

New records of two cusk eels of the genus *Neobythites* from Taiwan, with a northward range extension of *N. australiensis* Nielsen, 2002 (Actinopterygii: Ophidiiformes: Ophidiidae)

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Abstract

Two species of cusk eels, *Neobythites australiensis* Nielsen, 2002 and *Neobythites japonicus* Uiblein et Nielsen, 2023 were collected from southwestern and northeastern Taiwan, respectively. They represent the first record of both species from Taiwan. The former specimen represents the first record from the Northern Hemisphere, and the latter specimen represents the second record of *N. japonicus*. As a result, eight species of *Neobythites* are recognized in Taiwan. We provide a detailed description of the two specimens, comparison with other available specimens, discussion of intraspecific variations, and a dichotomous key to species of *Neobythites* in Taiwan.

Keywords

biodiversity, cusk eel, ichthyology, new record, Ophidiidae

Introduction

The cusk eel genus *Neobythites* Goode et Bean, 1885 is the most diverse group in the family Ophidiidae, with 60 species currently recognized as valid (Nielsen 2002; Nielsen et al. 2009; Ohashi et al. 2012; Uiblein and Nielsen 2018, 2021, 2023). Species of this genus are characterized by having a tapering caudal portion; operculum with one strong spine; pelvic-fin rays 2; medial basibranchial tooth

patch 2; preopercle with 0 to 3 spines; snout length equal or longer than the width of eye window (Nielsen 2002).

Six *Neobythites* species have been documented from Taiwan (Yeh et al. 2005, 2006; Ohashi 2019), viz. *Neobythites bimaculatus* Nielsen, 1997, *Neobythites fasciatus* Smith et Radcliffe, 1913, *Neobythites longipes* Smith et Radcliffe, 1913, *Neobythites sivicola* (Jordan et Snyder, 1901), *Neobythites stigmosus* Machida, 1984, and *Neobythites unimaculatus* Smith et Radcliffe, 1913.

Neobythites australiensis Nielsen, 2002 was described based on specimens collected from western Australia. Subsequently, Okamoto et al. (2011) reported a single specimen collected from the Okinawa Island, representing the second record, and also the first record in the Northern Hemisphere. Uiblein and Nielsen (2023) reviewed the ocellus-bearing *Neobythites* from the western Pacific Ocean, described five new species, and recognized the specimen of *N. australiensis* reported by Okamoto et al. (2011) as a new species, *Neobythites japonicus* Uiblein et Nielsen, 2023.

Recently, two unusual specimens of *Neobythites* were collected from Taiwan. Both were initially identified as *N. australiensis* with several morphological differences noticed and the authors of the present publication submitted a report to document the new finding. However, with the five new species published by Uiblein and Nielsen (2023) during the reviewing process of the first version of this paper, we reviewed our study and re-identified them as *N. australiensis* and *N. japonicus*, respectively, based on their diagnostic characters newly proposed. As a result, the former specimen represents the first record of *N. australiensis* from the western Pacific Ocean and the latter represents the second specimen of *N. japonicus* other than the holotype. Here we provide detailed descriptions of these two specimens, compare them with those available specimens, and discuss the intraspecific variations. A dichotomous key to all *Neobythites* species in Taiwan is provided as well.

Materials and methods

Specimens were fixed with 10% formaldehyde and subsequently transferred to 70% ethanol for permanent preservation. Terminology and methodology follow Nielsen (2002) and Ohashi et al. (2012). Vertebral counts follow Nielsen et al. (1999). Description and measurement of otoliths follow Lin and Chang (2012) and Uiblein and Nielsen (2023). Paired-fin characters were presented as left/right when available. Only developed rakers are included in gill-raker counts. The term “ocellus” on the dorsal fin was defined as a dark blotch surrounded by a white ring (Nielsen 2002; Uiblein and Nielsen 2005, 2023). The counts of medial fins and vertebrae were determined by X-radiograph. Measurements were taken using 150 mm digital calipers or 300 mm calipers for lengths longer than 150 mm and rounding to the nearest 0.1 mm. Standard length (SL) and head length (HL) were used throughout except otherwise indicated. Specimens are deposited at the Pisces Collection, National Museum of Marine Biology and Aquarium, Pingtung, Taiwan (NMMB-P).

Comparative material. *Neobythites bimaculatus*: NMMB-P33881 (4 specimens, 106.9–117.0 mm SL), off Dong-sha Island (Pratas Island), 13 February 2019, collected by H.-C. Ho. *Neobythites longipes*: NMMB-P35534 (1, 183.6), off Dong-gang fishing port, 12 March 2023, collected by H.-C. Ho. *Neobythites sivicola*: NMMB-P34995 (3, 126.5–157.8), off Diao-yu Islands, Yilan,

northeastern Taiwan, 1 May 2020, collected by H.-C. Ho. *Neobythites stigmosus*: NMMB-P25803 (1, 152.4), off Ke-Tzu-Liao (ca. 22°42'53"N, 120°13'12"E), Kaohsiung, southwestern Taiwan, 29 March 2017, collected by H.-C. Ho. NMMB-P34112 (1, 159.7), off Dong-gang fishing port, 1 April 2019, collected by H.-C. Ho. *Neobythites unimaculatus*: NMMB-P24561 (1, 131.7), off Dong-gang fishing port, 11 February 2015, collected by H.-C. Ho.

Results

Family Ophidiidae

Genus *Neobythites* Goode et Bean, 1885

Neobythites australiensis Nielsen, 2002

English name: Australian cusk eel

Chinese name: 澳大利亞新魮鰻

(Figs 1–2; Tables 1–3)

Neobythites australiensis Nielsen, 2002.—Nielsen (2002): 20 (Original description. Type locality: Southwest of Rowley Shoals, 18°04'35.99"S, 118°22'00"E, western Australia, depth 327–328 m).—Hoese et al. (2006): 562 (listed).—Uiblein and Nielsen (2005): 365 (in part).—Uiblein and Nielsen (2023): 187 (in part).

Specimen examined. NMMB-P37710, 1 specimen, 152.7 mm SL, off Dong-gang fishing port (ca. 22°22'22"N, 120°27'34"E), Pingtung, southwestern Taiwan, northern South China Sea, 12 March 2023, collected by H.-C. Ho.

Description of NMMB-P37710. Meristic and morphometric characters are provided in Tables 1–2. Dorsal-fin rays 92, originating over 5th vertebra. Pectoral-fin rays 27/29. Pelvic-fin rays 2/2. Anal-fin rays 73, originating below 21st dorsal-fin ray and 15th vertebra. Caudal-fin rays 4 (upper lobe) + 4 (lower lobe). Preopercular spines 2. Gill rakers on outer face of first gill arch 2 + 1 + 6 = 9. Pseudobranchial filaments 7. Precaudal vertebrae 13; caudal vertebrae 39 (not including ural centra); total vertebrae 52 (not including ural centra). Pyloric caeca 15.

Body compressed and elongated, depth at dorsal-fin origin 5.3 in SL, at anal-fin origin 5.4 in SL. Head length 4.5 in SL. Eye window small, horizontal width 5.1 in HL; snout rounded, its length 3.9 in HL, extending before premaxilla; interorbital space narrow, width 4.5 in HL; postorbital length 1.6 in HL.

Mouth large, upper-jaw length 1.8 in HL; posterior end of maxilla truncated, exceeding beyond vertical through posterior margin of eye window. Two nostrils, anterior nostril forming short tube and situated at about midline of snout; posterior nostril larger than anterior one, situated right in front of eye and lower than horizontal through anterior nostril. Symphysis of premaxillae forming notch, edentate. Premaxilla, dentary, vomer, and palatine with villiform teeth. Vomerine tooth patch triangular, slightly concave at both sides anteriorly. Palatine tooth patch rather broad, gradually thinner anteriorly. Opercle with one strong spine, its end not exceeding beyond flap of opercle.

Gill rakers rod-shaped, somewhat laterally compressed, covered with small teeth on tips and inner surfaces; rakers on outer row of first arch longest; inner surface of first arch and both inner and outer surfaces of second to fourth arches short; fifth ceratobranchial with bump-like rakers on outer face and single, long and slender tooth patch on inner face. Oval tooth patch present on upper ends of second and third epibranchials. Triangular tooth patch on second and third pharyngobranchials. Oval, somewhat rectangular tooth patch on fourth pharyngobranchial. Two basibranchials: anterior one elongated and posterior one oval.

Small cycloid scales present on head, body, and dorsal-and anal-fin bases, all embedded under skin. Lateral line single, situated at upper one-fifth of body; originating from upper part of gill opening and indistinct on posterior portion of body.

Pectoral fin short, its length 1.5 in HL, its tip slightly pointed, not reaching vertical through anus. Pelvic-fin

length 1.2 in HL, rather short, its tip not reaching anus. Caudal fin rounded, slightly pointed.

Osteology (Fig. 1C). First neural spine short, length about half of second neural spine; bases of first-two neural spines not thickened; parapophysis developed on seventh to 13th vertebra; pleural ribs present on third to 12th vertebra, and with epipleural on anterior five pleural ribs; epineurals absent. Anal-fin pterygiophores anterior to first haemal spine 5.

Otolith. Sagittal otolith (Fig. 2) oblong, length 25.1% HL, length/depth ratio 1.84. Both dorsal and ventral margins smoothly curved, with small lobes forming crenation on antero-dorsal and both antero- and postero-ventral margins; distal surface slightly concave; proximal surface slightly convex. Sulcus groove mesial, shallow, horizontal, and archaesusulcoid; its length 21.2% HL; both colliculums present, with ostial colliculum elongated and caudal colliculum oval; both crista superior and crista inferior

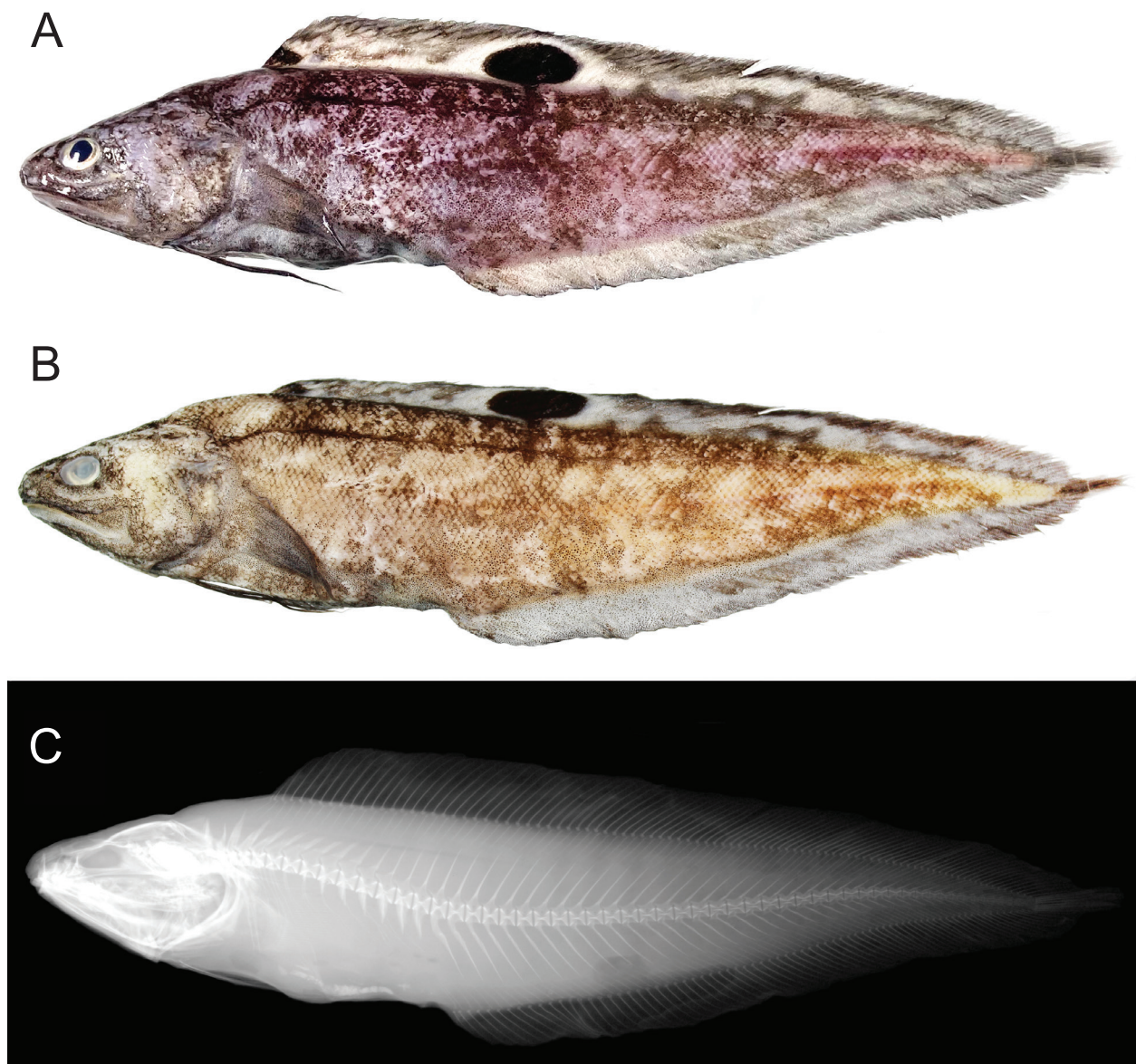


Figure 1. *Neobythites australiensis* Nielsen, 2002, NMMB-P37710, 152.7 mm SL. **A.** Fresh condition. **B.** Preserved condition. **C.** X-radiograph.

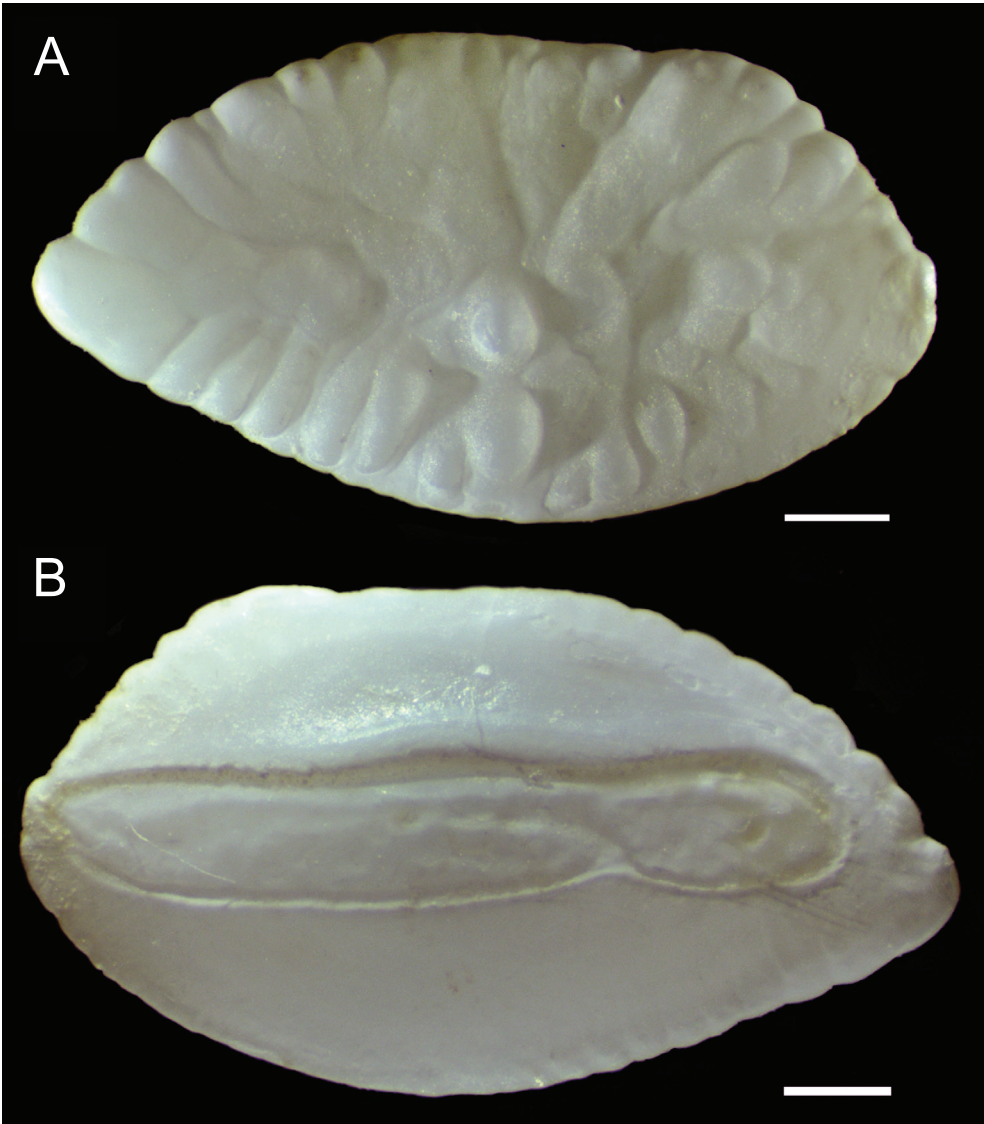


Figure 2. Right sagittal otolith of *Neobythites australiensis* Nielsen, 2002, 8.5 mm otolith length, taken from NMMB-P37710, 152.7 mm SL. **A.** Distal view. **B.** Proximal view. Scale bar = 1 mm.

Table 1. Meristic data of *Neobythites australiensis* Nielsen, 2002 and *N. japonicus* Uiblein et Nielsen, 2023. Data of other specimens were retrieved from Nielsen (2002) and Uiblein and Nielsen (2023). Paired-fin characters are presented as left/right.

Character	<i>N. australiensis</i>		<i>N. japonicus</i>	
	This study	Nielsen 2002	This study	Uiblein and Nielsen 2023
	NMMB-P37710	Type specimens	NMMB-P37712	Holotype
Dorsal-fin rays	92	88–92	91	91
Pectoral-fin rays	27/29	26–27	27/27	26
Anal-fin rays	73	73–77	75	75
Caudal-fin rays	4 + 4 = 8	8	4 + 4 = 8	8
Preopercular spines	2	2	2	2
Gill rakers	2 + 1 + 6 = 9	9–10	3 + 1 + 8 = 12	11
Pseudobranchial filaments	7	8–11	4	6
Vertebrae	13 + 39 = 52	13 + 40–41 = 53–54	13 + 40 = 53	13 + 39 = 52
Pyloric caeca	15	—	—	—
Dorsal-fin origin over vertebra	5 th	5 th –6 th	5 th	5 th
Anal-fin origin under dorsal-fin ray	21 st	21 st –23 rd	21 st	21 st
Anal-fin origin under vertebra	15 th	16 th –17 th	15 th	15 th

poorly developed; rostrum absent; excisura absent; dorsal depression very shallow; ventral depression absent.

Coloration. When fresh (Fig. 1A), body somewhat purplish, with brown reticulate patterns on head and body.

Dorsal fin dusky, with pale vermicular patterns. Anal fin dusky, without any ocellus, its anterior portion rather pale. Pectoral, pelvic, and caudal fins dusky. When preserved (Fig 1B), body color similar fresh but slightly paler. Sin-

Table 2. Morphometric data of *Neobythites australiensis* Nielsen, 2002 and *N. japonicus* Uiblein et Nielsen, 2023. Data of other specimens were retrieved from Nielsen (2002) and Uiblein and Nielsen (2023).

Character	<i>N. australiensis</i>		<i>N. japonicus</i>	
	This study	Nielsen 2002	This study	Uiblein and Nielsen 2023
	NMMB-P37710	Type specimens	NMMB-P37712	Holotype
Absolute values [mm]				
SL	152.7	180–245	158.9	167
Relative values (% SL)				
HL	22.0	23.5–24.5	22.6	23.0
Snout length	5.7	—	5.4	—
Horizontal eye window	4.3	4.2–4.7	4.3	4.1
Postorbital length	13.5	14.0–15.5	13.9	14.0
Interorbital width	4.9	—	5.5	—
Upper-jaw length	12.1	12.0–13.5	11.9	11.0
Pectoral-fin length	14.5	—	14.7	—
Pelvic-fin length	17.8	14.0–19.0	17.5	16.0
Predorsal length	24.2	24.5–27.5	24.6	25.0
Prepectoral length	22.4	—	22.7	—
Prepelvic length	16.3	—	17.0	—
Preal length	41.7	43.0–49.5	43.0	44.0
Body depth at dorsal-fin origin	19.0	—	19.8	—
Body depth at anal-fin origin	18.6	17.5–19.5	19.4	18.0
Pelvic-fin–anal-fin length	26.4	24.5–29.0	27.3	27.0
Snout to ocelli	45.1	44.5–49.0	49.4	46.0
Longest gill filament on anterior gill arch	1.7	1.6–1.8	1.7	1.6
Relative values (% HL)				
Longest gill filament on anterior gill arch	7.7	6.7–7.4	7.6	7.1

HL = head length, SL = standard length.

gle ocellus on dorsal fin, covering 19th–35th dorsal-fin rays, with central blotch covering 21st–30th dorsal-fin rays; anterior dorsal fin with single black blotch, covering 1st–4th dorsal-fin rays. Oral cavity, including underside of tongue, lower gill arches, and rakers pale or scattered with sparse melanophores; pyloric caeca pale. Mouth roof behind vomer, inner face of opercle, and upper gill arches dusky. Peritoneum black.

Distribution. Originally described from northwestern Australia. Although Uiblein and Nielsen (2023) described the previous record from the Pacific Ocean (Okamoto et al. 2011) as *N. japonicus*, the presently reported specimen from Taiwan confirmed the occurrence of this species and suggested a wide distribution in the west Pacific and east Indian Ocean. Inhabits depths down to 350 m (Nielsen 2002).

Remarks. The presently reported specimen was identified as *Neobythites australiensis* in having one ocellus on the dorsal fin, situated posterior to a vertical through the anus; a black blotch on anterior dorsal fin; no ocellus on the anal fin; two preopercular spines; short pelvic fins, their tips not reaching anus (Nielsen 2002).

However, there are a number of differences compared to the previous record (Tables 1–2). The Taiwanese specimen has slightly fewer pseudobranchial filaments (7, vs. 8–11); fewer caudal vertebrae (39, vs. 40–41); shorter head length (22.0% SL, vs. 23.5–24.5% SL); shorter postorbital length (13.5% SL, vs. 14.0–15.5% SL); shorter predorsal length (24.2% SL, vs. 24.5–27.5% SL); shorter preanal length (41.7% SL, vs. 43.0–49.5% SL); and longer anterior gill filaments (7.7% SL, vs. 6.7–7.4% SL). These minor differences are considered as intraspecific

variations. The condition of 29 pectoral-fin rays on right side of our specimen is higher than other known specimens (26–27).

Among species recorded in Taiwan, *N. australiensis* most resembles *N. unimaculatus* in having one ocellus on the dorsal fin (vs. none or more than one in other species), however, *N. australiensis* is readily distinguishable from *N. unimaculatus* in having a blotch situated at the anterior most dorsal-fin rays (vs. blotch absent; Nielsen 2002; this study); dorsal-fin rays 88–92 (vs. 99–106); anal-fin rays 73–75 (vs. 83–92); total vertebrae 52–54 (vs. 57–62).

Neobythites japonicus Uiblein et Nielsen, 2023

English name: Japanese cusk eel

New Chinese name: 日本新魮鰻

(Figs 3–4; Tables 1–3)

Neobythites japonicus Uiblein et Nielsen, 2023.—: Uiblein and Nielsen (2023): 188 (Original description. Type locality: West of Okinawa Island, Japan, depth ca. 100 m. Holotype: KAUM-I. 37071).

Neobythites australiensis (non Nielsen).—Okamoto et al. (2011): 69 (misidentification).

Specimen examined. NMMB-P37712, 1 specimen, 158.9 mm SL, off Daxi fishing port (ca. 24°53'37"N, 121°55'26"E), 30 Jan 2023, collected by J.-F. Huang.

Description of NMMB-P37712. Meristic and morphometric characters are provided in Tables 1–2. Dorsal-fin rays 92, originate over 5th vertebra. Pectoral-fin rays 27/27. Pelvic-fin rays 2/2. Anal-fin rays 75, originate

below 21st dorsal-fin ray and 15th vertebra. Caudal-fin rays 4 (upper lobe) + 4 (lower lobe). Preopercular spines 2. Gill rakers on outer face of first gill arch 3 + 1 + 8 = 12. Pseudobranchial filaments 4. Precaudal vertebrae 13; caudal vertebrae 40 (not including ural centra); total vertebrae 53 (not including ural centra).

Body compressed and elongated, depth at dorsal-fin origin 5.0 in SL, at anal-fin origin 5.2 in SL. Head length 4.4 in SL. Eye window small, horizontal width 5.3 in HL; snout rounded, its length 4.1 in HL, extending before premaxilla; interorbital space narrow, width 4.1 in HL; postorbital length 1.6 in HL. Mouth large, upper-jaw length 1.9 in HL; posterior end of maxilla truncated, exceeding beyond vertical through posterior margin of eye window. Two nostrils, anterior nostril forming short tube and situated at about midline of snout; posterior nostril oval, larger than anterior one situated in front of eye and lower than horizontal through ventral margin of eye window. Symphysis of premaxillae forming notch, edentate. Premaxilla, dentary, vomer, and palatine with villiform teeth. Vomerine tooth patch triangular, slightly concave at both sides anteriorly. Palatine tooth patch rather broad, slightly widened at middle portion. Opercle with one strong spine, its end not exceeding beyond flap of opercle.

Gill rakers rod-shaped, somewhat laterally compressed, covered with small teeth on tips and inner surfaces; rakers on outer row of first arch longest; inner surface of first arch and both inner and outer surfaces of second to fourth arches short; fifth ceratobranchial with bump-like rakers on outer face and single, long and slender tooth patch on inner face. Oval tooth patch present on upper ends of second and third epibranchials. Triangular tooth patch on second and third pharyngobranchials. Oval,

somewhat rectangular tooth patch on fourth pharyngobranchial. Two basibranchials: anterior one slender and elongated, with anterior portion wider than rest; posterior one oval.

Small cycloid scales present on head, body, and dorsal-and anal-fin bases, all embedded under skin. Lateral line single, situated at upper one-fifth of body; originating from upper part of gill opening and indistinct on posterior portion of body.

Pectoral fin short, its length 1.5 in HL, its tip slightly pointed, not reaching vertical through anus. Pelvic-fin length 1.3 in HL, rather short, its tip not reaching anus. Caudal fin rounded, slightly pointed.

Osteology (Fig. 3C). First neural spine short, length about half of second neural spine; bases of first-two neural spines not thickened; parapophysis developed on eighth to 13th vertebra; pleural ribs present on third to 12th vertebra, and with epipleural on anterior seven pleural ribs epineurals absent. Anal-fin pterygiophores anterior to first haemal spine 4.

Otolith. Sagittal otolith (Fig. 4) oblong, length 24.1% HL, length/depth ratio 1.82. Both dorsal and ventral margins smoothly curved, with small lobes forming crenation on antero-dorsal and both antero- and postero-ventral margins; distal surface slightly concave; proximal surface slightly convex. Sulcus groove mesial, shallow, horizontal, and archaesusloid; its length 19.1% HL; both colliculi present, with ostial colliculum elongated and caudal colliculum oval; both crista superior and crista inferior poorly developed; rostrum absent; excisura absent; dorsal depression very shallow; ventral depression absent.

Coloration. When fresh (Fig. 3A), body pale, and somewhat purplish, with brown reticulate patterns on

Table 3. Morphometric data of sagittal otoliths of *Neobythites australiensis* Nielsen, 2002 and *N. japonicus* Uiblein et Nielsen, 2023. Data of other specimens were retrieved from Uiblein and Nielsen (2023).

Character	<i>N. australiensis</i>		<i>N. japonicus</i>	
	This study	Uiblein and Nielsen 2023	This study	Uiblein and Nielsen 2023
	NMMB-P37710	Type specimens	NMMB-P37712	Holotype
Absolute values [mm]				
SL	152.7	180–245	158.9	167
HL	33.6	—	35.9	—
Relative values (% SL)				
Otolith length	5.5	5.8–5.9	5.4	5.3
Otolith height	3.0	2.7–2.9	3.0	2.6
Sulcus length	4.7	4.7–4.8	4.3	4.2
Ostium length	3.1	3.1–3.3	3.0	2.9
Ostium height	0.76	0.63–0.64	0.84	0.65
Relative values (% HL)				
Otolith length	25.1	—	24.1	—
Otolith height	13.7	—	13.3	—
Sulcus length	21.2	—	19.1	—
Ostium length	14.3	—	13.2	—
Ostium height	3.5	—	3.7	—
Relative values (% sulcus length)				
Ostium length	67.4	66.0–70.0	69.1	69.0
Ostium height	16.2	13.0–14.0	19.6	15.0
Relative values (% ostium length)				
Ostium height	24.1	19.0–20.0	28.3	23.0

HL = head length, SL = standard length.

head and body, some of which forming blotches. Dorsal fin dusky, with irregular-sized pale blotches. Anal fin dusky, without any ocellus, its anterior portion rather pale. Both margins of dorsal and anal fins whitish. Pectoral, pelvic, and caudal fins dusky. When preserved (Fig. 3B), body color similar fresh but slightly paler. Two ocelli present on dorsal fin, anterior one covering 1st–11th dorsal-fin rays, with central blotch covering 4th–9th dorsal-fin rays; posterior one covering 21st–35th dorsal-fin rays, with central blotch covering 23rd–33rd dorsal-fin rays. Oral cavity, including underside of tongue, lower gill arches, and rakers pale or scattered with sparse melanophores. Mouth roof behind vomer, upper gill arches, and inner face of opercle dusky. Peritoneum black.

Distribution. Originally described from the Okinawa Island, Japan (Okamoto et al. 2011; Uiblein and Nielsen 2023). The presently reported specimen represents the second specimen other than the holotype and the southernmost record of this species. Inhabits depths down to ca. 100 m (Okamoto et al. 2011).

Remarks. The presently reported specimen was identified as *N. australiensis* before Uiblein and Nielsen (2023) described *N. japonicus*. It was soon re-identified as *N. japonicus* in having two ocelli on the dorsal fin, the first situated at anterior-most dorsal-fin rays and the second situated posterior to a vertical through the anus; no ocellus on the anal fin; two preopercular spines; short pelvic fins, their tips not reaching anus (Uiblein and Nielsen 2023).

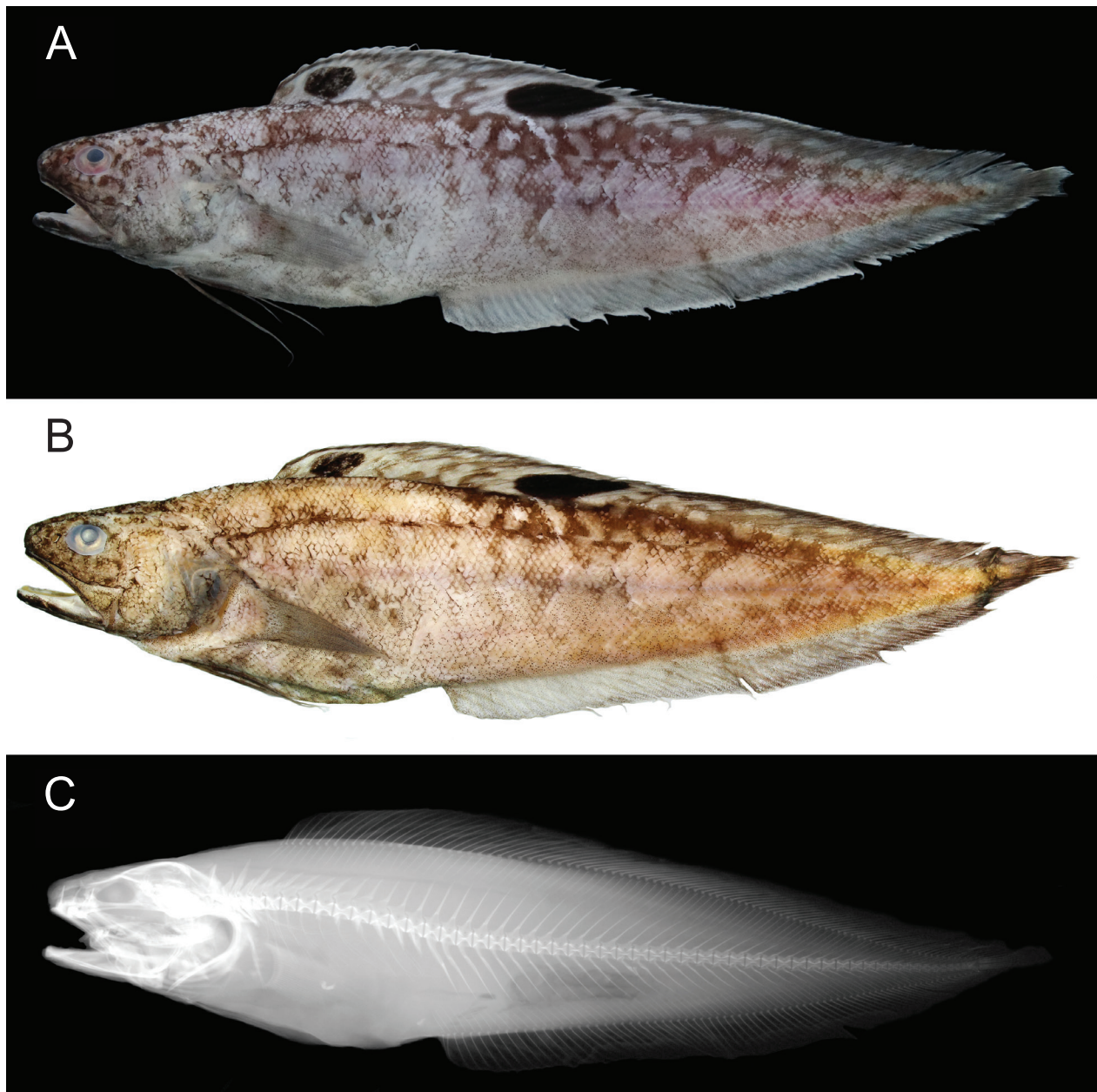


Figure 3. *Neobythites japonicus* Uiblein et Nielsen, 2023, NMMB-P37712, 158.9 mm SL. **A.** Fresh condition, photo by J.-F. Huang. **B.** Preserved condition. **C.** X-radiograph.

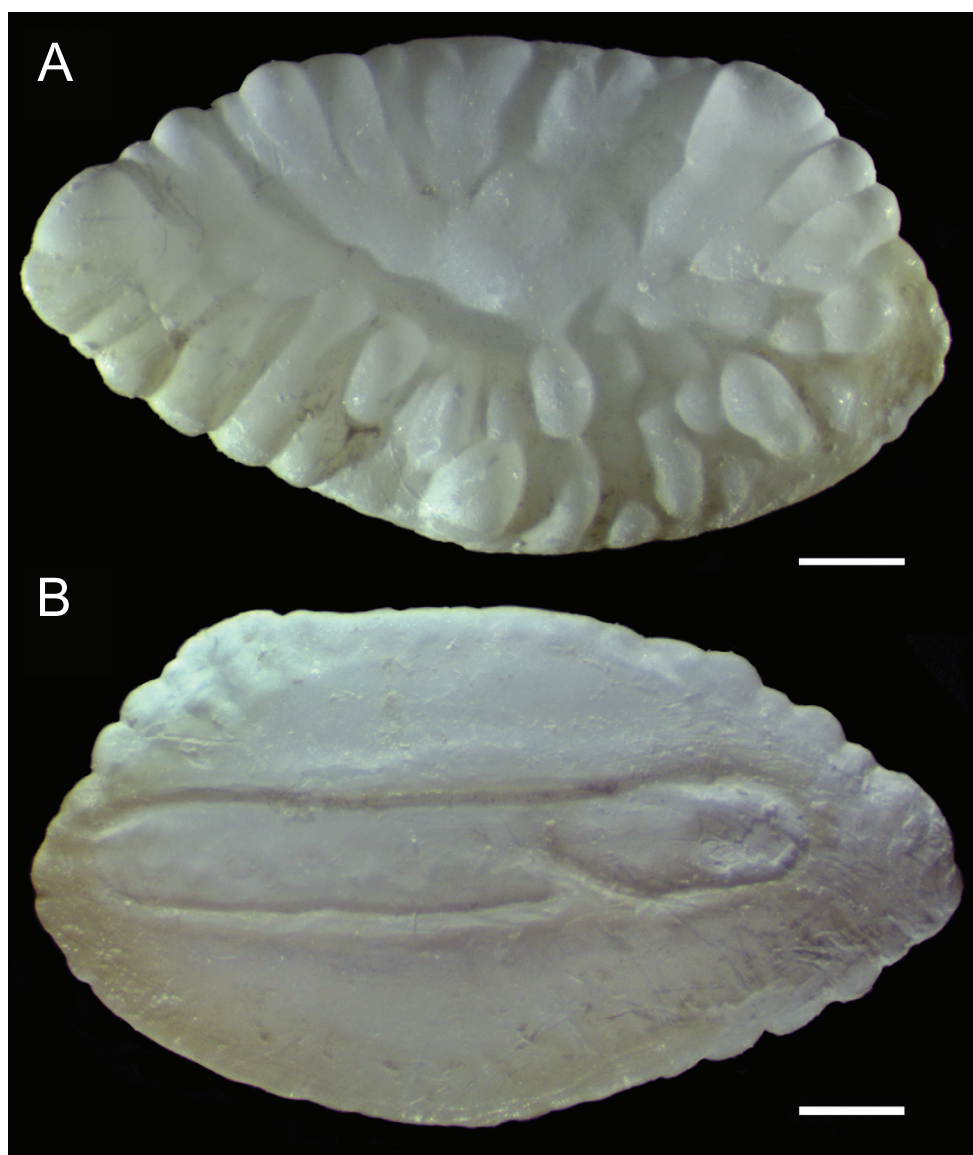


Figure 4. Right sagittal otolith of *Neobythites japonicus* Uiblein et Nielsen, 2023, 8.7 mm otolith length, taken from NMMB-P37712, 158.9 mm SL. **A.** Distal view. **B.** Proximal view. Scale bar = 1 mm.

However, there are still a number of minor differences comparing to the holotype (Tables 1–2). The Taiwanese specimens have fewer pseudobranchial filaments (4, vs. 6); more caudal vertebrae (40, vs. 39); shorter preanal length (43.0% SL, vs. 44.5% SL); and longer anterior gill filaments (7.6% HL, vs. 7.0% HL). These differences are considered as intraspecific variations.

Among species recorded in Taiwan, *N. japonicus* mostly resembles *N. bimaculatus* in having two ocelli

(sometimes three) on the dorsal fin (vs. one or more than two in other species). However, *N. japonicus* is readily distinguishable from *N. bimaculatus* in having the anterior ocelli situated at the anteriormost dorsal-fin rays and the posterior ocelli situated at the middle portion of the dorsal fin (vs. both ocelli at the middle portion of the dorsal fin, sometimes a third ocellus present (Nielsen 1997, 2002; this study); dorsal-fin rays 91 (vs. 99–106); anal-fin rays 75 (vs. 83–92); total vertebrae 53 (vs. 57–62).

Key to species *Neobythites* from Taiwan

1A	Dorsal fin without ocelli or blotches.....	<i>N. sivicola</i>
1B	Dorsal fin with ocelli or blotches.....	2
2A	Pelvic fin long, their ends reaching anus.....	<i>N. longipes</i>
2B	Pelvic fin short, their ends not reaching anus.....	3
3A	Anal fin with ocelli or blotches.....	4
3B	Anal fin without ocelli or blotches.....	5

4A	Four ocelli on dorsal fin	<i>N. fasciatus</i>
4C	Three ocelli on dorsal fin	<i>N. stigmatosus</i>
5A	One ocellus on dorsal fin.....	6
5B	Two ocelli on dorsal fin.....	7
6A	Dorsal-fin rays 99–106; anal-fin rays 83–92; anterior dorsal fin without black blotches	<i>N. unimaculatus</i>
6B	Dorsal-fin rays 88–92; anal-fin rays 73–75; anterior dorsal fin with a small black blotch.....	<i>N. australiensis</i>
7A	Dorsal-fin rays 99–106; anal-fin rays 83–92; dorsal fin with two ocelli behind central ocellus.....	<i>N. bimaculatus</i>
7B	Dorsal-fin rays 91; anal-fin rays 75; dorsal fin without ocelli behind central ocellus	<i>N. japonicus</i>

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