A new species of the genus *Bathyceradocus* from the Kumano-nada, central Japan (Crustacea: Amphipoda: Maeridae)

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**Abstract.**— A new species of *Bathyceradocus*, one of the maerid amphipods, is described based on the specimens collected from sunken wood on the bottom of the Kumano-nada, central Japan. *Bathyceradocus japonicus* sp. nov. can be distinguished from its congeners by the number of the accessory spines on the pleonite 1, the number of articles on the accessory flagellum, and the strongly oblique palm of the gnathopod 2 with the dentate margin. A brief note on the behavior of the new species and a key to species of the genus are provided.

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**Key words**: taxonomy, Amphipoda, Bathyceradocus, new species, Japan, behavior, key

**Introduction**

The amphipod genus *Bathyceradocus* was established by Pirlot (1934) with *B. stephenseni* Pirlot, 1934 from the Celebes Sea as its type species. Afterwards three species of the genus were described: *Bathyceradocus iberiensis* Andres, 1977 from off Spain in the northeast Atlantic; *B. wuzzae* Larsen & Krapp-Schickel, 2007 from the hydrothermal vents of the northeast Pacific; and *B. hawkingi* Jaźdżewska & Ziemkiewicz, 2019 from near the Kuril-Kamchatka Trench in the northwest Pacific. *Bathyceradocus stephenseni* was collected from various localities (Dahl, 1959; Barnard, 1961; Kamenskaya, 1981). Collection depths of all the species range from 1500 m (Barnard, 1961) to 7340 m (Kamenskaya, 1981) and these species usually dwell in sunken wood. In addition, Corbari & Jaźdżewska (2017) stated preliminarily that 15 *Bathyceradocus* species similar to *B. stephenseni* also occurred on the sea bottom with a depth range from 400 to 3500 m in the central and western Indo-Pacific and the tropical Atlantic.

Recently, we obtained several specimens of *Bathyceradocus* from sunken wood on the bottom of the Kumano-nada, central Japan. Closer examination revealed that they are new to science. Herein we describe this new species in detail and provide a key to species of the genus.

**Material and Methods**

The sunken wood in which *Bathyceradocus* inhabiting was collected by a commercial trawl net in the Kumano-nada. A part of the wood was transported to Toba Aquarium and placed into tanks for preparation and display. Four specimens of the amphipod were collected from the wood and the other amphipods were reared for observation. All the collected specimens were dissected and appendages or parts of appendages were drawn using a phase-contrast microscope (Nikon Eclipse E600) with an attached drawing tube (Nikon Y-IDT). Body length (BL) was measured from the apex of the rostrum along the dorsal margin to the distal end of the urosomite 3. The type specimens are
deposited in the Osaka Museum of Natural History, Japan (OMNH).

**Taxonomic Account**

**Family Maeridae Krapp-Schickel, 2008**
[Japanese name: Sunnariyokoebi-ka]

**Genus Bathyceradocus Pirlot, 1934**
[Japanese name: Chinboku-yokoebi-zoku, new]  
_Bathyceradocus_ Pirlot, 1934: 224.  
_Bathyceradocus_—Barnard, 1969: 238; Barnard & Barnard, 1983: 591.

**Type species**  
_Bathyceradocus Stephenseni_ Pirlot, 1934, monotypy.

**Diagnosis**

Body slender, laterally compressed; posterodorsal margins of pleonites 1–3 and urosomites 1–2 each with median spine and 0–4 (mainly 2–3) accessory spines on both sides (pleonite 1 lacking median spine in _B. wuzzae_), urosomite 3 lacking median spine; pleonal epimeron 3 projected posterodorsally. Head, rostrum obsolescent, lateral cephalic lobes and antennal sinus weak, eyes absent. Antennae slender; antenna 1, peduncular articles 1–2 longer than article 3, accessory flagellum long, with 6–13 articles. Mandible, molar developed; palp article 1 lacking distal spine, article 2 longest, article 3 almost straight, narrowed distally, with many setae ventrally; incisor and lacinia mobilis asymmetrical. Maxilla 1, inner plate with mediiodistal setae; palp 2-articulate, asymmetrical. Maxilla 2, inner plate setose mediiodistally. Coxae 1–4 ordinary length, coxa 4 excavated posteriorly; coxae 5–7 short, coxae 5–6 lobate; gills present on coxae 2–7, oostegites of female present on coxae 2–5. Gnathopod 1 small, more or less parachelate; carpus longer than propodus, carpus–propodus heavily setose. Gnathopod 2 enlarged, subchelate, symmetrical, propodus longer than carpus, palm oblique or transverse, carpus–propodus heavily setose. Pereopods, dactyli simple; bases of pereopods 5–7 expanded. Uropods biramous; peduncle of uropod 1, laterodistal and mediiodistal ends each with constricted hook-like robust seta, outer rami of uropods 1–2 shorter than inner rami; uropod 3, peduncle short, both rami oblong, outer ramus slightly shorter than or subequal length to inner ramus. Telson longer than wide, deeply cleft, weakly armed.

**Remarks**

The most distinct character of this genus is the presence of a gill on the coxa 7. There is only one genus having this character in the maerid amphipods, although Barnard & Barnard (1983) pointed out a possibility of the presence of a coxal 7 gill in _Metaceradocoides_ Birstein & Vinogradova, 1960. _Metaceradocoides_ differs from _Bathyceradocus_ in the absence of the dorsal ornamentation (Barnard & Barnard, 1983). The constricted hook-like robust setae on the uropod 1 are also unique in the amphipod genera. On the variation within the genus, the shape of the gnathopod palm is usually oblique, but transverse in _B. iberiensis_.

**Bathyceradocus japonicus** sp. nov.  
[Japanese name: Chinboku-yokoebi, new]  
LSID:urn:lsid:zoobank.org:act:90E3B8AA-2510-460A-9A41-AB35D49DEA75  
Figs. 1–5

**Material examined**

Holotype: male (BL: 16.6 mm, OMNH-Ar-11685), Kumano-nada, off Mikisaki, Owase City, Mie Prefecture, 350 m deep, inhabiting in sunken wood, 3 February 2019, coll. T. Moritaki. Paratypes: male (BL: 13.7 mm, OMNH-Ar-11686) and 2 ovigerous females (BL: 17.5, 16.6 mm, OMNH-Ar-11687, 11688), Kumano-nada, off Owase City, Mie Prefecture, 330–400 m deep, inhabiting in sunken wood, 29 September 2015, coll. T. Moritaki.
**Type locality**

Kumano-nada, off Mikisaki, Owase City, Mie Prefecture, Japan (33°57′N, 136°21′E, estimated).

**Etymology**

Referring to the type locality.

**Diagnosis**

Pleonites 1–3 and urosomites 1–2, each posterodorsal margin with large median spine and 2–3 accessory spines on both sides, pleonal epimera 1–3 projected posteroventrally. Antenna 1, accessory flagellum with 9–13 articles, primary flagellum article 1 long, with dense setae medially. Gnathopod 1, merus–propodus heavily setose. Gnathopod 2 in both sexes, carpus–propodus heavily setose, palm strongly oblique, defined by 4 robust setae, palmar margin dentate, with 6–7 submarginal tubercles.

**Description of male** [Based on holotype, male, 16.6 mm (OMNH-Ar-11685)]

Body (Fig. 1), pereonites smooth; pleonites 1–3 (Fig. 2A), posterodorsal margins each with large median spine and 2, 3, 3 accessory spines on both sides, respectively; pleonal epimera 1–3 (Fig. 2B) projected posteroventrally, each with oblique lateral ridge, ventral margins of epimera 2–3 with 5 and 10 robust setae, respectively; urosomites 1–2 (Fig. 2A), posterodorsal margins each with large median spine and 2 accessory spines on both sides, urosomite 1 bearing dorsomedian robust seta and posterodorsal robust seta on both sides, urosomite 2 with dorsomedian robust seta and 3 posterodorsal robust setae on both sides; urosomite 3 (Fig. 2A) lacking median spine, posterodorsal margin with small spine and 4 robust setae on both sides.

Head (Fig. 1) bearing short plumose seta on anterolateral corner. Antenna 1 (Fig. 2C) about 0.4 times length of body; peduncle with ratio of lengths of articles 1–3 : 0.55 : 0.3, article 1 with robust seta posteromedially; accessory flagellum with 13 articles, last article minute; primary flagellum with 29 articles, first article long, with dense setae medially, last article minute. Antenna 2 (Fig. 2D) about 1.3 times as long as antenna 1, weakly setose; peduncle with ratio of lengths of articles 3–5 1 : 2.5 : 4.3, articles 3–4 with 2 and 1 small...
medial robust setae, respectively; flagellum with 22 articles.

Upper lip (Fig. 3A), anterior surface with many long setae, ventral margin rounded, with short setae. Left mandible (Fig. 3B, B1), incisor long, with 6 cusps, lacinia mobilis narrow, 3-dentated, with 15 accessory setae; palp article length ratio 1 : 4.0 : 2.65, distal part of article 2 setose, distal 2/3 of article 3 ventral margin densely setose, lateral surface also setose. Right mandible (Fig. 3C, C1), incisor short, with 5 cusps, lacinia mobilis wider than left, 4-dentated, with 12 accessory setae; palp article length ratio 1 : 3.4 : 2.6, setation of palp same as left. Lower lip (Fig. 3D) with weakly defined inner lobes, distal margins of inner and outer lobes setose, mandibular processes small. Maxilla 1 (Fig. 3E, E1, F, F1), inner plate rounded, with many long mediiodistal setae; outer plate with 10 robust setae on distal margin, middle part bearing many feeble setae; left palp slender, with article length ratio 1 : 1.3,
Fig. 3. Bathyceradocus japonicus sp. nov., holotype (male, 16.6 mm, OMNH-Ar-11685). A, upper lip, anterior view; B, left mandible, medial view; B1, incisor, lacinia mobilis and accessory setae of left mandible, medial view; C, right mandible, dorsomedial view; C1, incisor, lacinia mobilis and accessory setae of right mandible, dorsomedial view; D, lower lip, ventral view; E, left maxilla 1, ventral view, inner plate lost; E1, distal robust setae of left maxilla 1, ventral view; F, right maxilla 1, ventral view; F1, distal robust setae of right maxilla 1, ventral view; G, left maxilla 2, ventral view; H, right maxilliped, ventral view; H1, distal robust setae on inner plate of right maxilliped, ventral view, slender setae omitted. Scales: 0.1 mm.
article 2 with 12 (1 lost) setae distally; right palp wide, with article length ratio 1 : 5.6, article 2 with 8 triangular robust setae and 4 slender setae distally. Maxilla 2 (Fig. 3G), inner plate broader than outer, bearing dense setae on mediiodistal margin, dorsal surface with oblique facial row of setae and many short feeble setae; outer plate densely setose terminally. Maxilliped (Fig. 3H, H1) heavily setose; inner plate truncate, distal margin with 4 robust setae; mediiodistal margin of outer plate without robust setae; palp with 4 articles, article 4 narrow, with slender nail on tip.

Gnathopod 1 (Fig. 4A, A1), coxa roundish rectangular, ventral margin with 4 robust setae; basis slightly curved anteriorly, medial surface and posterior margin with several long setae, posterodistal corner setose; merus posterior margin heavily setose; carpus–dactylus weakly twisted counter clockwise, posterior margin of carpus bearing dense long setae; propodus about 0.8 times as long as carpus, palm slightly projected posterodistally, defined by 3 short robust setae, posterior margin, medial surface and anterodistal corner setose; dactylus short, slightly curved posteriorly. Gnathopod 2 (Fig. 4B, B1), coxa obovate, ventral margin with 4 robust setae, gill wide; basis straight, posterior margin with several long setae, posterodistal corner setose; merus posterior margin with several setae; carpus–dactylus strongly twisted counterclockwise, lateral and posterodistal surfaces of carpus heavily setose, mediiodistal margin also setose; propodus about 1.9 times as long as carpus, palm long, strongly twisted counter clockwise, lateral and posterodistal surfaces of carpus and mediiodistal margin strongly setose, mediiodistal margin also setose; dactylus slender, slightly curved posteriorly.

Pereopods 3–4 (Fig. 4C, D), pereopod 3 longer than pereopod 4; coxa 3 narrowed and coxa 4 widened ventrally, ventral margin of coxa 3 with 2 short robust setae, gills large; bases slightly curved anteriorly, anteroproximal and posterior margins with several long setae; meri–propodi with several marginal robust setae; dactyli short, almost straight. Pereopod 5 (Fig. 4E) longer than pereopods 3–4; coxa short, bilobed, gill relatively large; basis subovate, slightly narrowed distally, posterodistal corner angular, lateral surface with ridge, anterior margin bearing 7 robust setae, posterior margin weakly serrated; ischium–propodus with several marginal robust setae; dactylus short, almost straight. Pereopod 6 (Fig. 4F) about 1.3 times as long as pereopod 5; coxa short, bilobed, gill medium-sized; basis subovate, slightly narrowed distally, posterodistal corner angular, lateral surface with ridge, anterior margin bearing 7 robust setae, posterior margin weakly serrated; ischium–propodus with many marginal robust setae; dactylus short, almost straight. Pereopod 7 (Fig. 4G) almost same length as pereopod 6, but wider than pereopod 6; coxa short, not lobate, gill small; basis subovate, narrowed distally, posterodistal corner angular, lateral surface with ridge, anterior margin bearing 8 robust setae, posterior margin weakly serrated; ischium–propodus with many marginal robust setae; dactylus short, almost straight.

Pleopods (Fig. 5A–C), pleopod 3 shortest; peduncles each bearing several or many slender setae, a few robust setae and 2 coupling hooks; both rami almost same length, outer rami with 26, 26, 23 articles, inner rami with 19, 20, 18 articles in pleopods 1–3, respectively. Uropod 1 (Fig. 5D, D1, D2), peduncle with 4 (1 lost) dorsolateral, 4 dorsomedial and 4 ventrolateral robust setae, laterodistal and mediiodistal ends each bearing constricted hook-like robust setae; outer ramus about 0.7 times as long as peduncle, about 0.8 times length of inner ramus, with 3 dorsolateral, 5 dorsomedial and 5 terminal robust setae; inner ramus with 6 dorsolateral, 6 dorsomedial and 5 (2 lost) terminal robust setae. Uropod 2 (Fig. 5F) about three-quarter length of uropod 1; peduncle bearing 3 dorsolateral and 1 dorsomedial ro-
bust setae, laterodistal and mediiodistal corners with 1 and 2 robust setae, respectively; outer ramus about 85% length of peduncle, about 0.7 times as long as inner ramus, with 5 dorsolateral, 4 dorsomedial and 5 terminal robust setae; inner ramus with 7 dorsolateral, 6 dorsomedial
Fig. 5. *Bathyceradocus japonicus* sp. nov. A–G, D1, F1, holotype (male, 16.6 mm, OMNH-Ar-11685); D2, paratype (male, 13.7 mm, OMNH-Ar-11686); H, H1, I, paratype (ovigerous female, 17.5 mm, OMNH-Ar-11687); I1, paratype (ovigerous female, 16.6 mm, OMNH-Ar-11688). A, left pleopod 1, posterior view; B, left pleopod 2, anterior view; C, left pleopod 3, posterior view; D, left uropod 1, dorsolateral view; D1, constricted hook-like robust setae on left uropod 1, dorsolateral view; D2, tip of inner ramus of left uropod 1, dorsolateral view; E, F, left uropods 2–3, dorsal views; F1, tip of left uropod 3 outer ramus, dorsal view; G, telson, dorsal view; H, left gnathopod 1, lateral view; H1, distal part of left gnathopod 1, lateral view, slender setae omitted; I, left gnathopod 2, lateral view, carpus–dactylus twisted; I1, distal part of left gnathopod 2, medial view, slender setae omitted. Scales: 0.2 mm.
and 5 terminal robust setae. Uropod 3 (Fig. 5F, F1) about 0.85 times as long as uropod 2; peduncle short, dorsal surface and distal end each with 2 robust setae; outer ramus about 1.45 times as long as peduncle, about 85% length of inner ramus, with 13 dorsolateral and 9 dorso-medial robust setae, distal margin bearing 4 (1 lost) robust setae and tiny second article with 4 short setae; inner ramus with 9 dorsolateral, 12 dorsomedial and 4 (1 lost) terminal robust setae. Telson (Fig. 5G) about 1.2 times longer than width, cleft about 90% of telson length, each lobe with 2 sensory setae on dorsal surface, each tip bearing 2 robust setae (large and small) and 2 sensory setae.

**Variation**

Number of accessory spines on pleonite 1 : 3 in paratype, male, 13.7 mm (OMNH-Ar-11686) and paratype, ovigerous female, 17.5 mm (OMNH-Ar-11687). Number of accessory spines on pleonite 2 : 2 and 3 in paratype, male, 13.7 mm (OMNH-Ar-11686) and paratype, ovigerous female, 16.6 mm (OMNH-Ar-11688). Number of articles on accessory flagellum: 9, 12, 10 in paratypes (OMNH-Ar-11686–11688), respectively. Gnathopod 1 in female [Fig. 5H, H1; paratype (OMNH-Ar-11687)]: almost same as holotype, male, 16.6 mm (OMNH-Ar-11685), but ventral margin of coxa with 5 robust setae. Gnathopod 2 in female [Fig. 5I, I1; paratypes (OMNH-Ar-11687–11688)]: subsimilar to holotype except for oostegite, but ventral margin of coxa with 3 robust setae, gill longer, basis anterior margin bearing several short setae, and palmar margin with 7 submarginal tubercles.

**Coloration in life**

Head pale yellow, other parts white.

**Remarks**

The strongly oblique palm of the gnathopod 2 with the dentate margin is peculiar in the genus, while the dense setae on the propodus make it difficult to observe. *Bathyceradocus japonicus* sp. nov. can be distinguished from its congeners by the number of the accessory spines on the pleonite 1 (2–3 in *B. japonicus*, 1–2 in *B. iberiensis* and 0 or 1 in the other species), and by the number of articles on the accessory flagellum (9–13 in *B. japonicus*, 9–10 in *B. stephenseni* and 6–8 in the other species).

**Distribution**

Currently known only from the Kumano-nada, central Japan, with a depth of 330–400 m (the shallowest record of *Bathyceradocus*).

**Behavior observed in the aquarium**

The behavior observed is as follows: this amphipod usually inhabits inside of the wood and sometimes appears to the surface; it often remains stationary in a burrow dug by the shipworm (teredinid bivalve), and rarely moves around actively (Fig. 6); when another amphipod approaches, it flips its pleon up intermittently.

Distinct digging, feeding or mating behaviors had not been observed. This species may have low digging ability like *Chelura terebrans* Philippi, 1839 associated with limnotriid isopod (Barnard, 1955). As regards the feeding habit of *Bathyceradocus*, Barnard (1961) found comminuted woody material in the stomach and Larsen & Krapp-Schickel (2007) suggested also usage of bacterial films. The twisted gnathopods with numerous setae can be assumed to have some function for feeding.

**Key to species of Bathyceradocus**

*Bathyceradocus stephenseni* sensu Dahl, 1959 and *B. stephenseni* sensu Kamenskaya, 1981 are excluded because data of the dorsal ornamentation are unknown.

1. Pleonite 1 lacking median spine
   
   - Pleonite 1 with median spine ..........2
2. Pleonite 1 lacking accessory spine ..........3

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– Pleonite 1 with accessory spine(s) ..........5
3. Pleonite 2 with 3 accessory spines on both sides ........................................ B. hawkingi
– Pleonite 2 with 2 accessory spines on both sides ..................................................4
4. Pleonites 3 with 3 accessory spines and urosomites 1–2 each with 2 accessory spines on both sides
........................................ B. stephensi sensu Barnard, 1961 from Madagascar
– Pleonites 3 with 2 accessory spines and urosomites 1–2 each with single accessory spine on both sides
........................................ B. stephensi sensu Barnard, 1961 from Panama
5. Pleonite 3 with 2 accessory spines on both sides
...... B. stephensi (including B. stepheseni sensu Barnard, 1961 from Mindanao Sea)
– Pleonite 3 with 3 accessory spines on both sides .................................................6
6. Accessory flagellum with 6 articles, gnathopod 2 palm transverse

........................................... B. iberiensis
– Accessory flagellum with 9–13 articles, gnathopod 2 palm oblique
........................................... B. japonicus sp. nov.

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