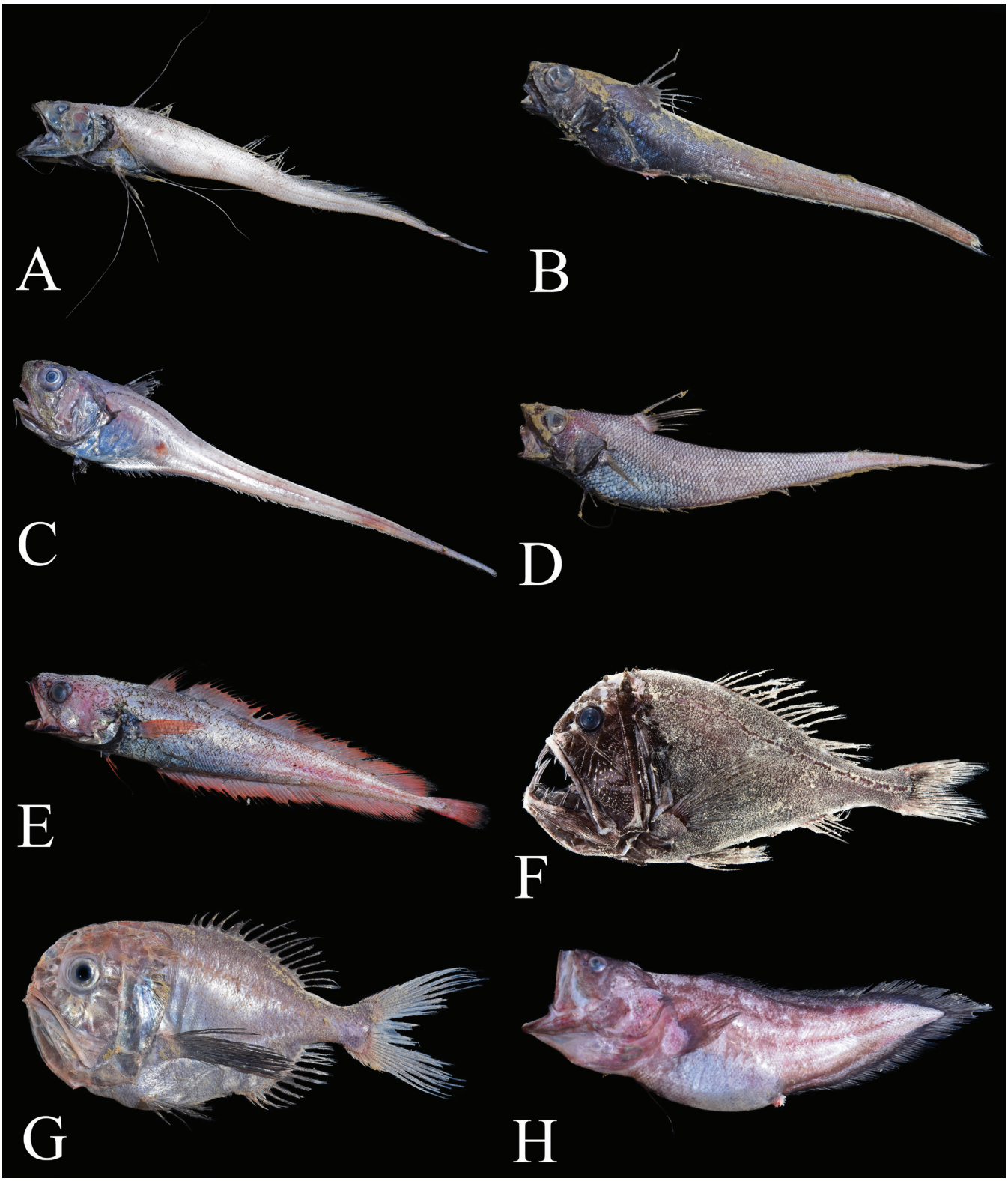

Plate 6. A, *Gadomus colletti*, LBRC-F4594, CP22. B, *Kuronezumia* cf. *leonis*, LBRC-F4709, CP33. C, *Malacocephalus laevis*, LBRC-F4591, CP20. D, *Nezumia spinose*, LBRC-F4532, CP12. E, *Gadella jordani*, LBRC-F4508, CP08. F, *Anoplogaster cornuta*, LBRC-F4575, CP18. G, *Hoplostethus melanopus*, LBRC-F4669, CP35. H, *Grammonus robustus*, LBRC-F4585, CP20.

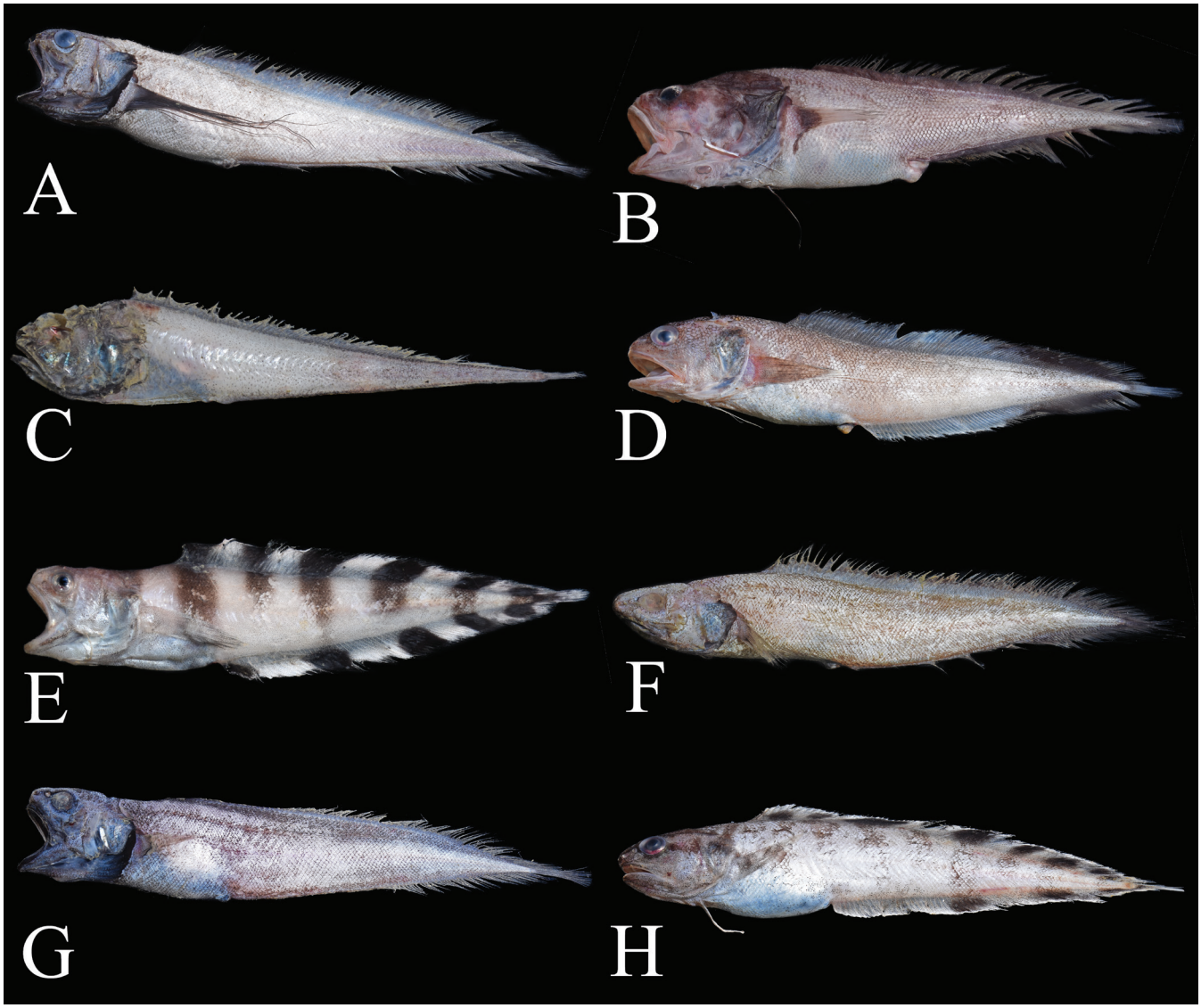

Plate 7. A, *Dicrolene tristis*, LBRC-F4599, CP22. B, *Diplacanthopoma brunnea*, LBRC-F4536, CP12. C, *Glyptophidium argenteum*, LBRC-F4529, CP12. D, *Hoplobrotula armata*, LBRC-F4707, CP33. E, *Hoplobrotula* sp., LBRC-F4708, CP33. F, *Monomitopus conjugator*, LBRC-F4533, CP12. G, *Monomitopus* sp. 1, LBRC-F4597, CP22. H, *Neobythites andamanensis*, LBRC-F4477, CP07.

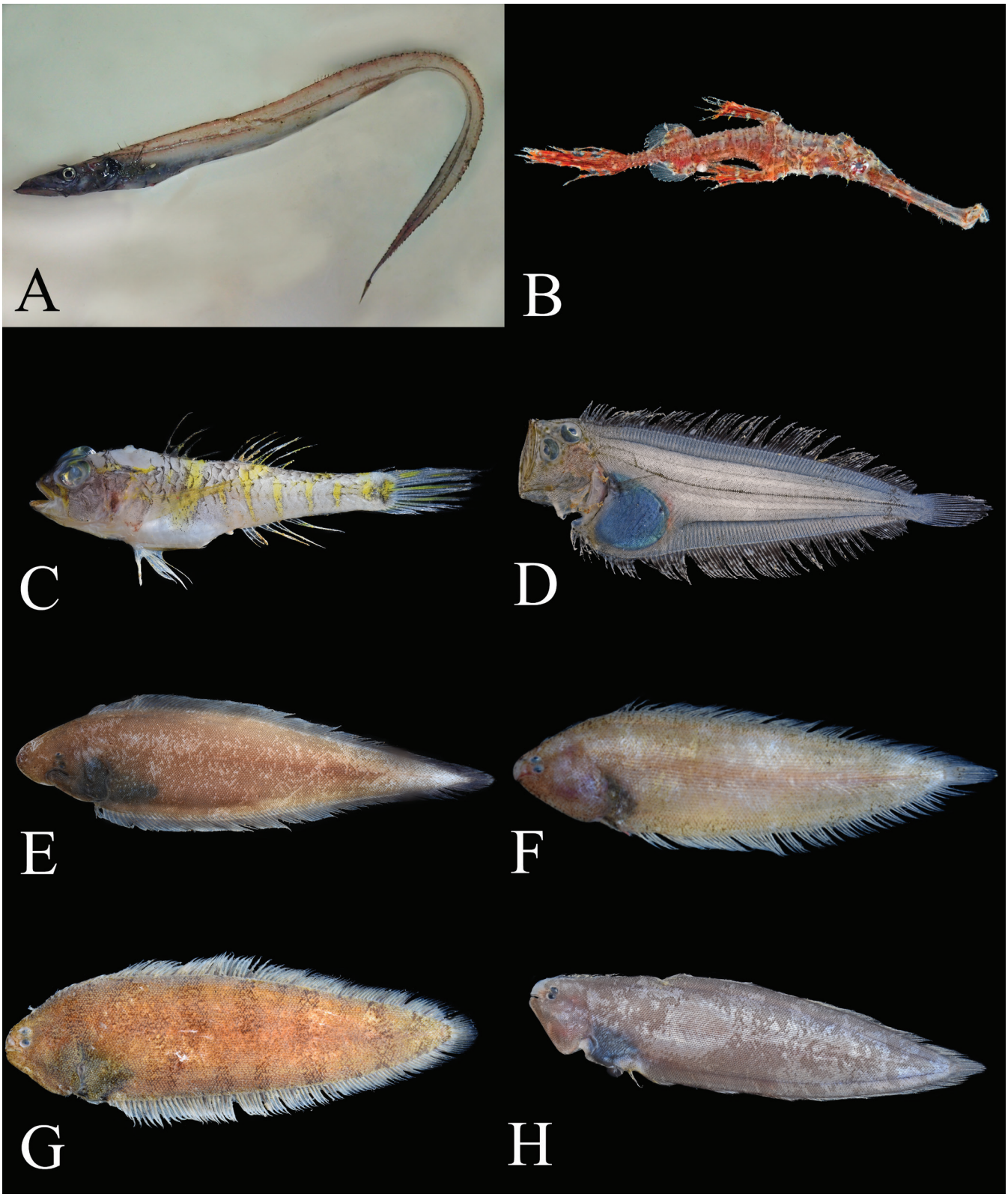

Plate 8. A, *Benthodesmus tenuis*, LBRC-F4552, CP12. B, *Solenostomus paradoxus*, uncat., DW16. C, *Obliquagobius yamadai*, LBRC-F4737, CP38. D, *Chascanopsetta lugubris*, LBRC-F4693, CP34. E, *Cynoglossus* cf. *suyeni*, LBRC-F4725, CP37. F, *Symphurus bathyspilus*, LBRC-F4589, CP20. G, *Symphurus* cf. *thermophiles*, LBRC-F4692, CP34. H, *Symphurus strictus*, LBRC-F4613, CP23.

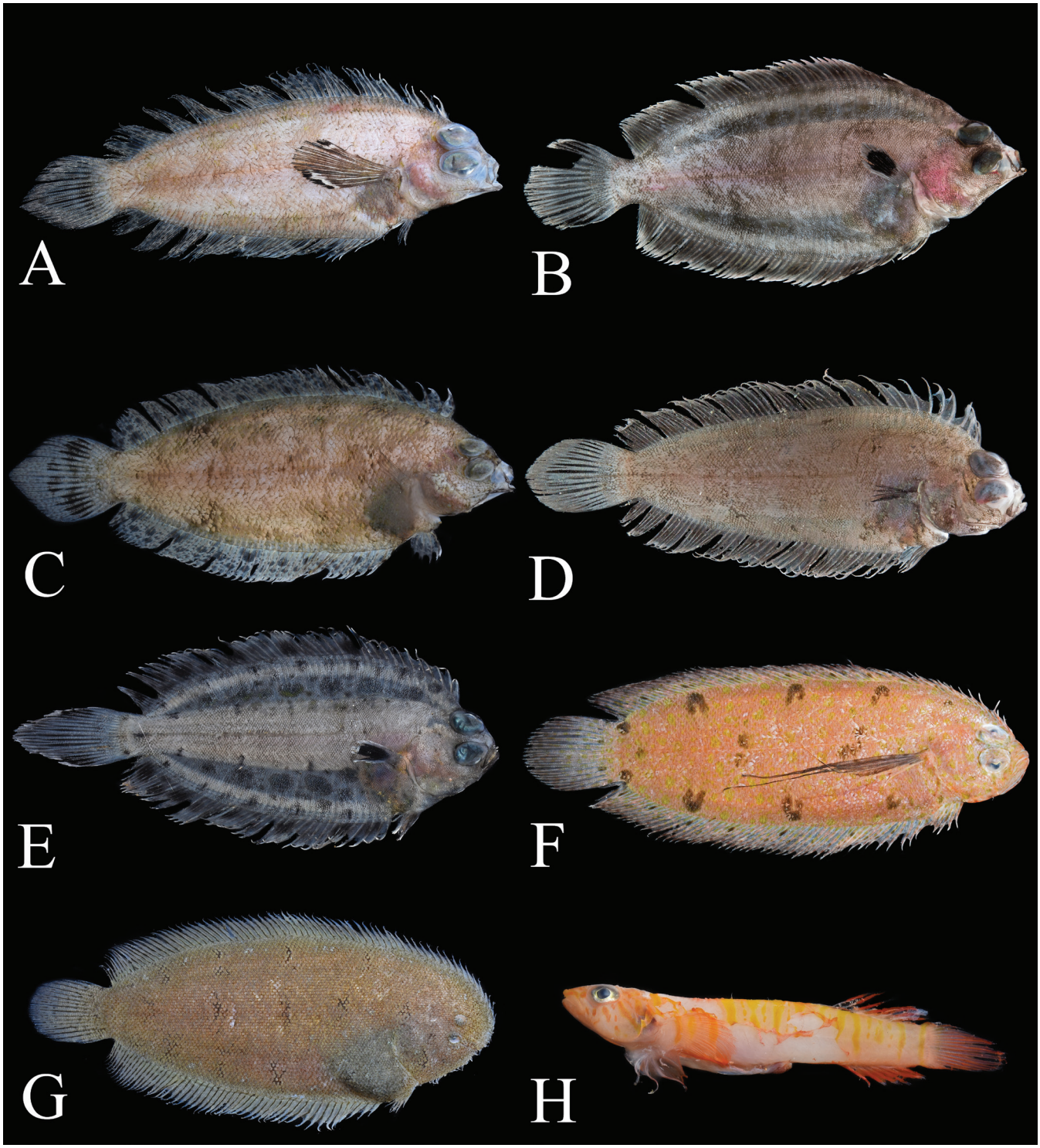

Plate 9. A, *Nematops macrochirus*, LBRC-F4690, CP34. B, *Poecilopsetta colorata*, LBRC-F4740, CP38. C, *Poecilopsetta plinthus*, LBRC-F4724, CP37. D, *Poecilopsetta praelonga*, LBRC-F4459, CP02. E, *Poelioseptta* sp. 1, LBRC-F4741, CP38. F, *Samariscus sunieri*, LBRC-F4695, CP34. G, *Aseraggodes cyaneus*, LBRC-F4727, CP37. H, *Kopua* sp., LBRC-F4736, CP38.

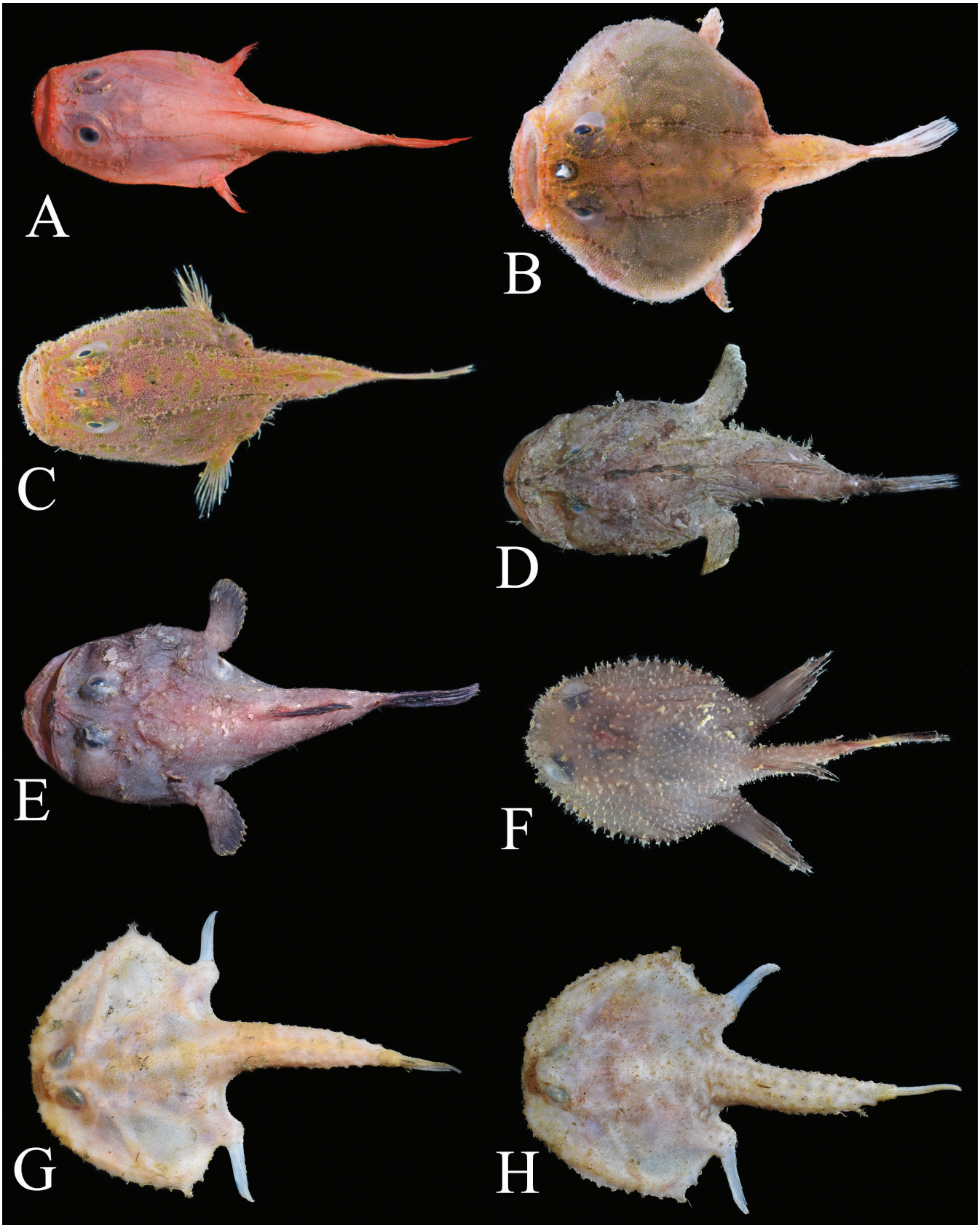

Plate 10. A, *Chaunax apus*, LBRC-F4527, CP12. B, *Chaunax penicillatus*, LBRC-F4578, CP20. C, *Chaunax gomoni*, LBRC-F4677, CP34. D, *Lophiodes naresi*, LBRC-F4732, CP38. E, *Lophiodes triradiatus*, LBRC-F4537, CP12. F, *Coelophrys micropa*, uncat., CP44. G, *Halicmetus* cf. *westraliensis*, LBRC-F4525, CP12. H, *Halicmetus reticulatus*, LBRC-F4476, CP07.

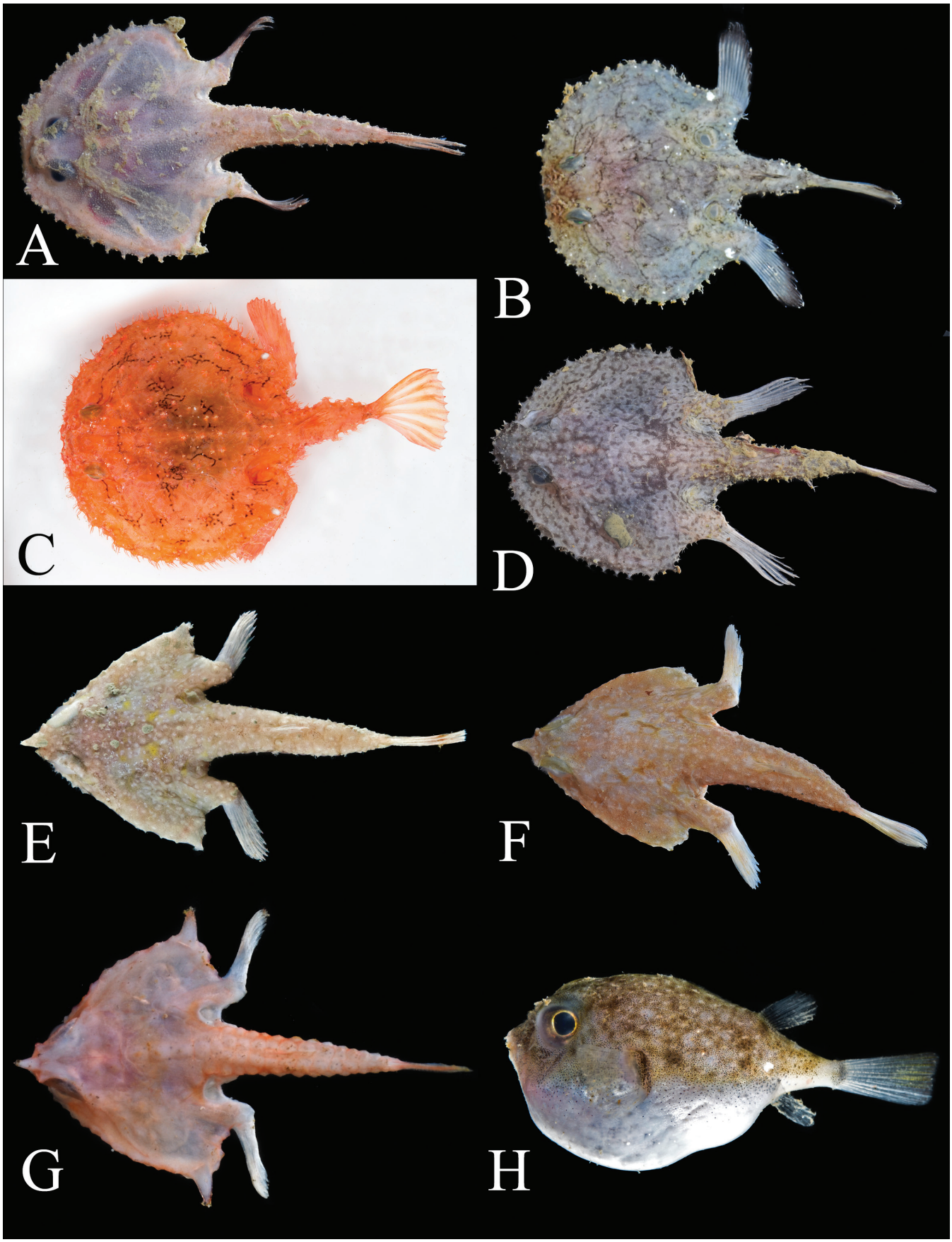

Plate 11. A, *Halicmetus ruber*, LBRC-F4603, CP22. B, *Halieutaea* cf. *stellata*, uncat., DW32. C, *Halieutaea stellata*, LBRC-F4714, DW32. D, *Halieutopsis nasutus*, LBRC-F4526, CP12. E, *Malthopsis* cf. *annulifera*, LBRC-F4936, CP03. F, *Malthopsis* cf. *kobayashii*, LBRC-F4719, CP37. G, *Malthopsis mitrigera*, LBRC-F4747, CP39. H, *Tylerius spinosissimus*, uncat., CP38.

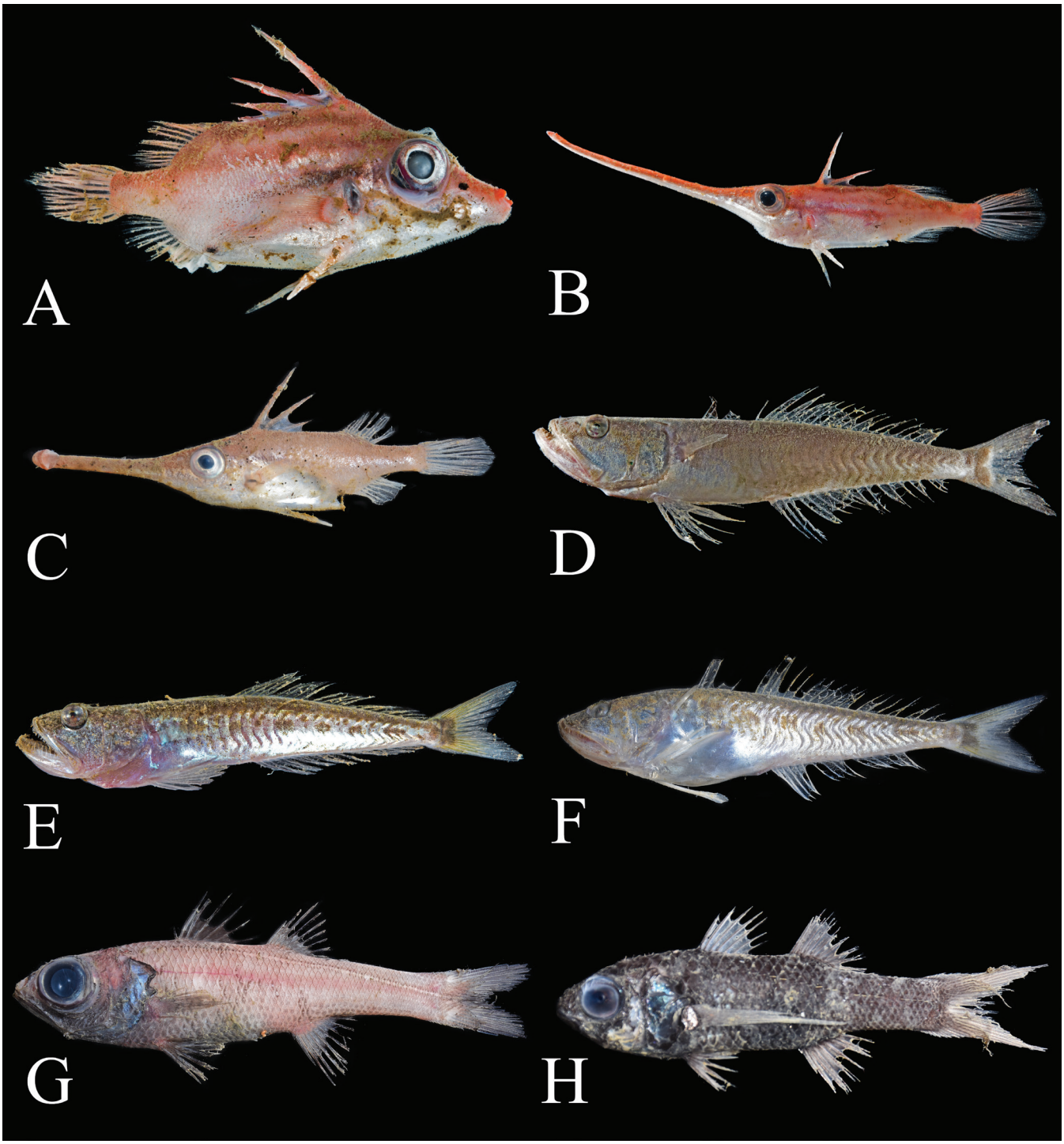

Plate 12. A, *Bathyphylax bombifrons*, uncat., DW32. B, *Halimochirurgus alcocki*, LBRC-F4743, CP38. C, *Macrorhamphosodes uradoi*, LBRC-F4676, CP34. D, *Champsodon longipinnis*, LBRC-F4452, CP02. E, *Champsodon nudivittis*, uncat., CP37. F, *Champsodon* sp. 1, LBRC-F4721, CP37. G, *Epigonus* sp. 1, LBRC-F4598, CP22. H, *Howella zina*, LBRC-F4607, CP23.

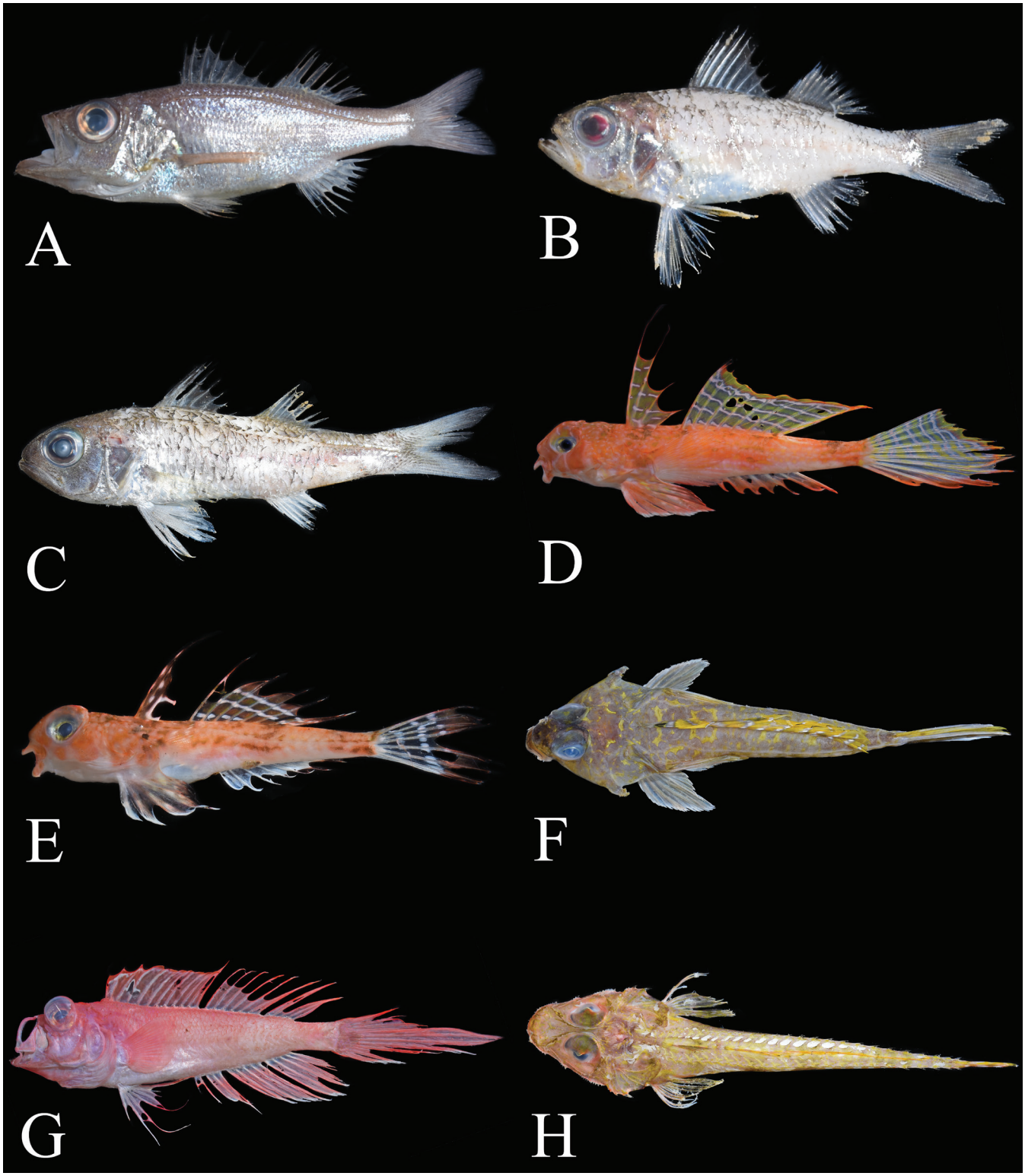

Plate 13. A, *Malakichthys elegans*, LBRC-F4705, CP35. B, *Parascombrops yamanouei*, LBRC-F4686, CP34. C, *Synagrops japonicus*, LBRC-F4685, CP34. D, *Foetorepus* cf. *kamoharai*, LBRC-F4730, CP38. E, *Foetorepus* sp. 1, LBRC-F4738, CP38. F, *Repomucenus* sp. 1, LBRC-F4682, CP34. G, *Owstonia* cf. *totomiensis*, LBRC-F4731, CP38. H, *Hoplichthys* sp. 1, LBRC-F4688, CP34.

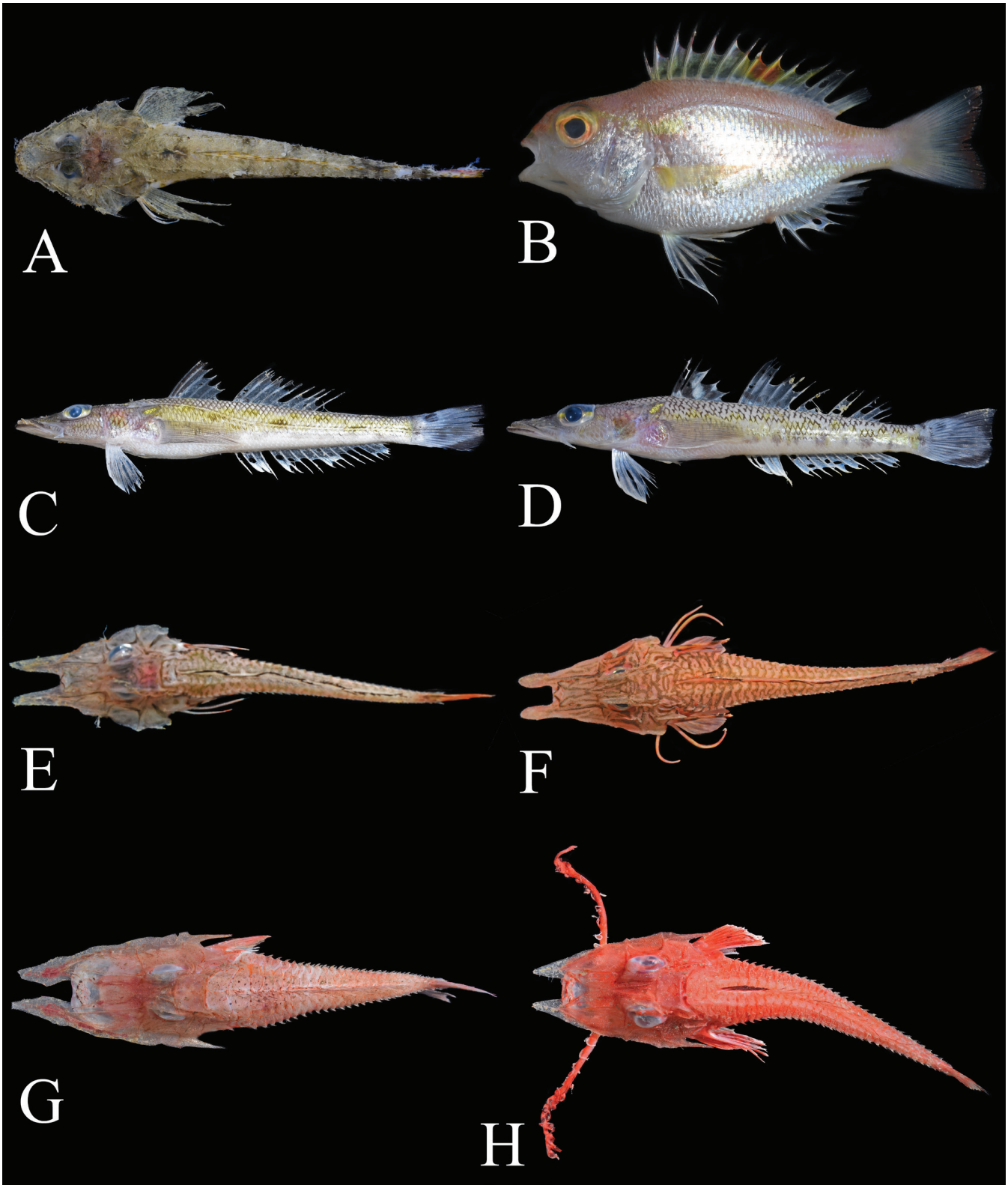

Plate 14. A. *Hoplichthys* sp. 2, LBRC-F4728, CP37. B, *Parascolopsis rufomaculatus*, LBRC-F4718, CP37. C, *Bembrops* cf. *caudimacula*, LBRC-F4687, CP34. D, *Bembrops* cf. *curvatura*, LBRC-F4582, CP20. E, *Peristedion riversandersoni*, LBRC-F4704, CP33. F, *Peristedion liorhynchus*, LBRC-F4667, CP34. G, *Satyrichthys clavilapis*, LBRC-F4483, CP07. H, *Scalicus orientalis*, LBRC-F4579, CP20.

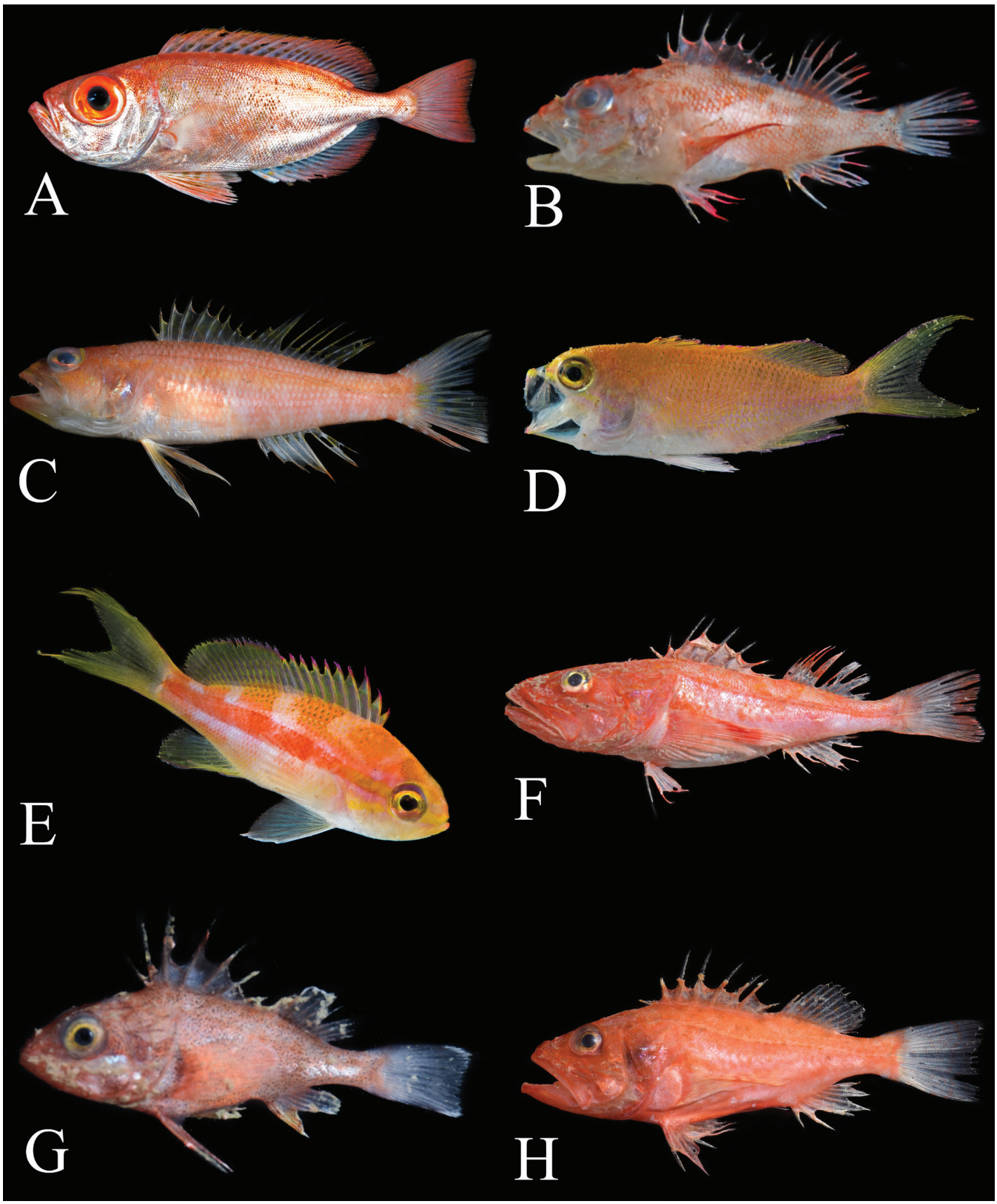

Plate 15. A, *Priacanthus macracanthus*, LBRC-F4734, CP37. B, *Sebastolobus* cf. *macrochir*, LBRC-F4700, CP33. C, *Chelidoperca flavolineata*, LBRC-F4715, CP37. D, *Pseudanthias* cf. *pleurotaenia*, uncat., DW16. E, *Pseudanthias fasciatus*, uncat., DW16. F, *Lioscorpius longiceps*, LBRC-F4576, CP20. G, *Setarches guentheri*, LBRC-F4590, CP20. H, *Setarches longimanus*, LBRC-F4716, CP37.

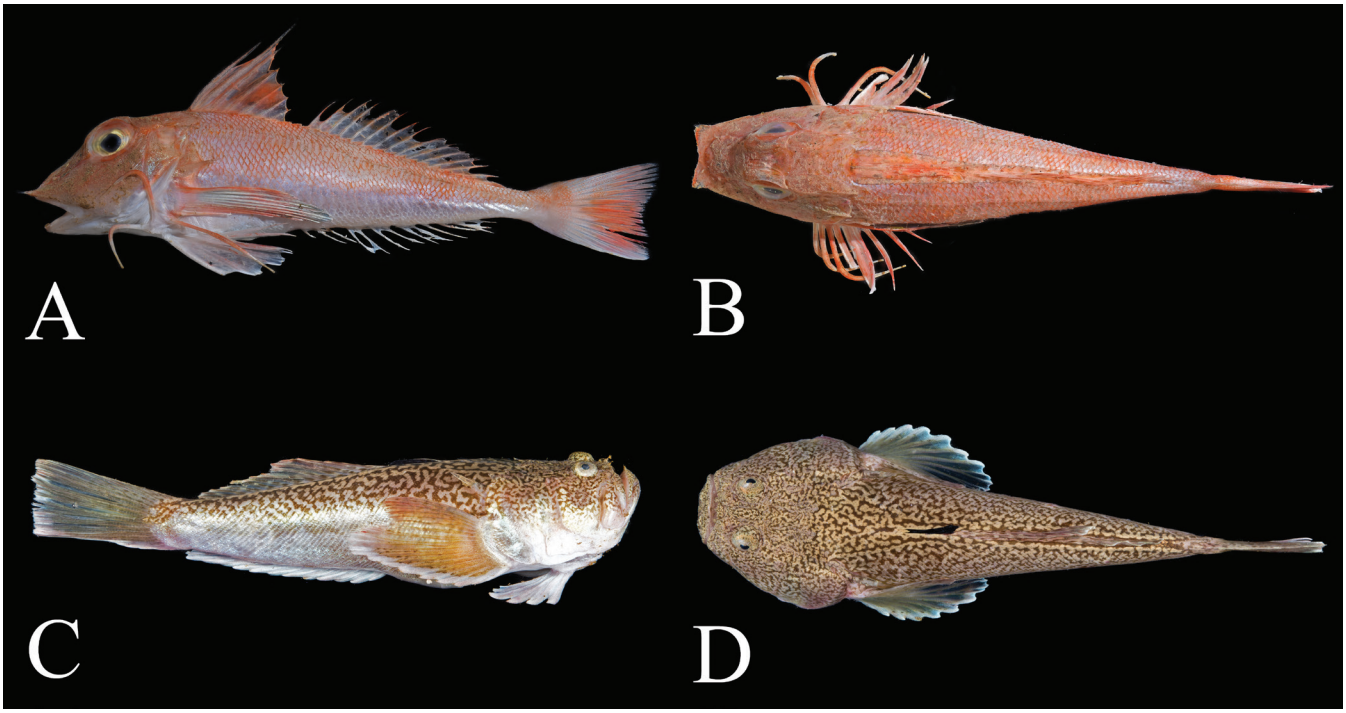

Plate 16. A, *Lepidotrigla macracaina*, LBRC-F4720, CP37. B, *Lepidotrigla spiloptera*, LBRC-F4696, CP34. C, D, *Uranoscopus* sp. 1, uncat., CP37.