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A new cutthroat eel of the genus *Synaphobranchus* (Anguilliformes: Synaphobranchidae) from Taiwan

HSUAN-CHING HO[1,2,5], WEI-CHUN HONG[3] & HONG-MING CHEN[3,4]

[1]*National Museum of Marine Biology & Aquarium, Pingtung Taiwan*
[2]*Institute of Marine Biology, National Dong Hwa University, Pingtung, Taiwan*
[3]*Department of Aquaculture, National Taiwan Ocean University, Keelung, Taiwan*
[4]*Center of Excellence for the Oceans, National Taiwan Ocean University, Keelung, Taiwan*
[5]*Corresponding author. E-mail. ogcoho@gmail.com*

Abstract

A new species of the cutthroat eel genus *Synaphobranchus* is described from Taiwan on the basis of 12 types and 11 non-type specimens. The new species can be distinguished from its congeners in having most of its head and abdomen naked, except for a patch of scales behind the eye, dorsal surface of trunk naked or covered by scattered scales; scales oval in shape; dorsal fin slightly before to about opposite to origin of anal fin; mean vertebral formula 28-28-131, precaudal vertebrae 50–56, total vertebrae 124–135. Comments of the congeners occurred in adjacent regions are provided.

Key words: Pisces, taxonomy, Synaphobranchidae, *Synaphobranchus oligolepis*, new species

Introduction

The eel family Synaphobranchidae is widespread in the vertical ocean column from less than 100 to several thousand meters. The family currently comprises 12 genera and about 40 species (Eschmeyer *et al.*, 2018), many of which were recently described (Ho *et al.*, 2015; this volume). Species of *Synaphobranchus* belong to a small genus with five species currently recognized (Melo, 2007).

Although Sulak & Shcherbachev (1997) provided a detailed examination of six synaphobranchid genera, their species of *Synaphobranchus* seem to have a very broad range of vertebral values and are likely species complex with geographic variations. Melo (2007) described a new species, *S. calvus,* and provided an updated key to the species.

In Taiwan, Chen & Mok (2001) mentioned a record of *S. kaupii*, but no details were provided. In his unpublished thesis, Chen recorded three species of *Synaphobranchus*, namely *S. kaupii* Johnson, 1862, *S. affinis* Günther, 1877a and an undescribed species. Shao *et al.* (2008) recognized *S. affinis*, *S. kaupii* and *S. brevidorsalis* Günther, 1877b based on specimens collected by research vessels from around Taiwan.

Re-examination of the Taiwanese specimens in collections revealed that most specimens recognized as *S. affinis* actually represent an undescribed species and the presence of *S. brevidorsalis* and *S. kaupii* in Taiwan is confirmed. The identification of species of *Synaphobranchus* in Taiwan is discussed.

Materials and methods

Methods for taking morphometric measurements and counts generally follow Böhlke (1989). Total length (TL) is used throughout. Head length is the distance from tip of snout to upper base of pectoral fin. Predorsal and preanal length are distances from tip of snout to origin of the fins. Body depths are measured at base of pectoral fin and anus. Body width is measured at anus. Snout length is measured from tip of snout to anterior margin of eye. Eye

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diameter is horizontal distance of the eye. Interorbital width is the narrowest distance between upper margins of both eyes. Gill opening length is the longest diameter. Trunk length is the horizontal distance between pectoral-fin base and origin of anal fin. Tail length is measured from the origin of anal fin to tip of caudal fin. Vertebral counts are made directly from x-ray films or with a digital x-ray machine. Institutional abbreviations follow Eschmeyer *et al.* (2018, online version).

Family Synaphobranchidae

***Synaphobranchus oligolepis* sp. nov.**
English name: Naked-belly cutthroat eel.
Figs. 1–3, 4A–B; Table 1.

Holotype. NMMB-P26670 (489 mm TL), off Dong-gang, Pingtung, southwestern Taiwan, northern South China Sea, ca. 300 m, bottom trawl, 9 Aug. 2017.

Paratypes (*indicates these with data taken). *NMMB-P7604 (391 mm TL), *NMMB-P7609 (392 mm TL), *NMMB-P25237 (419 mm TL); all collected from off Kaohsiung, southwestern Taiwan, northern South China Sea, ca. 300 m, bottom trawl, 4 Jul. 2004. *NMMB-P20636 (266 mm TL), Chang-bin, Taitung, southeastern Taiwan, 19 Mar. 2012. *NMMB-P23547 (275 mm TL), Dong-gang, Pingtung, southwestern Taiwan, 22 Jul. 2016. NMMB-P25959 (440 mm TL), Chang-bin, 2016. *TOU-AE7151 (455 mm TL), 2 Jul. 2014; *TOU-AE7153 (453 mm TL), 19 Nov. 2014; *TOU-AE6680 (352 mm TL), 2 Nov. 2012; all collected from off Shihtiping, Taitung, eastern Taiwan, longline. TOU-AE7284 (690 mm TL), TOU-AE7285 (502 mm TL), Chang-bin, Taitung, eastern Taiwan.

FIGURE 1. *Synaphobranchus oligolepis* **sp. nov.**, holotype, NMMB-P26670, 489 mm TL. A. lateral view. B. lateral view of trunk, the boundary of naked and scaled regions are marked by dots, anterior to left. C. lateral view of head, the scaled region is marked by dots. Bars indicate origin of dorsal fin (above) and anal fin (below).

Non-types. ASIZP 63731 (270 mm TL); ASIZP 63798 (510 mm TL); 22˚37'N 120˚11'E, off Kaoshiung, southwestern Taiwan, 821 m, otter trawl, 29 Aug. 2002. ASIZP 63729 (295 mm TL), 22˚32'N, 122˚01'E, off Taitung, southeastern Taiwan, 1027 m, otter trawl, 27 Aug. 2003. ASIZP 75078 (530 mm TL), 22˚13'N, 120˚24'E, off Pintung, southwestern Taiwan, 68–347 m depth, otter trawl, 29 Jul. 2014. NMMB-P23548 (178 mm TL), 2 Apr. 2014; NMMB-P21180 (167 mm TL); 2 Apr. 2014; TOU-AE5668 (540 mm TL), 24 Jul. 2010; TOU-AE5669 (488 mm TL), 24 Jul.2010; TOU-AE7081 (393 mm TL), 24 Jul. 2010; TOU-AE7266 (199 mm TL), 9 Aug. 2016; TOU-AE7267 (128 mm TL), 9 Aug. 2016; all collected from Dong-gang, southwestern Taiwan, market, bottom trawl.

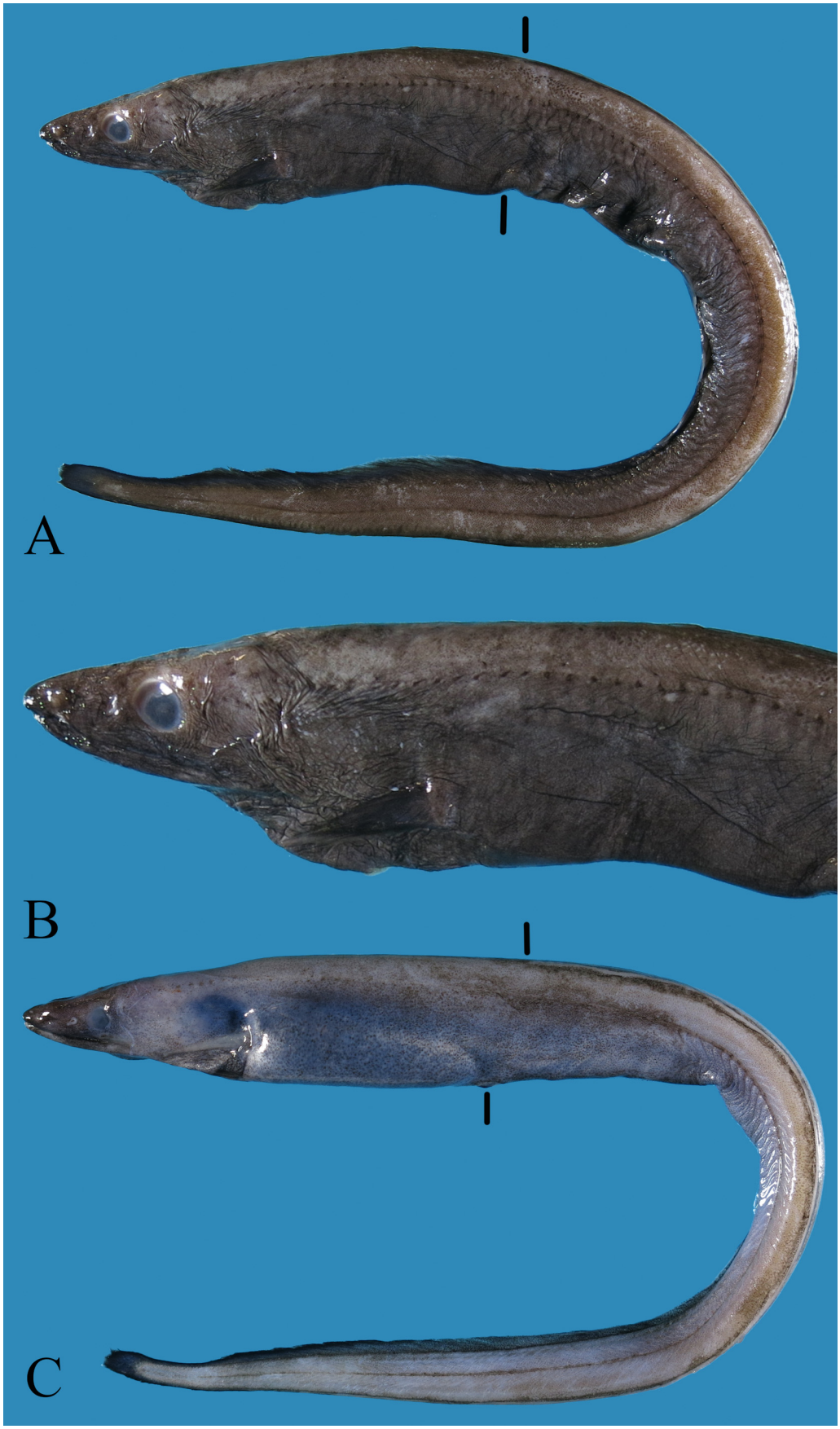

FIGURE 2. *Synaphobranchus oligolepis* **sp. nov.** A–B. NMMB-P25959, paratype, 440 mm TL. C. NMMB-P23547, paratype, 275 mm TL. Bars indicate origin of dorsal fin (above) and anus (below).

Diagnosis. A species of *Synaphobranchus* with the origin of dorsal fin slightly before to about opposite to origin of anal fin; body scale oval in shape; most parts of head and abdomen naked, except for a scaled patch on cheek behind the eyes; pectoral fin pale with a blackish base; mean vertebral formula 28-28-131, precaudal veterbrae 50–56, and total vertebrae 124–135.

Description. Morphometric and meristic data are provided in Table 1. Data of holotype (mm): total length 489; head length 66.3; predorsal length 122; preanal length 147; trunk length 80.7; tail length 342; depth at gill opening 28.9; depth at anus 28.1; width at anus 15.9; snout length 23.5; eye diameter 7.9; interorbital width 11.9; upper jaw length (rictus) 31.8; pectoral-fin length 24.5; length of gill opening 11.7.

TABLE 1. Morphometric and meristic data of *Synaphobranchus oligolepis* **sp. nov.**

	Holotype	Paratypes	Non-types
TL (mm)	489	266–455	128–540 (n=11)
In % TL			
Head length	13.6	14.0 (12.8–15.2)	13.7 (11.7–14.6)
Predorsal	24.9	29.6 (25.8–34.1)	29.5 (24.4–35.8)
Preanal	30.1	28.3 (25.6–33.0)	28.3 (24.5–30.2)
Trunk	16.5	14.3 (11.9–17.8)	14.6 (11.3–17.1)
Tail	69.9	72.4 (70.1–74.4)	71.7 (69.8–75.5)
Depth at gill opening	5.9	5.5 (2.8–7.9)	5.9 (2.5–8.9)
Depth at anus	5.7	6.9 (5.9–8.1)	5.7 (3.4–8.2)
Width at anus	3.3	6.3 (3.3–11.0)	3.2 (2.1–6.5)
Snout	4.8	4.4 (3.9–4.9)	4.1 (3.3–4.7)
Eye	1.6	2.0 (1.6–2.3)	2.0 (1.6–2.8)
Interorbital	2.4	2.3 (1.9–3.1)	2.1 (1.4–2.9)
Postorbital	8.1	7.9 (5.9–9.1)	7.4 (6.2–8.3)
Upper jaw	8.5	7.0 (6.0–7.8)	7.2 (5.5–8.2)
Gill opening	2.4	2.5 (2.1–3.3)	2.7 (1.7–3.2)
Pectoral fin	5.0	5.2 (4.4–5.9)	5.4 (4.0–6.5)
In % HL			
Snout	35.4	31.3 (28.6–34.2)	30.2 (23.1–34.6)
Eye	11.9	14.5 (12.4–17.6)	14.9 (11.8–19.5)
Interorbital	17.9	16.7 (13.0–24.0)	15.2 (9.9–19.9)
Post-eye	59.9	58.4 (53.5–62.9)	53.9 (49.1–57.7)
Upper jaw	53.0	50.3 (46.6–54.1)	52.5 (47.1–62.3)
Gill opening	17.6	18.1 (14.5–21.7)	20.2 (17.2–23.5)
Pectoral-fin	37.0	38.4 (34.3–42.8)	39.4 (27.9–46.2)
Meristics		n=8	
Predorsal vertebrae	21	25–33	26–32
Preanal vertebrae	30	25–31	23–30
Precaudal vertebrae	53	50–56	52–54
Total vertebrae	132	124–135	128–135
Pre-pectoral pores	9	5–10	6–10
Pre-dorsal pores	21	27–33	21–30
Pre-anal pores	28	24–31	25–33
Total pores	ca.125	132–135	124–140

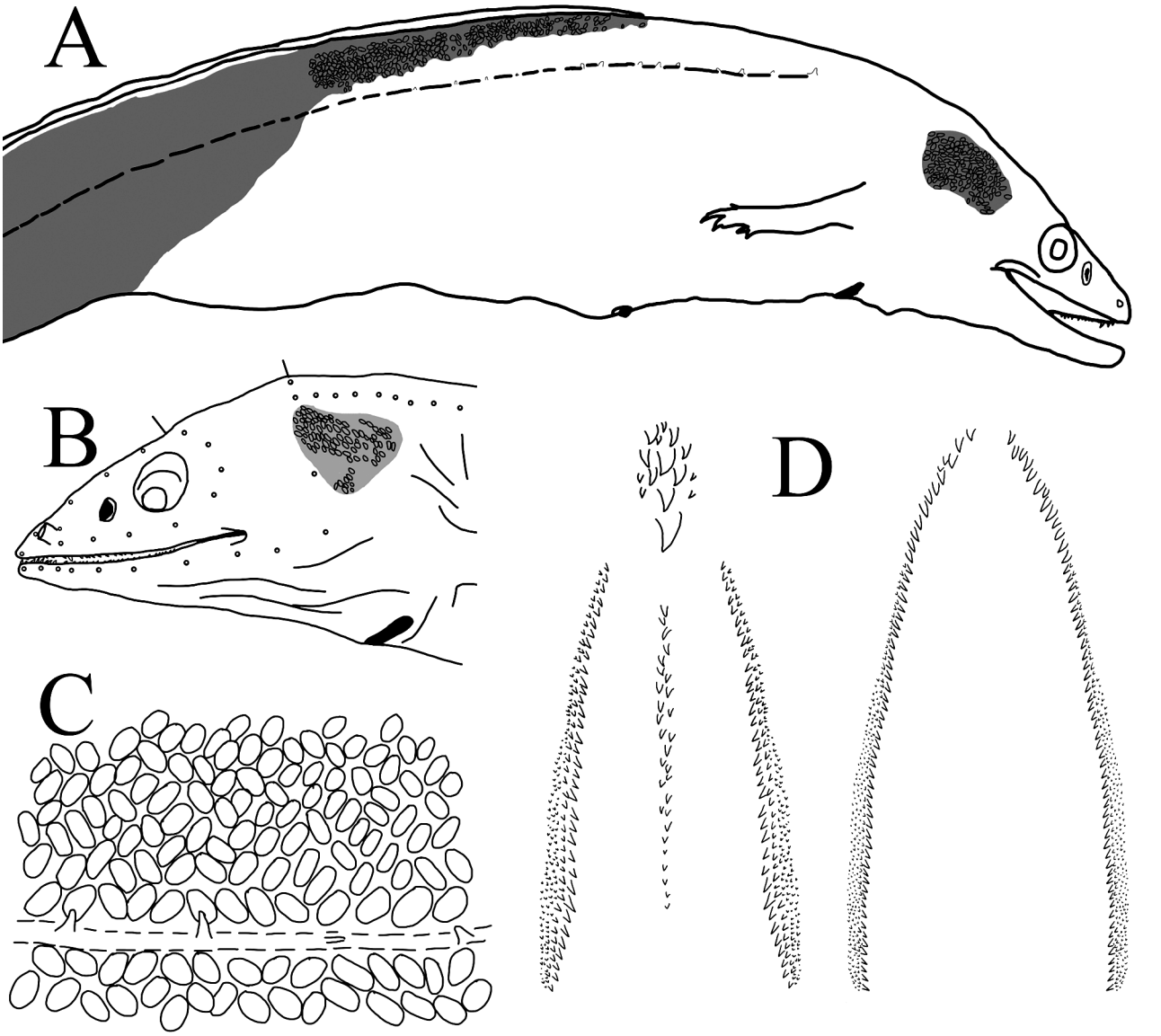

FIGURE 3. *Synaphobranchus oligolepis* **sp. nov.** A. NMMB-P25237, scaled regions are shaded in gray. B. Head pores, NMMB-P7604, bars indicate the frontal pore (left) and median supratemporal pore (right). C. Scales on lateral side of body, from TOU-AE7151. D. Tooth pattern, from the holotype.

Body anguilliform, slender and compressed, gradually tapering posteriorly. Caudal fin region truncated. Greatest body depth at dorsal-fin origin. Pectoral fin well developed, triangular, situated above posterior margin of gill opening. Gill openings at ventral surface of head, externally united at midline and internally separated by body wall. Pelvic fin absent. Dorsal and anal fins confluent with caudal fin. Dorsal-fin origin about same vertical of that of anal fin in most specimens examined, some individuals with origin of dorsal fin forward to the anus and some just slightly behind the anus, predorsal length 24.9–34.1% TL. Anal-fin origin just anterior to anus. Anal-fin rays better developed than those of dorsal fin.

Head not clearly distinguished from trunk, laterally compressed. Mouth terminal, lower jaw projects slightly beyond tip of snout. Jaws long, the gape extends posteriorly beyond the eyes. Anterior nostril tubular, directed anteroventrally. Posterior nostril nearly circular, with low rim restricted to anterior margin. Eye oval to rounded. Gill openings ventral, horizontal, internally united at midline, but internally separated by body wall, slightly anterior to origin of pectoral fin.

Scales oval to slightly elongated (Figs. 3C, 4B); a scale patch on cheek between eye and pectoral fin (Figs. 1C,

3B, 4A); most of head, nape and abdomen naked (Figs. 1–3); scattered scales may be present on dorsal surface of trunk in a few individuals, others either entirely naked or with damaged skin and not easy to detect.

Teeth conical to fang-like. Teeth on intermaxilla forming a narrow, oval patch, in about 5 (3–5) rows, larger teeth on medial row, few small teeth on each side of the patch; a space between intermaxillary and vomerine teeth; vomer with single row of small fang-like teeth, extending to about 3/4 of length of lower jaw and behind the posterior margin of eye (slightly shorter in some individuals); teeth on both jaws forming narrow bands, gradually expanded posteriorly, narrow on both ends, anterior portion with 2 irregular rows of large teeth, those along the innermost margin larger than outer row and slightly smaller posteriorly, those on the rest of the patch gradually becoming multiserial and villiform (Fig. 3D).

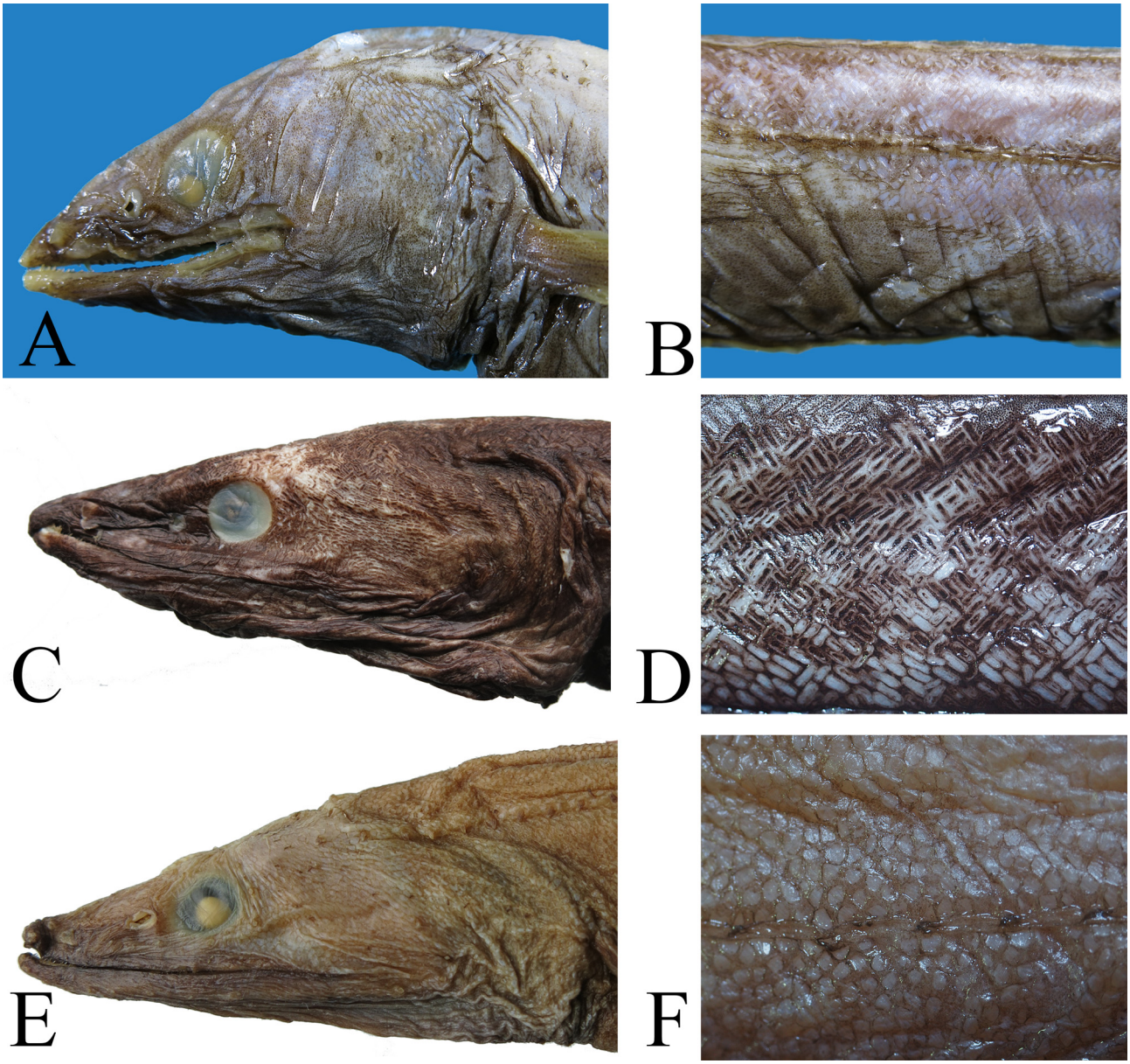

FIGURE 4. Head and body scales of three *Synaphobranchus* species. A–B. *Synaphobranchus oligolepis* **sp. nov.**, NMMB-P7604. C–D. *Synaphobranchus kaupii*. C. USNM 372012 (reversed). D. ASIZP 64275. E–F. *Synaphobranchus brevidorsalis*. E. USNM 117982 (from Japan, reversed). F. ASIZP 64244. Anterior to left, not to scale.

Head pore system complete, pores small (Fig. 3B). Supraorbital with 5 pores, first pore at underside of tip of snout, second pore at snout tip anterior to anterior nostril, third and fourth pores on dorsal surface of snout, fifth pore at upper corner of anterior margin of eye. A single small adnasal pore at posterodorsal corner of anterior nostril. Infraorbital with 8 pores, first pore below and behind anterior nostril, second to fourth pore along the upper jaw, four pores behind the eye. Paired frontal pores at interorbital space, one at each side. Mandibular with 9 (8–9)

pores; preopercular with 2 (2–4) pores, the uppermost pore about below the second lateral-line pore. Supratemporal with 3 pores (if outermost pore counted as first pore of lateral line). Lateral-line pores: before pectoral-fin base 9 (5–10); predorsal 21 (21–33); preanal 28 (24–33); total pores ca. 125 (124–140).

TABLE 2. Morphometric and meristic data of three nominal species of *Synaphobranchus* examined in present study.

	S. kaupii	*S. brevidorsalis*	*S.* cf. *oregoni*
TL (mm)	n=9 (600–700)	n=2 (210–338)	n=3 (285–400)
In % TL			
Head length	12.7 (11.5–13.3)	13.3–14.3	13.3 (12.1–14.0)
Predorsal	33.5 (31.4–35.6)	38.1–39.9	43.2 (42.5–43.9)
Preanal	28.3 (25.5–31.4)	26.7–31.1	26.7 (24.1–29.8)
Trunk	15.6 (12.6–19.7)	12.4–17.8	13.5 (12.1–15.8)
Tail	71.7 (68.6–74.5)	68.9–73.3	73.3 (70.2–75.9)
Depth at gill opening	5.7 (4.6–6.8)	5.5–5.9	6.0 (4.9–6.8)
Depth at anus	5.7 (3.9–7.3)	4.5–5.1	5.2 (4.0–6.1)
Width at anus	2.9 (2.2–3.8)	2.1–3.1	3.3 (2.6–3.8)
Snout	3.9 (3.3–4.2)	4.5–7.0	5.1 (4.3–6.6)
Eye	1.7 (1.6–1.9)	1.5–1.8	2.0 (1.6–2.3)
Interorbital	2.4 (2.1–2.5)	1.4–1.9	2.3 (1.9–2.6)
Postorbital	7.6 (6.5–8.9)	7.1–8.9	6.4 (5.3–7.1)
Upper jaw	8.0 (6.8–8.9)	6.6–7.6	7.5 (7.0–8.4)
Gill opening	2.3 (1.6–3.1)	~1.4	1.5 (1.4–1.6)
Pectoral fin	6.0 (5.3–7.4)	5.4–5.5	5.5 (5.0–6.2)
In % HL			
Snout	30.6 (24.5–36.7)	31.5–52.6	37.9 (31.0–46.8)
Eye	13.7 (12.1–15.0)	11.6–12.9	14.9 (13.3–17.0)
Interorbital	18.6 (17.4–20.4)	10.0–14.0	17.0 (15.8–18.5)
Post-eye	60.0 (49.1–66.7)	50.0–66.7	48.1 (44.2–50.8)
Upper jaw	62.9 (51.0–68.1)	46.2–57.0	56.6 (50.6–61.0)
Gill opening	18.3 (14.0–22.1)	~9.7	11.2 (10.5–11.7)
Pectoral-fin	47.3 (43.0–55.8)	37.8–41.4	41.2 (36.3–45.4)
Meristics			
Predorsal vertebrae	38 (36–41)	43 (42–43)	49 (48–49)
Preanal vertebrae	33 (31–34)	29 (28–30)	28 (28–30)
Precaudal vertebrae	67 (64–69)	62 (60–63)	66 (65–68)
Total vertebrae	146 (145–149)	128 (126–129)	~132
Pre-pectoral pores	10–11	10–11	~8
Pre-dorsal pores	33–42	44–46	42–47
Pre-anal pores	31–38	34–36	27–28
Total pores	142–147	~130	132–137

Predorsal vertebrae 21 (21–33); preanal vertebrae 30 (23–31); precaudal vertebrae 53 (50–56); total vertebrae 132 (124–135). Mean vertebral formula 28-28-131.

Coloration. When fresh, body uniformly dark brownish to blackish; lips and fins darker (Fig. 2). When preserved (Figs. 4A–B), body deep gray to deep brown dorsally and paler ventrally; some individuals more or less

uniformly colored. Lips darker. Dorsal fin with gray or brown base and white margin on most of the length, uniformly black on posterior portion; anterior 2/3 of anal fin with light gray base and broad white margin, gradually becoming light gray base and black margin posteriorly, then uniformly black; caudal fin black. Anus black. Mouth cavity deep gray. Gill chamber dark black. Peritoneum uniformly black.

Distribution. Known from the type series and non-types collected from off eastern and southwestern Taiwan. It may be found in other Taiwanese waters when more investigations are carried out. Precise depths unknown, but some specimens were collected by bottom trawl or hook-and-line at depth around 300–400 meters.

Etymology. The specific name is from the Greek, *oligo*= few, *lepis*=scale, derived from its diagnostic character of a large naked region on head and body.

Discussion

As diagnostic characters shown above, the new species can be easily distinguished from all known species by the origin of the dorsal fin about opposite to that of the anal fin; body scales oval in shape; most parts of head and abdomen naked, except for a scaled patch on cheek between eye and pectoral-fin base; and pectoral fin blackish with pale margin.

In Taiwan, several species of *Synaphobrnchus* have been reported, including *S. kaupii*, *S. brevidorsalis*, *S. affinis* and an undescribed species. However, some of their identifications are still doubtful.

The first problem is the difficulty in separating *S. kaupii* and *S. affinis*. In most specimens we examined, the scales are narrow and slender when its skin is complete and the scales are well covered by the skin (Figs. 4C–D). However, when the scales are removed, their pockets are much stouter or oval (Fig. 4D). The first author examined specimens of *S. kaupii* collected from the Atlantic Ocean and found that their squamation is quite distinct from that of our specimens which were recognized as same species. Svendsen (unpublished thesis) provided a detailed analysis and concluded that most characters used to distinguish these two species in history are weak, except for the total vertebrae that can be used to separate these two species (e.g. 145–152 in *S. kaupii* vs. 136 in one syntype and 125–140 in literature records of *S. affinis*). We herein recognized our specimens as *S. kaupii* based on the following characteristics: origin of dorsal fin slightly but always behind level of anus (predorsal length 31.4–35.6% and preanal length 25.5–31.4% TL); scales oval to slightly elongate, their length less than twice their width (Fig. 4D); scales covered the entire body, except for all fins and the anterior portion of head; MVF 38-33-146, precaudal vertebrae 64–69, and total vertebrae 145–149.

Specimens of *S. brevidorsalis* (n=2, Figs. 4E–F) can be distinguished from other congeners in Taiwan by having very small and rounded scales on the body (more than 10 rows between the dorsal fin and lateral line); origin of dorsal fin far behind level of anus (predorsal length 38.1–39.9% and preanal length 26.7–31.1% TL); MVF 43-29-128, precaudal vertebrae 60–63, total vertebrae 126–129. Melo (2007) provided the predorsal length 42.2–54.6% TL and lateral-line pores to dorsal-fin origin 58–62, whereas our specimens have only 45–46. Judging from type locality of *S. brevidorsalis* is north of New Guinea, the identities of Atlantic population may need further investigation.

A fourth species recognized as an undescribed species by Chen (unpublished thesis) and as *Synaphobranchus* sp. by Hatooka (2002) is also found among the specimens collected from the Philippines. Their large rounded scales are most similar to those of *S. oregoni*. However, our specimens have fewer total vertebrae 132–137 (n=3) (vs. 140–150 in Robins & Robins, 1989). Moreover, Hatooka (2002) provided 130–133 for specimens of *Synaphobranchus* sp. from Japan and Sulak & Shcherbachev (1997) provided 132 (n=1) for their *S. oregoni* from the western north Pacific. More investigation may prove that the western Pacific population is a distinct species.

Although the arrangement of squamation of *S. oligolepis* is somewhat similar to that of *S. calvus*, our specimens have a small scaled patch on the cheek (vs. posterior half of head entirely covered by scales); the dorsal-fin origin is about opposite to the anus (vs. origin of dorsal fin far behind the anus), predorsal vertebrae 25–33 (vs. 42–45 in Melo, 2007) and predorsal lateral-line pores 21–33 (vs. 41–53).

Despite the nomenclatural confusion mentioned above, four distinct species in Taiwan can be identified, as shown in previous works, by the position of the dorsal-fin origin, squamation, and vertebral formula. The result is also supported by a DNA barcoding analysis (J. J.-N. Chen, personal data). A key to all nominal species found in Taiwan is provided below.

Key to species of *Synaphobranchus* found in Taiwan

1A. Most of head, nape and abdomen naked; origin of dorsal fin slightly before to about opposite to anus (some slightly behind the anus); predorsal vertebrae 21–33; precaudal vertebrae 50–56 . . . . . *S. oligolepis* **sp. nov.**

1B. Scales cover entire body, except for fins and anterior portion of head; origin of dorsal fin far behind the anus; predorsal vertebrae 36–49; precaudal vertebrae 60–69 2

2A. Scales on body oval to slightly elongate; total vertebrae 145–147; predorsal length 31–36% TL. . . . . *S. kaupii*

2B. Scales on body rounded or irregular, never elongate; total vertebrae 126–132; predorsal length more than 38% TL. 3

3A. Scales small, about 20 rows between dorsal fin and lateral line; predorsal vertebrae 42–43; predorsal length 38–40% TL. . . . . *S. brevidorsalis*

3B. Scales large, about 10 rows between dorsal fin and lateral line; predorsal vertebrae 48–49; predorsal length 43–44% TL . . . . . *S.* cf. *oregoni* [data taken from 3 specimens collected from the Philippines]

Comparative materials. ***Synaphobranchus kaupii*:** USNM 160589, 2, 375–475 mm, Hokkaido, Japan, 492–596 m, 3 Oct. 1906. TOU-AE5666, 682 mm TL, 24 Jul. 2010; TOU-AE5667, 700 mm TL, 24 Jul. 2010; collected from off Lamy Island. TOU-AE7082, 636 mm TL, 20 Nov. 2012; TOU-AE7150, 608 mm TL, 15 Jul. 2014; collected from off Shihtiping, Taitung, eastern Taiwan, longline. ASIZP 63800, 675 mm TL, 22˚29'N, 120˚02'E, off Kaohsiung, southwestern Taiwan, otter trawl, 29 Aug. 2003. ASIZP 64079, 640 mm TL, 22˚14'N, 121˚02'E, off Taitung, southeastern Taiwan, 1282 m, otter trawl, 30 Aug. 2003. ASIZP 64275, 680 mm TL, 22˚32'N, 121˚08'E, off Taitung, southeastern Taiwan, 1174 m depth, otter trawl, 29 Aug. 2003. ASIZP 66114, 600 mm TL, 24˚04'N, 122˚23'E, off northeastern Taiwan, 1162–1228 m depth, otter trawl, 15 Jun. 2005. ASIZP 69699, 600 mm TL, 22˚4.1'N, 121˚9.2'E, off Hualien, eastern Taiwan, 1291–1295 m depth, trawl, 24 Aug. 2006. TOU-AE7282, 549 mm TL, TOU-AE7283, 888 mm TL, Wu-shih-bi, Taitung, southeastern Taiwan, 26 Feb. 2017. USNM 49995, 380 mm, Sagami Bay, Kanagawa, Honshu, Japan, not date. USNM 117895, 2, 332–407 mm, off Koshika Islands, Japan, East China Sea, 794 m, USNM 175145, 385 mm, Sulawesi, Indonesia, 732 m, 28 Dec. 1909. 11 Aug. 1906. USNM 160587, 440 mm, Kobe, Honshu, Japan, 30 Aug. 1906. USNM 160593, 388 mm, Suruga Bay, Honshu, Japan, 360 m, 13 Oct. 1906. USNM 160595, 2, 312–343 mm, Suruga Bay, Honshu, Japan, 15 Oct. 1906. USNM 372012, 671 mm, Dong-gang, southwestern Taiwan, 24 Mar. 1999. USNM 438249, 515 mm, Myanmar, 772 m, 5 May, 2015. ***Synophobranchus brevidorsalis*:** ASIZP 64244, 338 mm TL, 21˚35.6'N, 118˚16.2'E, 1617 m, southwestern Taiwan, bottom trawl, 28 Aug. 2002. ASIZP 75057, 210 mm TL, 22˚3.6'N, 118˚54.8'E, southwestern Taiwan, bottom trawl, 29 Jul. 2014. USNM 117982, 410 mm, Japan, 549–1843 m, 15 Aug. 1906. USNM 175147, 493 mm, Philippines, no other data. ***Synaphobranchus* cf. *oregoni*:** ASIZP 68049, 290 mm TL, 14˚33.7'N, 123˚14'E, 944–1004 m, 27 May 2007; ASIZP 68064, 400 mm TL, 15˚4.3'N, 123˚8.7'E, 1347–1392 m, 27 May 2007; ASIZP 68276, 285 mm TL, 15˚37.5'N, 121˚58.9'E, 1273–1333 m, 3 Jun. 2007; all collected from Aurora, Philippines. ***Synaphobranchus oregoni*:** USNM 186050, 700 mm, Alabama, Gulf of Mexico, 1097 m, 3–4 Jun. 1959.

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