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New records for decapods from the Cretaceous Goshoura Group (Albian to Cenomanian), Amakusa City, Kyushu, Japan

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Abstract

Three decapod species, *Eryma moriedaorum* Ando, Hirose, Ugai, and Shimada, new species, *Hoploparia hinokunika* Ando and Shimada, new species and *Bournelyreidus shiranui* Ando, new species are described from the Cenomanian Gannohana Member of the Enokuchi Formation of the Goshoura Group in the Goshoura-jima Island, Amakusa City, western Kumamoto Prefecture. Two decapod species, *H. hinokunika* and Axioidea fam., gen. et sp. indet. are described from the Cenomanian Karakizaki Formation of the Goshoura Group in the Goshoura-jima Island. *Eryma moriedaorum* is characterized by a long rostrum and a very shallow branchiocardiac groove and is closest to *E. nippon* Karasawa, Ohara and Kato. However, the present species differs from *E. nippon* in having a shallow cervical groove and a longer rostrum. *Hoploparia hinokunika* is most similar to *H. albertaensis* Tshudy and Feldmann but differs in having cervical, hepatic, and postantennal spines. *Bournelyreidus shiranui* is closest to *B. oaheensis* (Bishop), but differs in having a narrow front and a short rostrum.

Keywords : Erymidae, Nephropidae, Lyreididae, Late Cretaceous, Kumamoto Prefecture

Introduction

The Lower to Upper Cretaceous Goshoura Group (Albian to Cenomanian) is rich in non-marine and marine fossils (*e.g.*, Matsumoto, 1938; Matsumoto and Tashiro, 1975; Komatsu and Maeda, 2005; Komatsu, 2013). Although many decapod specimens have been collected from this group (Hirose and Ugai, 2012; Karasawa and Komatsu, 2013), only one species, *Joeranina goshourajimensis* Karasawa and Komatsu, 2013, has been described from the Hokahira Member of the Enokuchi Formation of the Goshoura Group (Karasawa and Komatsu, 2013). In this paper, three new decapod species and one unnamed species are described. The described specimens are deposited in the Goshoura Cretaceous Museum (GCM-IVP).

Localities and geological setting

The Cretaceous Goshoura Group is mainly distributed in Goshoura-jima and Shishi-jima islands in the southeastern part of the Amakusa Islands, Kyushu, Japan (Fig. 1). Detailed stratigraphy and depositional facies were reported by Komatsu (1999) and Komatsu and Maeda (2005); Karasawa and Komatsu (2013) summarized the geology of Goshoura Group. The Goshoura Group is divided into the Eboshi, Enokuchi, and Karakizaki formations and the Enokuchi Formation is subdivided into the Hokahira and Gannohana members in ascending order (Komatsu and Maeda, 2005) (Fig. 2). The decapods described herein were collected from the Gannohana Member of the Enokuchi Formation and the Karakizaki Formation. The Gannohana Member consists of sandstone associated with cross stratification and mudstone, and this member yields abundant bivalves and ammonoids such as *Graysonites adkinsi* and *Mariella oehlerti*. Additionally, the member seemed to be deposited during the Cenomanian by the evidence of the ammonoids and under the tidal-flat, shoreface, and inner shelf environments

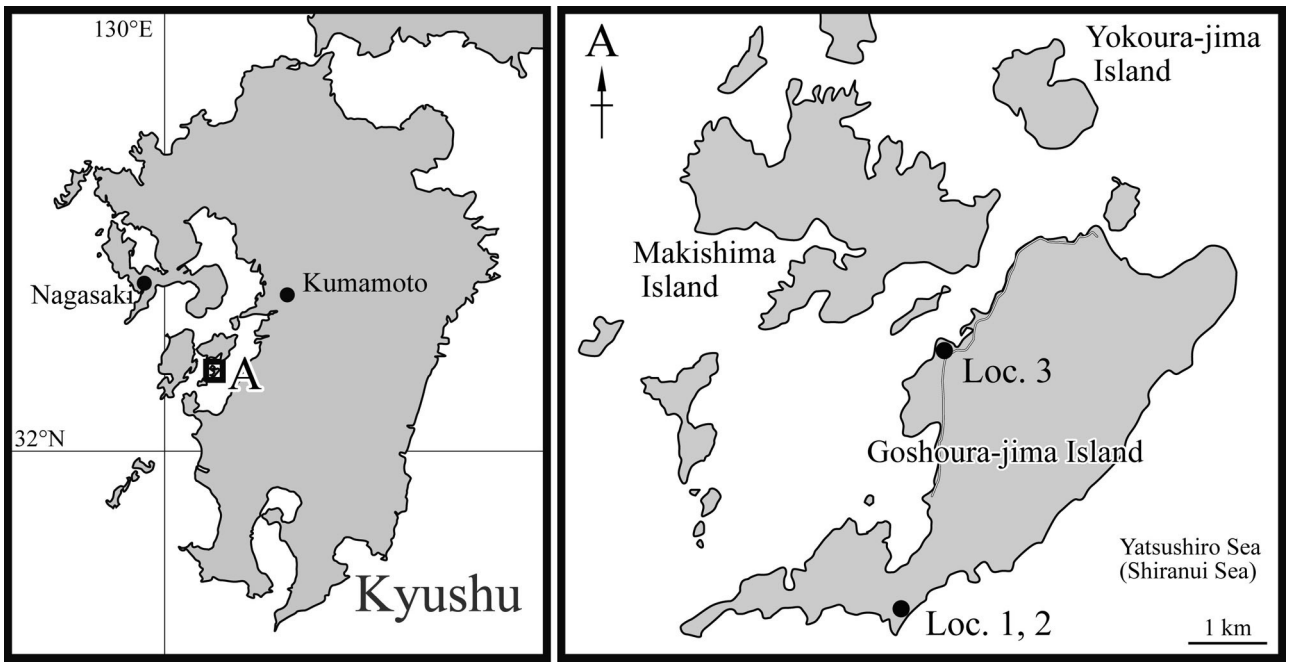

Fig. 1. Fossil localities in Goshoura-jima Island.

(Komatsu and Maeda, 2005). The Karakizaki Formation consists of sandstone and gravelly sandstone which yield fresh-water molluscan fossils. Therefore, Komatsu and Maeda (2005) suggested that the formation consists of fluvial and tidal-flat sediments.

The decapods described herein were collected from the following localities (Figs. 1, 2, Table 1):

Loc. 1: Cliff of Gannohana, southeast of Goshoura-jima Island, Goshoura town. Fine-grained sandstone includes few fossils of the Gannohana Member of the Enokuchi Formation. The decapod specimens are rare in sandstones.

Loc. 2: Cliff of Gannohana, southeast of Goshoura-jima Island, Goshoura town. Coarse-grained sandstone includes abundant benthic molluscs and ammonoids of the Gannohana Member of the Enokuchi Formation. The decapod specimens are common in sandstones.

Loc. 3: Roadcut of Karakizaki, west of Goshoura-jima Island, Goshoura town. Fine-grained sandstone includes few fossils of the Karakizaki Formation. The decapod specimens are rare in sandstones.

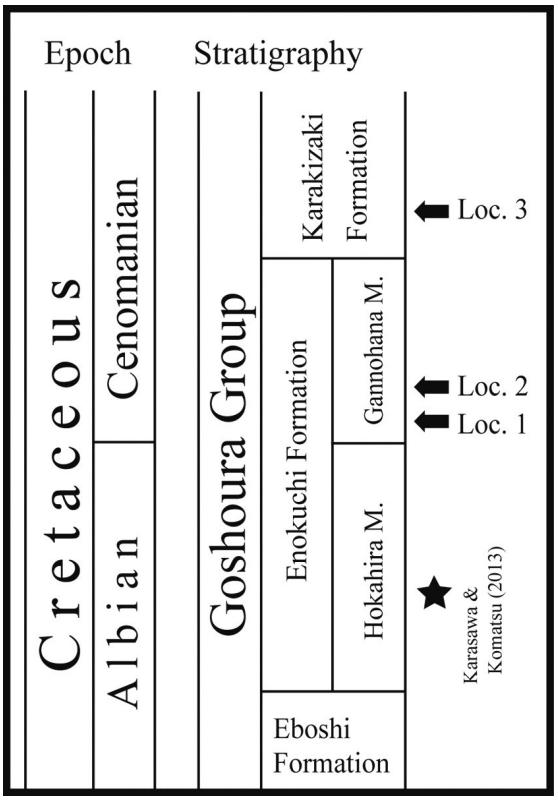

Fig. 2. Stratigraphy of the Goshoura Group modified after Karasawa and Komatsu (2013). Arrows indicate horizon of decapods in this study and star mark indicates horizon of decapod in Karasawa and Komatsu (2013).

Systematic Palaeontology

Order Decapoda Latreille, 1802

Clade Erymida sensu Schram and Dixon, 2004

Superfamily Erymoidea Van Straelen, 1925

Family Erymidae Van Straelen, 1925

Genus *Eryma* Meyer, 1840a

Type species: *Macrourites modestiformis* von Schlotheim, 1822, by subsequent designation of Glaessner (1929).

Included species: See Schweitzer *et al.* (2010), Devillez *et al.* (2017) and Devillez and Charbonnier (2017, 2019).

Eryma moriedaorum Ando, Hirose, Ugai, and Shimada, new species

(Fig. 3)

Decapoda; Hirose and Ugai, 2012, figs. 7.5, 7.6.

Material examined: GCM-IVP2789 (holotype, carapace), GCM-IVP2085 (paratype, left cheliped), GCM-IVP2733 (paratype, carapace), GCM-IVP3044 (paratype, carapace), GCM-IVP4154 (paratype, carapace).

Type locality: All specimens were collected from Loc. 2; Gannohana Member of the Enokuchi Formation of the Goshoura Group in Goshoura town, Amakusa City, Kumamoto Prefecture. Late Cretaceous (Cenomanian).

Etymology: This species is named for the family of late M. Morieda, his wife F. Morieda and his son H. Morieda, who kindly helped the authors for fieldwork in Goshoura-jima Island.

Diagnosis: Carapace long, subcylindrical; surface covered with tubercles. Rostrum long, slender with pointed tip. Intercalated plate narrow with short, weak ridge on median line. Gastro-orbital groove weakly developed. Cervical groove deep, sinuous, extending ventrally to join deep, curved antennal groove. Hepatic groove deep, strongly sinuous, joining cervical and postcervical grooves. Attachment site of mandibular muscle triangular, well defined, swollen, smooth. Postcervical groove deep, sinuous, joining inferior groove. Inferior groove well curved forward. Branchiocardiac groove shallow, well curved forward, connection with postcervical groove. Palm longer than high; surface covered with tubercles. Fixed finger slender, longer than palm. Dactylus as long as fixed finger, slightly curved dorsally.

Description: Carapace subcylindrical, 2.5 times longer than high; cross section vertically oval, longer than wide; surface covered with coarse tubercles. Rostrum about 15% length of carapace, slender with pointed tip. Intercalated plate narrow, short, weakly longitudinally ridge on median line. Orbital and antennal spines not preserved. Gastro-orbital groove shallow, short, weakly developed, originating from median portion of cervical groove. Cervical groove deep, but shallow dorsally, sinuous, extending ventrally to join antennal groove. Antennal groove deep, slightly curved dorsally. Hepatic groove deep, one time strongly sinuous, joining cervical and postcervical grooves. Attachment site of mandibular muscle triangular, well defined, swollen, smooth. Attachment site of adductor testis muscle subrectangular, narrow, inflated. Postcervical groove deep, but shallow dorsally, 2 to 3 times sinuous, joining inferior groove. Inferior groove deep, concave forward extending ventrally. Branchiocardiac groove very shallow, slender, not extending dorsally, curved forward, joining postcervical groove, becoming shallower at junction with postcervical groove. Lateral margins weakly rimmed.

Table 1. List of fossil decapods from the present localities.

Species/Locality	Loc. 1	Loc. 2	Loc. 3
Eryma moriedaorum		5	
Hoploparia hinokunika	2		4
Axoidea sp. indet.			1
Bournelyreidus shiranui		3	

Pereiopod 1 of 1st cheliped belongs to claw form II of Devillez *et al.* (2016). Palm longer than high; surface covered with coarse tubercles. Fixed finger slender, 1.2 times longer than palm, slightly curved dorsally; surface covered with coarse tubercles; occlusal margin not preserved. Dactylus poorly preserved, as long as fixed finger, slightly curved dorsally.

Remarks: The present species seems to be closely related to *Eryma nippon* Karasawa, Ohara, and Kato, 2008, described from the Lower Cretaceous (Barremian) Arida Formation of Wakayama Prefecture, central Japan. However, the present species has a shallow cervical groove at the dorsal part of the carapace and a longer rostrum. *Eryma moriedaorum* is similar to *E. jungostrix* Feldmann and Titus, 2006, described from the upper Jurassic (Oxfordian) Redwater Shale of Utah, U.S.A., but differs in having an inflated attachment site of adductor testis muscle and a short antennal groove. The present species is also similar to *E. antiquum* (Birshtein, 1958) described from the upper Permian (Changhsingian) of Russia, but differs in having a short gastro-orbital groove, a strongly curved inferior groove and a shallow branchiocardiac groove. The present species resembles *E. vocontii* Devillez, Charbonnier, Hyžný, and Leroy, 2016, described from the Lower Cretaceous (Albian) of southeastern France, but differs in having a shallow branchiocardiac groove and a strongly curved inferior groove. The present species also resembles *E. mandelslohi* (Meyer,1840b), first described

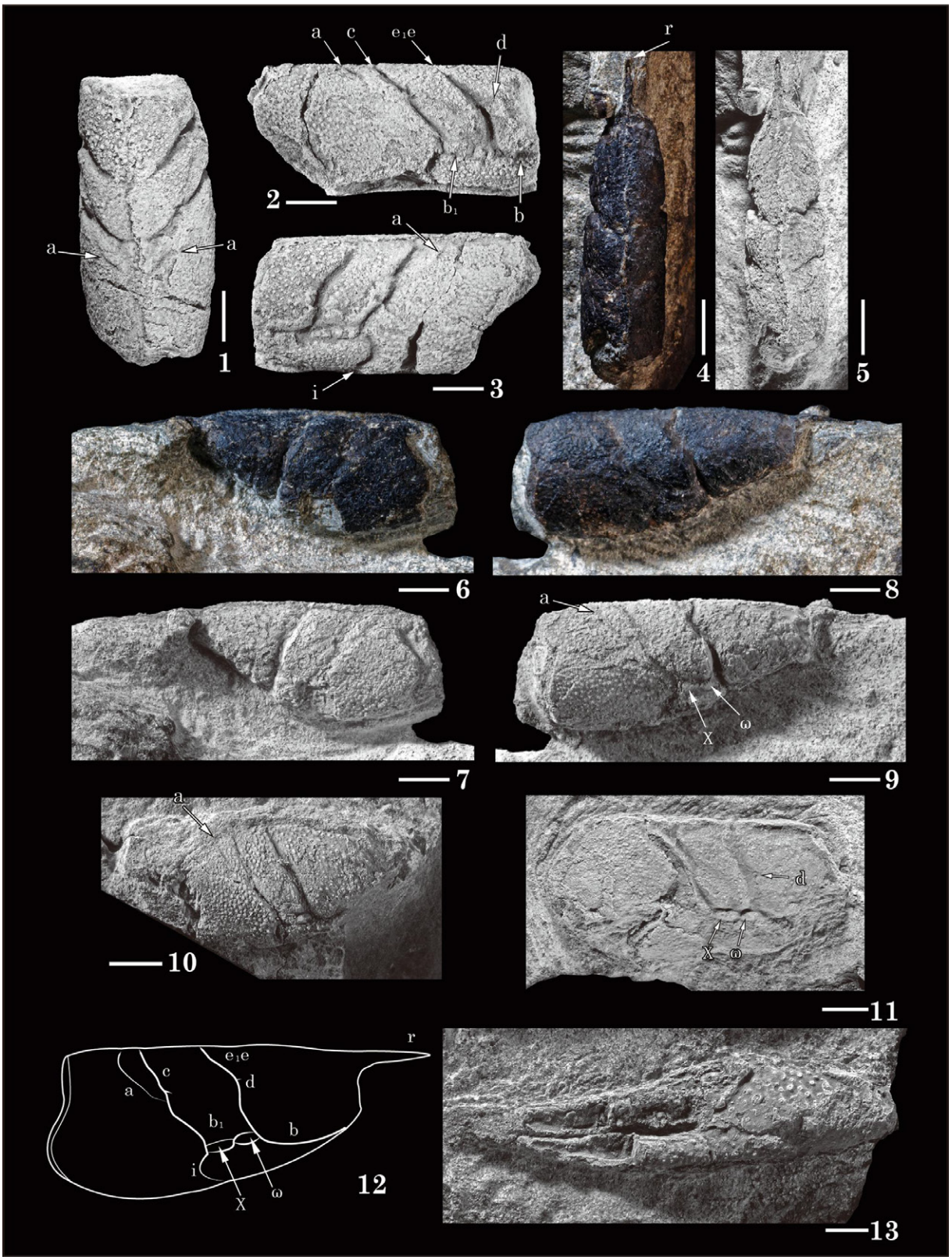

Fig. 3. ***Eryma moriedaorum*** **Ando, Hirose, Ugai and Shimada, new species. 1–3**, GCM-IVP2789, holotype, carapace, 1, dorsal view; 2, left lateral view; 3, right lateral view. **4–9**, GCM-IVP2733, paratype, carapace, 4, 5, dorsal view; 6, 7, left lateral view; 8, 9, right lateral view. **10**, GCM-IVP3044, paratype, carapace, right lateral view. **11**, GCM-IVP4154, paratype, carapace, right lateral view. **12**, line drawing reconstruction of carapace. **13**, GCM-IVP2085, paratype, left cheliped, left lateral view. 1–3, 5, 7, 9–11 and 13 are coated with ammonium chloride (NH_4Cl). All scale bars indicate 5.0 mm. Abbreviations refer to Devillez and Charbonnier (2019, Fig. 1A): a: branchiocardiac groove; b: antennal groove; b_1: hepatic groove; c: postcervical groove; d: gastro-orbital groove; e_1e: cervical groove; i: inferior groove; r: rostrum; χ: attachment site of adductor testis muscle; ω: attachment site of mandibular muscle.

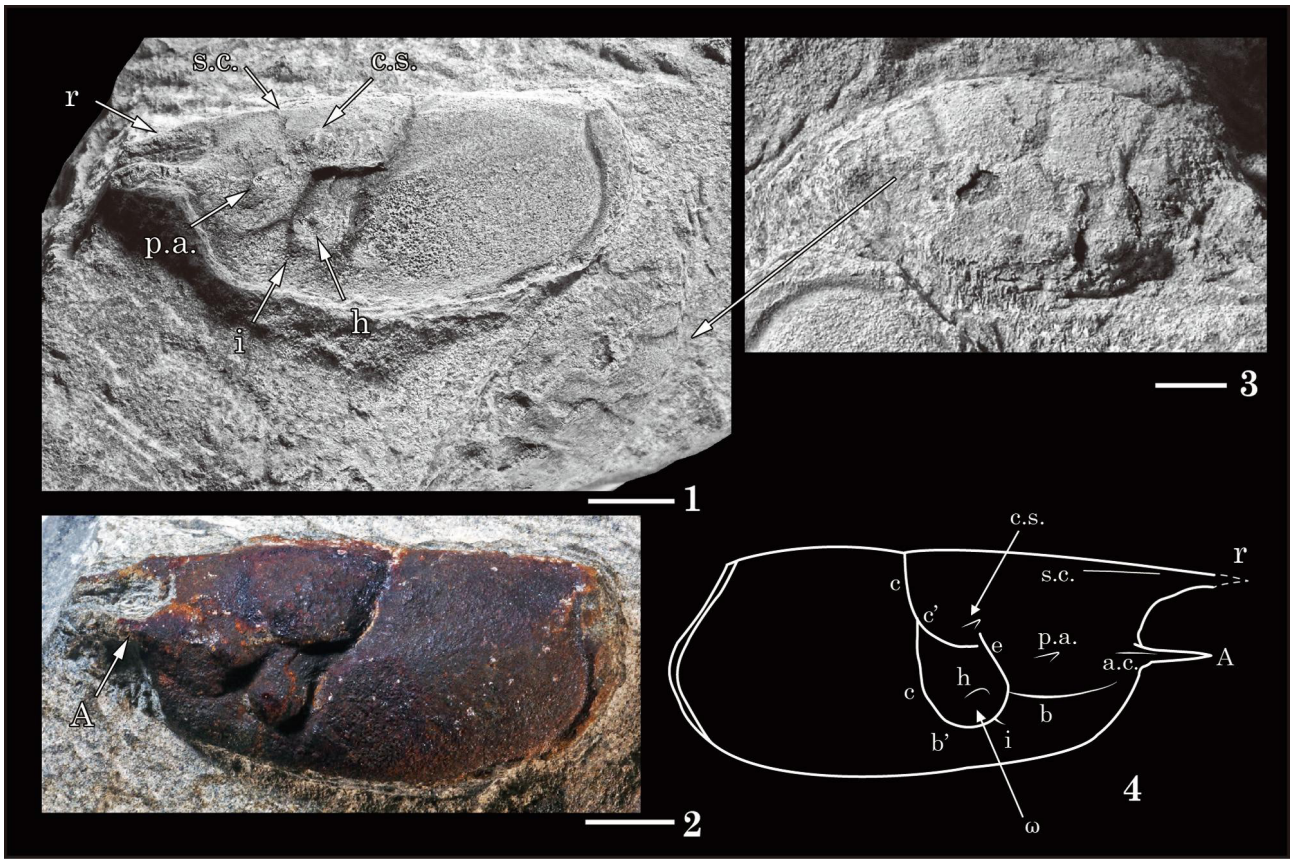

Fig. 4. ***Hoploparia hinokunika*** **Ando and Shimada, new species. 1–3,** GCM-IVP4028, holotype, 1, carapace and abdomen, left lateral view; 2, carapace, left lateral view; 3, abdomen, left lateral view. **4**, line drawing reconstruction of carapace. 1 and 3 are coated with ammonium chloride (NH_4Cl). All scale bars indicate 5.0 mm. Abbreviations refer to Feldmann *et al.* (1993, Fig. 3.6): A: antennal spine; a.c.: antennal carina; b: antennal groove; b': hepatic groove; c: postcervical groove; c': intercervical groove; c.s.: cervical spine; e: cervical groove; h: hepatic spine; i: inferior groove; p.a.: postantennal spine; s.c.: supraorbital carina; ω: prominence omega.

from the Middle Jurassic (Callovina) of Metzingen, Germany, but differs in having a shallow branchiocardiac groove, a long antennal groove and a slender palm of 1st cheliped.

The genus has a geologic record ranging from the Late Permian to the Early Cretaceous before this study (Glaessner, 1969; Devillez and Charbonnier, 2017, 2019). *Eryma moriedaorum* represents the first Late Cretaceous record and the youngest occurrence of the genus.

Infraorder Astacidea Latreille, 1802

Section Homarida Scholtz and Richter, 1995

Superfamily Nephropoidea Dana, 1852

Family Nephropidae Dana, 1852

Genus *Hoploparia* McCoy, 1849

Type species: *Astacus longimanus* Sowerby, 1826, by subsequent designation of Rathbun (1926).

Included species: See Kornecki *et al.* (2017).

Hoploparia hinokunika **Ando and Shimada, new species**

(Fig. 4, 5)

Decapoda; Hirose and Ugai, 2012, fig. 7.7.

Material examined: GCM-IVP4208 (holotype, carapace and abdomen), GCM-IVP1741 (paratype, right cheliped), GCM-IVP1742 (paratype, right cheliped), GCM-IVP1743 (paratype, carapace), GCM-IVP2003 (paratype carapace), GCM-IVP2012 (paratype, abdomen).

Type locality: GCM-IVP2012 and GCM-IVP4208 were collected from Loc. 1; Gannohana Member of the Enokuchi Formation of the Goshoura Group in Goshoura town, Amakusa City, Kumamoto Prefecture. Late Cretaceous (Cenomanian).

GCM-IVP1741, GCM-IVP1742, GCM-IVP1743 and GCM-IVP2003 were collected from Loc. 3; Karakizaki Formation

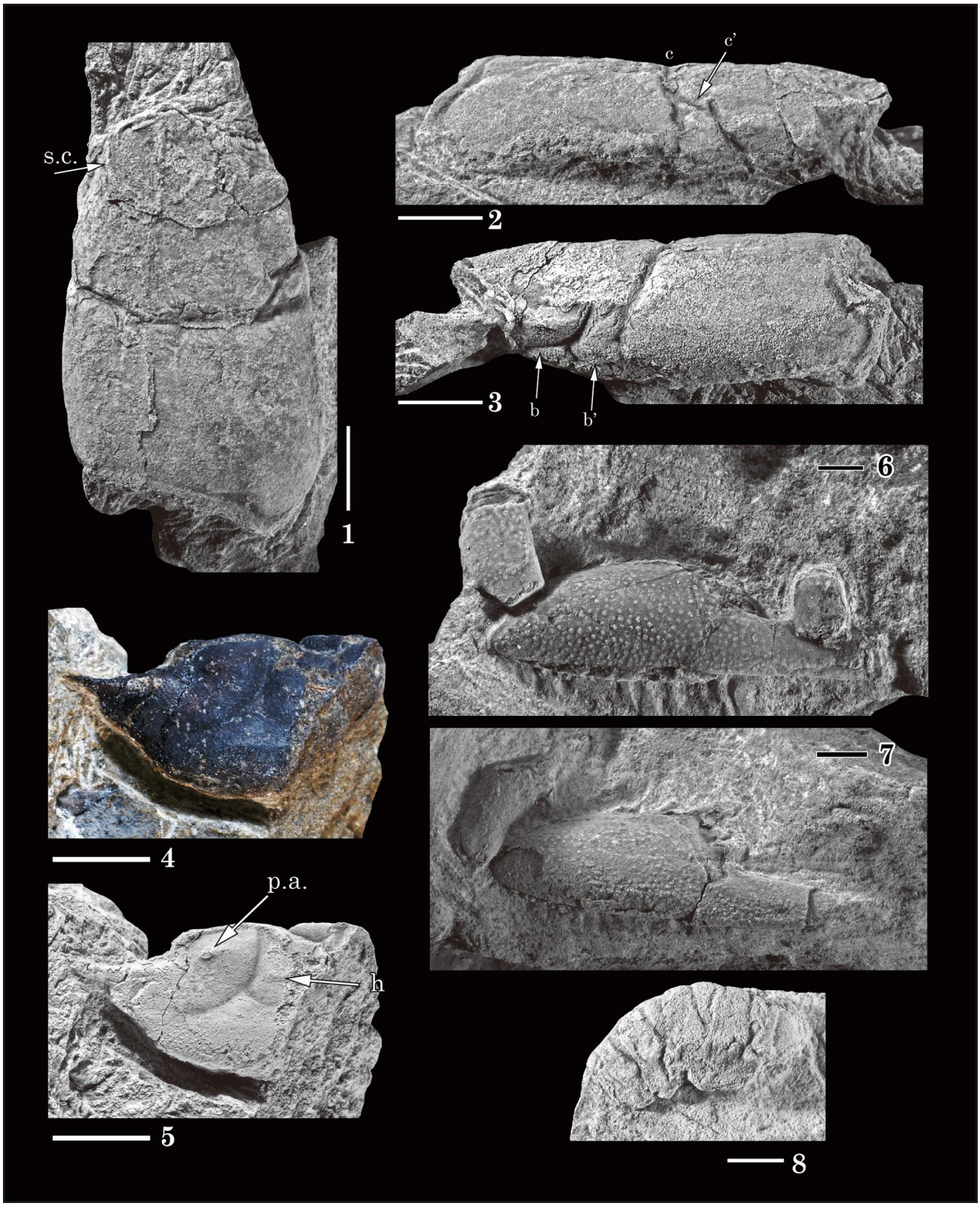

Fig. 5. ***Hoploparia hinokunika*** **Ando and Shimada, new species. 1–3,** GCM-IVP2003, paratype, carapace, 1, dorsal view; 2, right lateral view; 3, left lateral view. **4, 5,** GCM-IVP1743, paratype, carapace, left lateral view. **6,** GCM-IVP1741, paratype, right cheliped, right lateral view; **7,** GCM-IVP1742, right cheliped, right lateral view. **8,** GCM-IVP2012, paratype, abdomen, right lateral view. 1–3, 5 and 6–8 are coated with ammonium chloride (NH_4Cl). All scale bars indicate 5.0 mm. Abbreviations refer to Feldmann *et al.* (1993, Fig. 3.6): b: antennal groove; b': hepatic groove; c: postcervical groove; c': intercervical groove; e: cervical groove; h: hepatic spine; p.a.: postantennal spine; s.c.: supraorbital carina.

of the Goshoura Group in Goshoura town, Amakusa City, Kumamoto Prefecture. Late Cretaceous (Cenomanian).

Etymology: The trivial name is derived from "Hinokuni", meaning Kumamoto in an ancient age.

Diagnosis: Carapace long, subcylindrical. Supraorbital carina weakly ridged. Rostrum slender, long. Antennal spine long, slender, bearing well defined antennal ridge. Gastric region not delimited. Cephalic region well delimited by cervical and antennal grooves, bearing a single postantennal spine. Cervical groove deep, straight, starting at mid to 2/3 of carapace height, joining antennal and hepatic grooves. Cervical spine weakly developed. Antennal groove shallow, short. Intercervical groove deep, curved forward without connection with cervical groove. Postcervical groove deep, sinuous, extending ventrally to join hepatic and intercervical grooves. Prominence omega swollen. Hepatic groove curved dorsally, joining antennal groove. Hepatic spine weakly defined. Palm of 1st cheliped elongate, longer than high; surface covered with coarse tubercles; dorsal margin with 5 to 6 spines; ventral margin smooth. Fixed finger slender, slightly curved dorsally; surface covered with fine tubercles.

Description: Carapace twice longer than high, subcylindrical; surface covered with fine tubercles; weak median ridge behind rostral region. Rostrum poorly preserved, slender, about 15% length of carapace; tip brocken. Supraorbital carina weakly ridged, extending gastric region. Antennal spine 80% as long as rostrum, slender bearing well defined antennal ridge; tip pointed. Gastric region not delimited. Cephalic region well delimited by the cervical and antennal grooves, bearing a well-defined postantennal spine. Cervical region bearing a small cervical spine. Cervical groove well defined, deep, nearly straight, starting at mid to 2/3 of carapace height, joining antennal and hepatic grooves. Antennal groove shallow, short, slightly curved dorsally. Inferior groove shallow, short. Intercervical groove deep, curved forward without connection with cervical groove. Postcervical groove well defined, deep, two to three times slightly sinuous, obliquely extending ventrally. Prominence omega strongly defined, well swollen. Hepatic groove shallow, strongly concave, joining antennal grooves. Hepatic spine developed.

Carpus of 1st cheliped subrectangular; surface covered with coarse tubercles. Palm of 1st cheliped elongate, 1.5 times

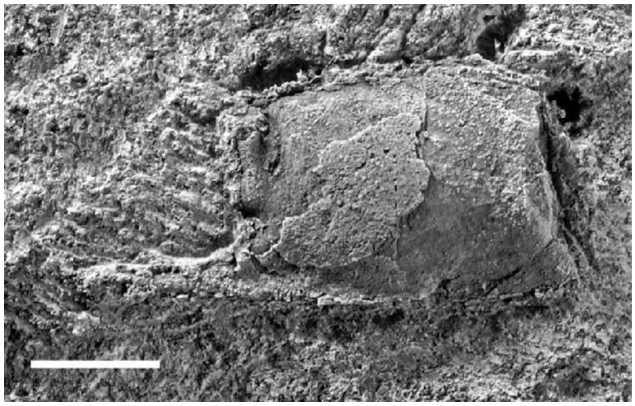

Fig. 6. Axoidea Fam., gen. et sp. indet. GCM-IVP2094, left lateral view. Scale bar indicates 5.0 mm.

dorsal margin with 5 to 6 spines; ventral margin smooth. Fixed finger slender, slightly curved dorsally; surface covered with fine tubercles.

Pleon poorly preserved; surface covered with fine tubercles; dorsal margin slightly rounded; transverse groove sinuous; somites with a dorsally aligned tubercle.

Remarks: The genus includes 66 species before this study (Kornecki *et al*., 2017). However, the present taxon can be distinguished from these species by the characters of grooves and antennal, postantennal and hepatic spines on the carapace, and is safely described as a new species (Table 2). The present species is closest to *Hoploparia albertaensis* Tshudy and Feldmann in Tshudy *et al*., 2005, described from the Upper Cretaceous (Coniacian) Bad Heart Formation of Alberta, Canada, by having a long antennal spine, and its outline of antennal, inferior, cervical, hepatic, postcervical, and intercervical grooves. However, the present species differs from *H. albertaensis* in having cervical, hepatic, and postantennal spines. The present species seems to be related to *H. stokesi* (Weller, 1903), first described from the Upper Cretaceous (Campanian) of James Ross Basin of Antarctic Peninsula. *Hoploparia stokesi* differs from the present species in having a postorbital spine, a second intercervical groove and a long gastro-orbital groove. *Hoploparia bearpawensis* Feldmann in Feldmann *et al*., 1977, described from the Upper Cretaceous (Campanian) Bearpaw Shale of Montana, U.S.A., seems to be similar to the new species. However, the present species has a hepatic spine and does not have a gastrolateral spine. The present species is similar to *H. tshudyi* Schweitzer and Feldmann, 2001, described from the Cretaceous (Albian to Cenomanian) Moonshine Creek

Character/ Species	***H. hinokunika***	*H. albertaensis*	*H. stokesi*	*H. bearpawensis*	*H. tshudyi*	*H. collingnoni*	*H. kamimurai*	*H. gabbi*	*H. natsumiae*
r	Without spine	Without spine	With spines	Lack	Lack	Without spine	Without spine	Lack	Lack
p.o.	Absent	Present	Present	Absent	Present	Present	Present	Present	Present
A	Long	Long	Long	Lack	Lack	Short	Long	Long	Lack
g.l.	Absent	Absent	Absent	Present	Absent	Present	Absent	Absent	Absent
p.a.	Present	Absent	Present	Present	Absent	Present	Absent	Present	Present
c.s.	Present	Absent	Present	Present	Absent	Absent	Absent	Absent	Absent
p.o.	Absent	Absent	Absent	Present	Absent	Absent	Absent	Absent	Absent
h	Present	Absent	Present	Absent	Absent	Absent	Absent	Absent	Absent
ω	Swollen	Flat	Swollen	Swollen	Flat	Flat	Flat	Flat	Swollen
g.o.	Absent	Absent	Long	Absent	Absent	Absent	Absent	Absent	Long
b	Short	Short	Short	Short	Short	Long	Short	Short	Long
i	Present	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent
c'	Long	Long	Long	Short	Short	Long	Short	Short	Short
c"	Absent	Absent	Present	Absent	Absent	Absent	Absent	Absent	Present
b'	Connect with b	Connect with b	Connect with b	Connect with b	Connect with b	Connect with b	Connect with b	Connect with b	Connect with b
c	Connect with b'	Connect with b'	Connect with b'	Connect with b'	Connect with b'	Connect with b'	Without connect with b'	Connect with b'	Connect with b'

Table 2. Comparison of major characteristics in *Hoploparia hinokunika* new species, *H. albertaensis*, *H. stokesi*, *H. bearpawensis*, *H. tsudyi*, *H. collingnoni*, *H. kaminurai*, *H. gabbi* and *H. natsumiae*. The morphological characters are based on Feldmann *et al*. (1993) and Tshudy and Sorhannus (2003). Abbreviations refer to Feldmann *et al*. (1993, Fig. 3.6): A: antennal spine; b: antennal groove; b': hepatic groove; c: postcervical groove; c': intercervical groove; c": second intercervical spine; c.s.: cervical spine; g.l.: gasrtolateral spine; g.o.: gastro-orbital groove; h: hepatic spine; i: inferior groove; p.a.: postantennal spine; p.o.: postorbital spine; r: rostrum; ω: prominence omega.

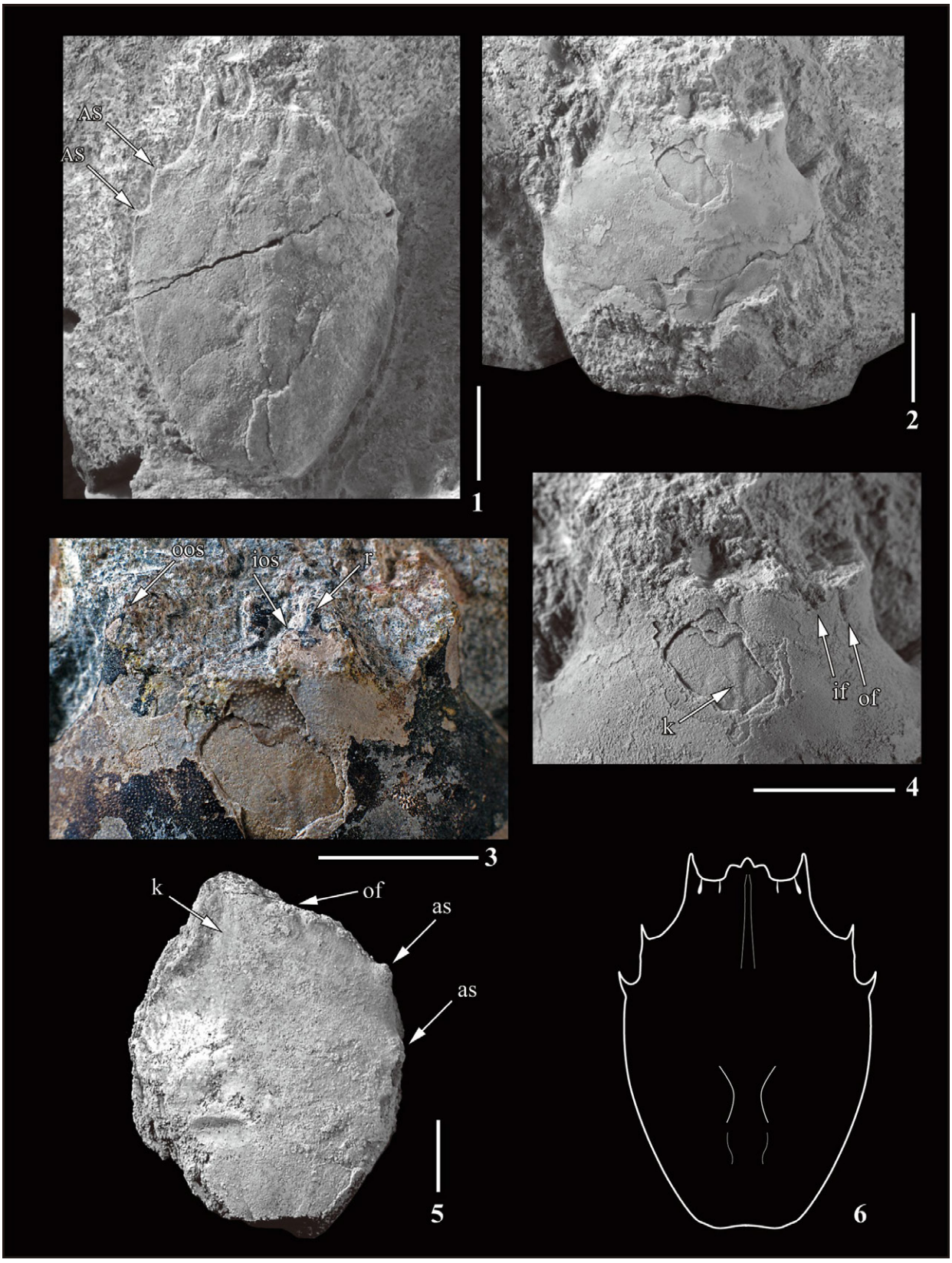

Fig. 7. ***Bournelyreidus shiranui*** **Ando, new species. 1**, GCM-IVP3184, holotype, carapace. **2–4**, GCM-IVP3223, paratype, carapace. 3, 4, expansion of front. **5**, GCM-IVP2114, paratype, carapace. **6,** line drawing reconstruction of carapace. 1, 2, 4 and 5 are coated with ammonium chloride (NH_4Cl). All scale bars indicate 5.0 mm. Abbreviations: as: anterolateral spine; if: inner fisser; ios: inner-orbital spine; k: keel; of: outer fisser; oos: outer-orbital spine; r: rostrum.

well-defined postantennal and hepatic spines. *Hoploparia hinokunika* is also similar to *H. collingnoni* (Van Straelen, 1949) which was first described from the Lower Cretaceous (Albian) of Madagascar. However, *H. hinokunika* has a short antennal groove and a cervical spine, and the present species does not have a postorbital spine. The present species resembles *H. kamimurai* Kato and Karasawa, 2006, described from the Lower Cretaceous (Barremian) Ishido Formation of Gunma Prefecture, central Japan, but differs in having a hepatic groove which joins the cervical groove. The present species resembles *H. gabbi* Pilsbry, 1901, described from the Upper Cretaceous (Santonian to Campanian) Merchantville Formation of New Jersey and Delaware, U.S.A., but differs in having hepatic, cervical and postantennal spines, and an absence of the supraorbital spines. The present species also resembles *H. natsumiae* Karasawa, Ohara, and Kato, 2008, described from the Lower Cretaceous (Barremian) Arida Formation of Wakayama Prefecture, central Japan, but clearly differs in having a short 1st cheliped and a cervical spine, and absence of the second intercervical groove.

Infraorder Axiidea De Saint Laurent, 1979

Superfamily Axioidea Huxley, 1879

Axoidea Fam., gen. et sp. indet.

(Fig. 6)

Material examined: GCM-IVP2094 (propodus).

Type locality: Loc. 3; Karakizaki Formation of the Goshoura Group in Goshoura town, Amakusa City, Kumamoto Prefecture. Late Cretaceous (Cenomanian).

Remarks: A single propodus was found. The specimen is not determined at the family, genus and species level.

Infraorder Brachyura Latreille, 1802

Superfamily Raninoidea de Haan, 1839

Family Lyreididae Guinot, 1993

Subfamily Marylyreidinae van Bakel, Guinot, Artal, Fraaije, and Jagt, 2012

Genus *Bournelyreidus* van Bakel, Guinot, Artal, Fraaije, and Jagt, 2012

Type species: *Hemioon eysunesensis* Collins and Rasmussen, 1992, by original designation.

Included species: See Schweitzer *et al.* (2019).

***Bournelyreidus shiranui* Ando, new species**

(Fig. 7)

Decapoda; Hirose and Ugai, 2012, fig. 7.8.

Material examined: GCM-IVP3184 (holotype, carapace), GCM-IVP3223(paratype, carapace), GCM-IVP2114 (paratype, carapace)

Type locality: All specimens were collected from Loc. 2; Gannohana Member of the Enokuchi Formation of the Goshoura Group in Goshoura town, Amakusa City, Kumamoto Prefecture. Late Cretaceous (Cenomanian).

Etymology: The trivial name is derived from "Shiranui", a Japanese flame spirit (Yokai) which occurs around the Goshoura-jima Island. The name is an arbitrary combination of letters.

Diagnosis: Carapace ovate, longer than wide. Front narrow. Rostrum triangular. Outer-orbital spine slender, longer than rostrum. Anterolateral margin slightly convex bearing anterolateral spines. Two pairs of anterolateral spines short, slightly concave, forming 12° to 15° angle with midline of carapace; carapace widest at most posterior anterolateral spine. Posterolateral margin straight, then becoming slightly concave and converging posteriorly. Posterior margin weakly concave, narrow. Dorsal surface of carapace with fine tubercles. Midline of carapace slightly keeled from rostrum to posterior mesogastric region. Cardiac region with one pair shallow nodes.

Descriptions: Moderate-sized raninoid, largest individual with carapace length exceeding 20 mm. Carapace ovate in outline, greatest width about 65% carapace length. Front narrow, 50 to 55% of maximum carapace width. Rostrum triangular, slender, slightly longer than wide, well-defined rim; tip obscure. Inner-orbital spines short, nearly an isosceles right triangular. Outer-orbital spines covered with very fine tubercles, sharp, parallel or slightly divergent anteriorly, longer than rostrum; tip pointed. Orbits smooth concave arcs, interrupted by two V-shaped fissures; outer fissure deep, longer than inner fissure, subtle, at base of outer-orbital spine; inner fissure deep, at base of inner-orbital spine. Anterolateral margin slightly concave bearing two pairs anterolateral spines located at posterior end of anterolateral margin. Anterolateral spine 1.0 to 1.5 mm, slightly curved forming 12° to 15° angle with midline of carapace; tip pointed; carapace widest at most posterior anterolateral spine. Posterolateral margin straight, then becoming slightly concave and converging posteriorly.

Posterior margin weakly convex, about half maximum carapace width. Dorsal surface of carapace with fine tubercles.

Midline of carapace slightly keeled from rostrum to posterior mesogastric region becoming wide at anterior mesogastric region. Cardiac and intestinal regions with low median ridge. Cardiac region with shallow one pair node, well separated from other regions, broadly swollen, flattening to posterior margin.

Remarks: The present species is closest to *Bournelyreidus oaheensis* (Bishop, 1978) which was first described from the Upper Cretaceous (Campanian to Maastrichtian) Pierre Shale of South Dakota, U.S.A. However, *B. shiranui* is readily distinguished from *B. oaheensis* because the present species has a narrow front and a short rostrum. The new species also resembles *B. carlilensis* (Feldmann and Maxey, 1980) which was described from the Upper Cretaceous (Turonian) Carlile Shale of Kansas, U.S.A. *Bournelyreidus shiranui* has a long outer-orbital spine, which is longer than the rostrum, and a short keel on the midline of the carapace, while *B. carlilensis* has a short outer-orbital spine which is shorter than the rostrum and a long keel which begins at the base of the frontal area and extends to the posterior margin. The present species also resembles *B. ericksoni* Kornecki, Feldmann, and Schweitzer, 2017, from the Upper Cretaceous (Maastrichtian) Coon Creek Formation of Mississippi, U.S.A., but differs in having a short keel on the midline of the carapace and a longer outer-orbital spine. The present species represents the oldest record of the genus.

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References

Birshtein, J. A. (1958): Ein Vertreter der ältesten Ordo der Crustacea Decapoda *Protoclitiopsis antiqua* gen. nov. sp. nov. aus dem Permo West Sibiriens. Doklady Akademii Nauk, SSSR, 122, 477–480.

Bishop, G.A.(1978): Two new crabs, *Sodakus tatankayotankaensis* n. gen., n. sp. and *Raninella oaheensis* n. sp. (Crustacea, Decapoda), from the Upper Cretaceous Pierre Shale of South Dakota. Journal of Paleontology, 52, 608–617.

Collins, J. S. H. and Wienberg-Rasmussen, H. (1992): Upper Cretaceous–Lower Tertiary decapod crustaceans from West Greenland. Bulletin Grønlands Geologiske Undersøgelse, 162, 1–46.

Dana, J. D. (1852): Parts I and II, Crustacea. U.S. Exploring Expedition during the Years 1838, 1839, 1840, 1841, 1842, under the Command of Charles Wilkes, U.S.N., 13. C. Sherman. Philadelphia, p. 1–1618, 1map, sepatate folio atlas with 96 pls.

de Haan, W. (1833–1850) : Crustacea. *In* P. F. von Siebold, Fauna Japonica, sive descriptio animalium, quae in iterne per Japoniam, jussu et auspiciis superiorum, qui summum in India Batavia Imperium tenent, suscepto, Annis 1823–1830 collegit, notis, observationibus et adumbrationibus illustravit. i–xvii+I–xxx i+ix–xvi+1–243. Lugdunum, Batavorum.

de Saint Laurent, M. (1979): Sur la classification et la phylogénie des Thalassinides: definitions dela superfamille des Axioidea, de la sous-famille des Thomassiniinae et de deux genres nouveaux (Crustacea, Decapoda). Comptes Rendus Hebdomadaires des Séances de l'Academie des Science ssérie, D288(31), 1395–1397.

Devillez, J. and Charbonnier, S. (2017): The genus *Eryma* Meyer, 1840 (Crustacea: Decapoda: Erymidae): new synonyms, systematic and stratigraphic implications. Bulletin de la Société Géologique de France, 188(3), 10p.

Devillez, J. and Charbonnier, S. (2019): Review of the Early and Middle Jurassic erymid lobsters (Crustacea: Decapoda). Bulletin de la Société Géologique de France, 190(1), 37p.

Devillez, J., Charbonnier, S., Hyžný, M. and Leroy, L. (2016): Review of the Early Cretaceous erymid lobsters (Crustacea: Decapoda) from the Western Tethys. Geodiversitas, 38(4), 515–541.

Devillez, J., Charbonnier, S., Veselská, M. K. and Pezy. J.-P. (2017): Review of the Late Cretaceous erymid lobsters

(Crustacea: Decapoda) from the Western Tethys. Proceedings of the Geologists' Association, 128, 779–797.

Feldmann, R. M. and Maxey, M. (1980): *Raninella carlilensis*, a new raninid crab from the Carlile Shale (Turonian) of Kansas. Journal of Paleontology, 54(4), 858–861.

Feldmann, R. M. and Titus, A. L. (2006): *Eryma jungostrix* n. sp. (Decapoda; Erymidae) from the Redwater Shale of the Stump Formation (Jurassic; Oxfordian) of Utah. Journal of Crustacean Biology, 26(1), 63–68.

Feldmann, R. M. Tshudy, D. M. and Thomson, M. R. A. (1993): Late Cretaceous and Paleocene Decapod Crustaceans from James Ross Basin, Antarctic Peninsula. Journal of Paleontology, 67, 1–41.

Feldmann, R. M., Bishop, G. A. and Kammer, T. M. (1977): Macrurous decapods from the Bearpaw Shale (Cretaceous:Campanian) of northeastern Montana. Journal of Paleontology, 51, 1161–1180.

Glaessner, M. F. (1929): Crustacea Decapoda. *In* J. F. Pompeckj (ed.), Fossilium Catalogus I: Animalia, Part 41: 1–141. W. Jünk, Berlin.

Glaessner, M. F. (1969): Decapoda. *In* R. C. Moore (ed.), Treatise on Invertebrate Paleontology, Part R, Arthropoda 4. Vol. 2, R399–R651. Geological Society of America and University of Kansas Press.

Guinot, D. (1993): Données nouvelles sur les Raninoidea de Haan, 1841 (Crustacea Decapoda Brachyura Podotremata).Comptes Randus de l'Académie des Sciences (Paris), Sciences de la vie, 316(3), 1324–1331.

Hirose, K. and Ugai, H. (2012): Fossils of "Trigonia sandstone Fossil hunting park"—Fossils of the Gannohana Member (Enokuchi Formation, the Goshoura Group)—. Bulletin of Goshoura Cretaceous Museum, 13, 19–24.

Huxley, T. H. (1879): On the classification and the distribution of the crayfishes. Proceedings zoological Society of London, 1878, 752–788.

Karasawa, H. and Komatsu, T. (2013): A new species of raninoidan crab (Decapoda; Brachyura) from the Cretaceous Goshoura Group, Kyushu, Japan. Bulletin of Goshoura Cretaceous Museum, 14, 1–6.

Karasawa, H., Ohara, M. and Kato, H. (2008): New records for Crustacea from the Arida Formation (Lower Cretaceous, Barremian) of Japan. Boletín de la Sociedad Geológica Mexicana, 60(1), 101–110.

Kato, H., and Karasawa, H. (2006): New nephropid and glypheid lobsters from the Mesozoic of Japan. Revista Mexicana de Ciencias Geológicas, 23(3), 338–343.

Komatsu, T.(1999): Sedimentology and sequence stratigraphy of a tide-and wave-dominated coastal succession: the Cretaceous Goshoura Group, Kyushu, southwest Japan. Cretaceous Research, 20, 327–342.

Komatsu, T. (2013): Palaeoecology of the mid-Cretaceous siphonate bivalve genus Goshoraia (Mollusca, Veneridae) from Japan. Palaeontology, 5, 381–397.

Komatsu, T. and Maeda, H. (2005): Stratigraphy and fossil bivalve assemblages of the mid-Cretaceous Goshoura Group, southwest Japan. Palaeontological Research, 9, 119–142.

Kornecki, K. M., Feldmann, R. M. and Schweitzer, C. E. (2017): Decapoda (Crustacea) from the Coon Creek Formation (Maastrichtian) of Mississippi and Tennessee. Bulletin of the Florida Museum of Natural History, 53, 269–334.

Latreille P. A. (1802): Histoire naturelle, génerale et particulière, des Crustacés et des Insectes, vol. 3. F. Dufart. Paris, 467p.

Matsumoto, T. (1938): The Geology of Goshoura Island, Amakusa. Journal of Geological Society of Japan, 45, 1–46.

Matsumoto, T. and Tashiro, M. (1975): A record of *Mortoniceras* (Cretaceous ammonite) from Goshoura Island, Kyushu. Transaction of Proceedings of Palaeontological Society of Japan, 100, 230–238.

McCoy, F. (1849) On the classification of some British fossil Crustacea with notices of new forms in the University Collection at Cambridge. Annals and Magazine of Natural History, Series 2, 4, 161–179, 330–335.

Meyer, H. von (1840a): Briefliche Mittheilungen. Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefactenkunde, 1840, 576–587.

Meyer, H. von (1840b): Neue Gattungen fossiler Krebse aus Gebilden vom bunten Sandstein bis in die Kreide. Zoological Museum, Stuttgart, 28 p.

Pilsbry, H. A. (1901) Crustacea of the Cretaceous Formation of New Jersey. Proceedings of the Academy of Natural Sciences of Philadelphia, 53, 111–118.

Rathbun, M. J. (1926) The fossil stalk-eyed Crustacea of the Pacific slope of North America. U. S. National Museum,

Bulletin, 138, 155p.

Scholtheim, E. F. von (1822): Beiträge zur näheren Bestimmung der versteinerten und fossilen Krebsarten. Nachträge zur Petrefactenkunde, 2, 1–88.

Scholtz, G. and Richter, S. (1995): Phylogenetic systematics of the reptantian Decapoda (Crustacea, Malacostraca). Zoological Journal of the Linnean Society, 113, 289–328.

Schram, F. R. and Dixon, C. J. (2004): Decapod phylogeny: addition of fossil evidence to a robust morphological cladistics data set. Bulletin of the Mizunami Fossil Museum, 31, 1–19.

Schweitzer, C. E. and Feldmann, R. M. (2001): New Cretaceous and Tertiary decapod crustaceans from western North America. Bulletin of the Mizunami Fossil Museum, 28, 173–210.

Schweitzer, C. E., Feldmann, R. M., Garassino, A., Karasawa, H. and Schweigert, G. (2010): Systematic List of Fossil Decapod Crustacean Species. Crustaceana Monographs, 10, 1–222.

Schweitzer, C. E., Feldmann, R. M., Phillips, G. E. and Armstrong, A. (2019): Createous Decapoda (Crustacea) from Mississippi, USA. Neues Jahrbuch für Geologie und Paläontologie, 293(2), 145–197.

Sowerby, G. B. (1826): Description of a new species of Astacus, found in a fossil state at Lyme Regis. Zoological Journal, 2, 493–494.

Tshudy, D., and Sorhannus, U. (2003): *Hoploparia*, the best-known fossil clawed lobster (Family Nephropidae), is a "Wasterbasket" genus. Journal of Crustacean Biology, 23(3), 700–711.

Tshudy, D., Donaldson, W. S., Collom, C., Feldmann R. M. and Schweitzer, C. E. (2005): *Hoploparia albertaensis*, a new species of clawed lobster (Nephropidae) from the late Coniacian, shallow-marine Bad Heart Formation of northwestern Alberta, Canada. Journal of Paleontology, 79, 961–968.

van Bakel, B. W. M., Guinot, D., Artal, P., Fraaije, R. H. B. and Jagt, J. W. M. (2012): A revision of the Palaeocorystoidea and the phylogeny of raninoidian crabs (Crustacea, Decapoda, Brachyura, Podotremata). Zootaxa, 3215, 1–216.

van Straelen, V. (1925): Contribution à l'étude des crustacés décapodes de la période jurassique. Mémoires de la Classe des Sciences de l'Académie royale de Belgique, 7, 1– 462.

van Straelen, V. (1949): Crustacés. *In* Collignon M. (ed.), Recherches sur les faunes albiennes de Madagascar I.-L'Albien d'Ambarimaninga. Annales géologiques du Service des Mines, 16 (1), 99.

Weller, S. (1903): The Stokes collection of Antarctic fossils. Journal of Geology 11: 413–419.

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urn:lsid:zoobank.org:act:DF9C43BF-3BB7-4435-A491-CEA0905AFDE7

***Bournelyreidus shiranui* Ando, new species**
urn:lsid:zoobank.org:act:9A31B847-0C7A-4152-AFE1-E00EA68436F1