New Japanese Record of the Rare Cusk Eel *Benthocometes australiensis* (Actinopterygii: Ophidiiformes: Ophidiidae), a First Record of the Species from the Northern Hemisphere

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A specimen (114.4 mm SL) of the rare ophidiid species, *Benthocometes australiensis* Nielsen, 2010, was collected from a deep-sea water intake at a depth of 320 m off Cape Muroto, Kochi Prefecture, Shikoku Island, Japan. The species is previously only known from the holotype trawled off northwestern Australia. Thus, the present specimen is the first record from the Northern Hemisphere and the second record of the species. New Japanese names “Suisei-ashiro-zoku” and “Muroto-suisei-ashiro” are proposed for *Benthocometes* and *B. australiensis* respectively.

Key Words: Ophidiid fish, Kochi Prefecture, Japan, deep-sea water intake, range extension.

Introduction

The ophidiid genus *Benthocometes* Goode and Bean, 1896 includes two valid species, *Benthocometes robustus* (Goode and Bean, 1886) and *Benthocometes australiensis* Nielsen, 2010. The former is considered to be a senior synonym of *Benthocometes armatus* (Döderlein, 1886) and *Benthocometes muraenolepis* (Vaillant, 1888) (Bougis and Ruivo 1954; Nielsen 2010). *Benthocometes robustus* is known from off New Jersey, the United States of America, to Rio Grande do Sul, Brazil, along the Atlantic coasts of the Americas, including the Gulf of Mexico and Caribbean Sea (Haimovici *et al.* 1994; Nielsen 2010), and in the eastern Atlantic from off northwestern Africa and several localities in the Mediterranean Sea from off Spain to Cyprus (Nielsen 2010). *Benthocometes australiensis* is known only from the holotype from off northwestern Australia (Nielsen 2010).

In 2006, a single specimen of *Benthocometes* was collected from a deep-sea water intake operated by Kochi Prefectural Deep Seawater Laboratory, Shikoku Island, Japan, at a depth of 320 m off the eastern side of Cape Muroto. This specimen was identified as *B. australiensis* based on the circular form of its palatine dentition, and a combination of meristic and morphometric characters. Thus, we report the first record of *B. australiensis* from the Northern Hemisphere, and provide an updated diagnosis and a description of the Japanese specimen.

Materials and methods

Methods for measurements and counts follow Nielsen *et al.* (1999). Standard and head lengths are abbreviated as SL and HL, respectively. Vertebrae and vertical-fin rays were counted from x-ray radiograph. Institutional codes follow Fricke and Eschmeyer (2018). The present specimen is deposited in the Laboratory of Marine Biology, Faculty of Science and Technology, Kochi University (BSKU).

Benthocometes Goode and Bean, 1896

[New Japanese name: Suisei-ashiro-zoku]

Benthocometes australiensis Nielsen, 2010

[New standard Japanese name: Muroto-suisei-ashiro]

(Figs 1, 2; Table 1)

Benthocometes australiensis Nielsen, 2010: 59 (original description; holotype: NMV A 29728-016; type locality: off northwestern Australia, 390–394 m depth).

Material examined. BSKU 117791, 114.4 mm SL, 33°17′38.0″N, 134°13′34.3″E, off eastern side of Cape Muroto, Kochi Prefecture, Shikoku Island, Japan, 320 m depth, pumped up together with deep seawater, collected by Kochi Prefectural Deep Seawater Laboratory, 4 April 2006.

Diagnosis. Long gill rakers on anterior arch 3; predorsal pterygiophores 4; teeth patch on palatine circular; predorsal length 17.7–22.0% of SL; upper jaw length 8.0–8.7% of SL; dorsal-fin origin above 3rd vertebra; anal-fin origin below bases of 24th–28th dorsal-fin rays; all teeth on jaws conical, canine-like; distinct supraorbital pores [Modified from

Fig. 1. *Benthocometes australiensis*, BSKU 117791, 114.4 mm SL. Preserved condition.

Fig. 2. Soft x-ray image of *Benthocometes australiensis*, BSKU 117791, 114.4 mm SL.

Nielsen (2010)].

Description of Japanese specimen. Selected counts and measurements are given in Table 1. Body short, compressed, robust. Head relatively small, its length 47.8% of preanal length. Head and body fully covered with small scales (size of each scale under pectoral fin about 1.7 mm in diameter). Lateral line distinct and short, ending a head-length from caudal-fin base, its length 65.6% of SL. Snout short, its length 23.1% of HL. Eyes relatively large, diameter 24.7% of HL. Mouth small, posterior end of maxilla below middle of eye. Anterior nostril with short tube. Posterior nostril larger than anterior, without tube, adjoining eye. Tip of snout with about 20 small, black skin flaps. Opercle with 2 strong and sharp spines. Origin of dorsal fin anterior to a vertical from pectoral-fin base. Anal-fin origin slightly anterior to horizontal mid-point of body, located below 14th vertebra. Pelvic fin originating below dorsal-fin origin, its tip below middle of pectoral fin. Caudal fin connected with dorsal and anal fins. Fin membrane of vertical and pectoral fins thin. Anterior gill arch with 2–3 small, spiny knobs on upper branch; lower branch with 3 long rakers and 7 small, spiny knobs. Cephalic sensory canals with open pores; number of pores in supraorbital row 3, infraorbital row 5, mandib-

ular row 3 and preopercular row 2. All conical teeth small, canine-like, curved. Vomerine tooth patch small, circular, with 12 teeth. Palatine tooth patch short, oval, with about 20 teeth. Teeth on premaxilla with 2 rows near symphysis, 1 row posteriorly. Teeth on lower jaw with 2–3 rows near symphysis, 1 row posteriorly.

Axial skeleton (based on radiographs; Fig. 2). First neural spine short, half length of second spine. 1st–7th precaudal vertebrae with pointed neural spines. 8th–12th precaudal vertebrae with relatively blunt neural spines and all caudal neural spines with pointed tips. Haemal spines of precaudal vertebrae with pointed tips. Neural spines on precaudal vertebrae, 5th–12th with enlarged bases. Parapophyses on 6th–12th vertebrae increasing in width and length toward 12th one. Pleural ribs on 3rd–12th vertebrae. First predorsal pterygiophores above 1st vertebra.

Color in alcohol (Fig. 1). Ground color of head and body brown with numerous small black spots on head, pectoral fin and abdomen. Fin membrane of vertical and pectoral fins translucent. Vertical fins with numerous small brown spots. Lower jaw relatively pale, around symphysis blackish. Inside of operculum densely covered with melanophores. Lateral line pale.

Table 1. Measurements and counts of *Benthocometes australiensis* and *B. robustus*.

	This study	Nielsen (2010)	
	<i>B. australiensis</i> BSKU 117791	<i>B. australiensis</i> Holotype	<i>B. robustus</i> 29 specimens
SL (mm)	114.4	93	20–123
Counts			
Dorsal-fin rays	98	98	93–111
Predorsal pterygiophores	4	4	7–10
Caudal-fin rays	11	11	11
Anal-fin rays	77	80	78–94
Pectoral-fin rays	28	30	28–32
Pelvic-fin rays	2	2	2
Precaudal vertebrae	12	12	11–12
Total vertebrae	49	50	47–50
Dorsal-fin origin above vertebra no.	3	3	6–7
Anal-fin origin below dorsal-fin ray no.	28	24	17–20
Anal-fin origin below vertebra no.	14	15	13–16
Long gill rakers	3	3	9–12
Pseudobranchial filaments	7	7–8	6–8
Measurements			
% of SL			
Head length	21.8	23.0	20.0–25.0
Depth at anal-fin origin	25.6	22.5	17.0–21.5
Upper-jaw length	8.0	8.7	11.0–13.0
Diameter of eye window	5.4	5.7	5.4–6.9
Interorbital width	5.8	5.1	5.1–6.4
Postorbital length	13.1	13.0	10.5–13.0
Preanal length	45.6	46.0	40.5–47.0
Predorsal length	17.7	22.0	26.5–31.0
From base of pelvic to anal-fin origin	23.9	25.0	22.0–27.5
Pectoral-fin length	15.2	14.0	9.5–13.0
Pelvic-fin length	11.0	14.0	9.1–12.5
Snout to post. end of lateral line	82.5	79.0	74–86

Distribution. Known from the southeastern Indian Ocean off northwestern Australia (type locality; Nielsen 2010) and the northwestern Pacific off southwestern Japan (this study), at depths of 320–394 m.

Remarks. The Japanese specimen identified as a species of *Benthocometes* is clearly distinguished from other ophidiid genera by the following combination of characters: 2 posteriorly directed opercle spines, 3 long gill rakers, 7 pseudobranchial filaments, 4 predorsal pterygiophores, a blunt snout, and diameter of eye larger than snout length (Nielsen *et al.* 1999; Nielsen 2010; this study). Nielsen (2010) reported that the two valid species of *Benthocometes*, *B. robustus* and *B. australiensis*, can be distinguished from each other by the numbers of long gill rakers on the anterior arch (3 in *B. australiensis* vs. 9–12 in *B. robustus*) and predorsal pterygiophores (4 vs. 7–10), form of palatine dentition (circular vs. elongate), predorsal length (22.0% vs. 26.5–31.0% SL), upper jaw length (8.7% vs. 11.0–13.0% SL), position of dorsal-fin origin (above 3rd vs. 6th–7th vertebrae), position of anal-fin origin (below 24th vs. 17th–20th dorsal-fin rays), form of teeth (large canine-like teeth vs. small granular teeth), and supraorbital pores (developed vs. undeveloped). These characters of the Japanese specimen agree well with those of *B. australiensis* given by Nielsen (2010) except the position of

the anal-fin origin, which is located below the base of 28th dorsal-fin ray in the Japanese specimen but below the base of 24th dorsal-fin ray in the holotype. According to Nielsen (2010), this character's interspecific range in *B. robustus* is four, and we therefore regard this slight difference in the position of the anal-fin origin (below bases of 24th–28th dorsal-fin rays) as intraspecific variation.

Benthocometes australiensis was described by Nielsen (2010) based on the 93 mm SL holotype collected from off northwestern Australia. The Japanese specimen is the second record of *B. australiensis*, and the first record from the Northern Hemisphere. In addition, based on the specimen BSKU 117791, the new standard Japanese names, “Suisai-ashiro-zoku” and “Muroto-suisai-ashiro,” are proposed for the genus and species, respectively. These names are derived from part of the generic name, “comet” (=Suisai), the Japanese name for ophidiids (=Ashiro), and the locality of the Japanese specimen (=Muroto).

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