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Decapod Crustaceans Collected from the Southern Part of the Sea of Japan in 2000–2001 using TRV Toyoshio-maru

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Abstract During biological expeditions to the southern part of the Sea of Japan in 2000–2001 conducted on the TRV *Toyoshio-maru* of Hiroshima University, a small collection of decapod Crustacea was obtained in depths ranging from 43 to 133 m. The material is represented by five infraorders, 20 families and 41 species. It includes some little known species, such as the thalassinideans *Axiopsis tsushimaensis* Sakai, 1992, *Calaxius mimasensis* (Sakai, 1967a), and *Cheramus spinophthalmus* (Sakai, 1970), the pagurid *Catapaguroides japonicus* de Saint Laurent, 1968, and the pilumnids *Typhlocarcinops takedai* Ng, 1987 and *Xenophthalmodes morsei* Rathbun, 1932. These species are fully described and illustrated, enabling better comparisons between those species and their close relatives. Brief accounts are given for the pagurids *Anapagurus japonicus* Ortmann, 1892 and *Turleania similis* Komai, 1999b, and the galatheids *Munida japonica* Stimpson, 1858 and *M. pherusa* Macpherson and Baba, 1993, in order to supplement previous taxonomic accounts of these species.

Key words: Crustacea, Decapoda, Sea of Japan, taxonomy.

Introduction

A small, but diverse collection of decapod crustaceans from the southern part of the Sea of Japan, obtained during biological expeditions in 2000–2001 conducted on TRV *Toyoshio-maru* of the Faculty of Applied Biological Science, Hiroshima University, provides the foundation of this report. The decapod crustacean fauna of this region has been well documented (cf. Yokoya, 1933; Miyake *et al.*, 1962; Fujino and Miyake, 1970; Sakai, 1970; Takeda and Miyake, 1972; Takeda, 1973). The collection includes a total of 73 specimens (apart from those not identifiable to species level) representing five infraorders, 20 families and 41 species (Table 1). It contains some poorly or little known taxa. Among the interesting species are the axiid shrimp *Calaxius mimasensis* (Sakai, 1967a), and the pilumnid crab *Typhlocarcinops takedai* Ng, 1987, both represented only by type material. Specimens of the rare axiid

Axiopsis tsushimaensis Sakai, 1992 and the callianassid mud shrimp *Cheramus spinophthalmus* (Sakai, 1970), both of which were originally described from the surveyed area, are also included. The rare pagurid hermit crab *Catapaguroides japonicus* de Saint Laurent, 1968, known only from Sagami Bay and Suruga Bay (de Saint Laurent, 1968; Miyake, 1978), is represented by a single male specimen in the present collection. These five species are fully described and illustrated, as the original descriptions of them are based on incomplete specimens or omit several important details. Although the pilumnid *Xenophthalmodes morsei* Rathbun, 1932 has been well represented in previous literature, morphology of this species remains poorly known. Therefore, a detailed description of this species is also presented, making it possible to better assess its relationships with congeneric species. Brief accounts are given for the following species in order to supplement

Table 1. List of decapod species collected during TRV *Toyoshio-maru* cruises to southern Sea of Japan. Stations are given in the combination of the year (00=2000; 01=2001) and station number (see Table 2).

Family Species	Stations	Number of specimens	CBM-ZC reg. no.
Solenoceridae			
<i>Solenocera comata</i> Stebbing, 1915	00-07; 00-12	1; 1	5618; 5622
Sicyonidae			
<i>Sicyonia cristata</i> (De Haan, 1849)	00-05	1	5610
<i>Sicyonia curvirostris</i> Balss, 1913	00-12	1	5623
Pasiphaeidae			
<i>Leptocheila sydniensis</i> Dakin and Colefax, 1940	01-07	1	6149
Alpheidae			
<i>Alpheus collumianus</i> Stimpson, 1860	00-14	1	5634
<i>Synalpheus neomeris</i> (De Man, 1897)	01-09	1	6151
Processidae			
<i>Hayashidonus japonicus</i> (De Haan, 1849)	00-05	1	5611
Crangonidae			
<i>Philocheras incisus</i> (Kemp, 1916)	01-09	2	6152
Axiidae			
<i>Axiopsis tsushimaensis</i> Sakai, 1992	01-06	1	6146
<i>Calaxius mimasensis</i> (Sakai, 1967)	00-12	2	5624
Callinassidae			
<i>Cheramus spinophthalmus</i> (Sakai, 1970)	01-10; 01-12	7; 8	6166; 6170
Diogenidae			
<i>Diogenes penicillatus</i> (Stimpson, 1858)	01-12	1	6171
Paguridae			
<i>Anapagurus japonicus</i> Ortmann, 1892	01-09	1	6153
<i>Catapaguroides japonicus</i> de Saint Laurent, 1968	01-09	1	6154
<i>Nematopagurus vallatus</i> (Melin, 1939)	00-05	1	5614
<i>Pagurus megalops</i> (Stimpson, 1858)	00-05	1	5612
<i>Turleania similis</i> Komai, 1999	00-12	1	5625
Galatheidae			
<i>Bathymunida brevirostris</i> (Yokoya, 1933)	01-09	1	6156
<i>Munida japonica</i> Stimpson, 1858	00-12	2	5626
<i>Munida pherusa</i> Macpherson and Baba, 1993	01-09; 01-12	2; 1	6157; 6172
<i>Paramunida scabra</i> (Henderson, 1888)	00-06	3	5615
Latreillidae			
<i>Eplumula phalangium</i> (De Haan, 1839)	01-09	1	6158
Dorippidae			
<i>Ethusa quadrata</i> Sakai, 1937	00-10	1	5639
Leucosiidae			
<i>Cryptocnemus obolus</i> Ortmann, 1892	00-12	4	5629
<i>Ebalia longimana</i> Ortmann, 1892	00-12	1	5627
<i>Ebalia tuberculosa</i> (A. Milne Edwards, 1873)	01-09	1	6160
<i>Leucosia unidentata</i> De Haan, 1841	00-06	1	5616
<i>Nursia japonica</i> Sakai, 1935	01-10	1	6165
<i>Praebebalia longidactyla</i> Yokoya, 1933	01-09	1	6161
Calappidae			
<i>Mursia trispinosa</i> Parisi, 1914	01-12	1	6173
Majidae			
<i>Cyrtomaia owstoni</i> Terazaki, 1903	00-12	1	5630
<i>Sunipea indicus</i> (Alcock, 1892)	00-10	1	5640

Table 1. (continued)

Family Species	Stations	Number of specimens	CBM-ZC reg. no.
Portunidae			
<i>Liocarcinus corrugatus</i> (Pennant, 1777)	00-10; 01-12	1; 1	5642; 6175
<i>Charybdis bimaculata</i> (Miers, 1886)	00-14	1	5635
<i>Portunus haani</i> (Stimpson, 1857)	00-05	1	5613
Cancridae			
<i>Cancer gibbosulus</i> (De Haan, 1833)	00-12; 01-12	2; 1	5617; 6174
Pilumnidae			
<i>Typhlocarcinops takedai</i> Ng, 1987	01-11; 01-12	6; 1	6168; 6176
<i>Xenophthalmodes morsei</i> Rathbun, 1932	01-11	1	6169
Goneplacidae			
<i>Carcinoplax longimanus</i> (De Haan, 1844)	01-06; 01-07	1; 1	6147; 6150
<i>Carcinoplax surugensis</i> Rathbun, 1932	01-06	1	6148
<i>Singhaplax nipponensis</i> (Yokoya, 1933)	00-07	1	5621

previous descriptions: *Anapagurus japonicus* Ortmann, 1892, *Turleania similis* Komai, 1999b, *Munida japonica* Stimpson, 1858, and *M. pherusa* Macpherson and Baba, 1993. Complete synonymies are given for *Axiopsis tsushimaensis*, *Calaxius mimasensis*, *Cataguroides japonicus*, *Typhlocarcinops takedai*, and *Xenophthalmodes morsei*, and restricted synonymies, listing significant references accompanied by illustrations, are given for the other species.

Materials and Methods

Collecting sites of the expeditions were located in depths ranging from 43 to 163 m (but one station at a depth of 721 m) in the southern part of the Sea of Japan (Table 2). Collections were made with an ORI dredge. Duration of tows was 5–10 minutes. Stations where decapods were recovered are shown in Table 2. Samples were fixed in 3% formalin sea water solution, and later preserved in 70% ethanol. They are deposited in the collection of the Natural History Museum and Institute, Chiba. Supplemental specimens from other sources have been also examined, when necessary. For thalassinideans and galatheids, postorbital carapace length (cl), measured from the posterior margin of the orbit to the midpoint of the posterodorsal margin of the carapace, is used as a standard measurement. For pagurids, shield length (sl), measured from the tip of the rostrum to the midpoint of the posterior margin of the shield, is used. For brachyurans, meas-

urements are given in this sequence: carapace length measured from the midpoint of the frontal margin to the midpoint of the posterior margin of the carapace (cl) by greatest carapace width (cw). The following abbreviations are used: CBM=Natural History Museum and Institute, Chiba; KMNH=Kitakyushu Museum of Natural History; USNM=National Museum of Natural History, Smithsonian Institution; ZLKU=Zoological Laboratory, Faculty of Agriculture, Kyushu University; ovig=ovigerous female (s); stn=station.

Taxonomic Account

Infraorder Thalassinidea

Family Axiidae

Axiopsis tsushimaensis Sakai, 1992

(Figs. 1–3)

- Axiopsis consobrina* De Man, 1905: 595 (part).
Axiopsis (Axiopsis) consobrina - De Man, 1925: 80 (part).
Axiopsis (Axiopsis) aff. serratifrons - Sakai, 1970: 37; 1987: 303 (list), 304 (list).
Axiopsis tsushimaensis Sakai, 1992: 173, figs 14, 15 [type locality: off Fukuoka, Tsushima Strait]; Sakai, 1994: 198; Komai, 2000: 228 (list).

Material examined. TRV *Toyoshio-maru*, 2001-11 cruise: stn 6, off Hagi, Yamaguchi Prefecture, 115 m, 1 female (cl 5.0 mm) (CBM-ZC 6146).

Description. Integument of body not firm.

Table 2. List of sampling data.

Station	Locality	Position	Depth	Date	Local time
00-05	N of Karatsu, Fukuoka	33°45.00' N, 130°01.18' E	43 m	14 July 2000	10:07-10:30
00-06	NE of Iki Island	33°57.23' N, 129°54.24' E	86 m	14 July 2000	08:23-08:50
00-07	N of Iki Island	34°09.27' N, 129°46.24' E	105 m	13 July 2000	16:27-17:04
00-10	S of Iki Island	34°04.26' N, 129°06.31' E	122 m	13 July 2000	09:00-09:37
00-12	S of Izuhara, Tsushima Island	33°56.21' N, 129°25.36' E	133 m	13 July 2000	11:27-12:05
00-14	NW of Iki Island	33°58.14' N, 129°31.36' E	101 m	13 July 2000	13:45-14:17
01-06	off Hagi, Yamaguchi	35°20.00' N, 131°10.00' E	115 m	05 July 2001	13:08-13:37
01-07	off Hagi, Yamaguchi	35°10.00' N, 131°10.00' E	129 m	05 July 2001	14:38-15:10
01-09	off Hagi, Yamaguchi	34°55.00' N, 131°10.00' E	79-83 m	06 July 2001	10:16-10:45
01-10	off Hagi, Yamaguchi	34°40.00' N, 131°10.00' E	99 m	05 July 2001	12:25-13:06
01-11	off Kawajiri-misaki, Yamaguchi	34°29.00' N, 131°04.20' E	86-88 m	07 July 2001	09:45-10:00
01-12	off Kawajiri-misaki, Yamaguchi	34°28.40' N, 130°52.10' E	84 m	07 July 2001	10:55-11:10

latter difference may be attributable to difference in preservation: the present specimen was fixed in a 3% formalin sea water solution, but the type specimens were preserved in 70% ethanol. The bands on the ambulatory dactyli of the type specimens may have faded away by the time it was described. The difference in the armature of the right cheliped palm could be within a range of intraspecific variation.

Family Galatheidae

Munida japonica Stimpson, 1858

Munida japonica Stimpson, 1858: 252 [type locality: originally Kagoshima Bay, but subsequently changed to off Makura-zaki, Kagoshima, by designation of a neotype by Macpherson and Baba (1993)]; Macpherson and Baba, 1993: 399, fig. 9; Wu et al., 1998: 115, figs. 24, 26F, G).

Material examined. TRV *Toyoshio-maru*, 2000–10 cruise: stn 12, off Tsushima Island, 133 m, 2 males (cl 8.3, 9.3 mm) (CBM-ZC 5626).

Distribution. So far known with certainty only from Japan, the Philippines, Indonesia, and Taiwan, at depths of 102–220 m (Macpherson and Baba, 1993; Macpherson, 1997; Wu et al., 1998).

Remarks. The taxonomy of *Munida japonica* and related species was substantially clarified by Macpherson and Baba (1993). The present specimens are identifiable as *Munida japonica* on account of the following features: carapace with posteriormost striae uninterrupted medially; distal spines of basal segment of antennular peduncle subequal in size; distomesial spine on first segment of antennal peduncle distinctly overreaching third segment; merus of third maxilliped with distal spine on dorsal (=extensor) margin; fourth to seventh thoracic sternites with few striae; lateral parts of seventh thoracic sternite without granules; second abdominal somite with spines on anterodorsal margin. According to the redescription by Macpherson and Baba (1993) based on the neotype and supplemental material from Japan and the Philippines, there are two spines at each anterolateral angle of the second abdominal

somite. In one of the two specimens examined here (larger male cl 9.3 mm), only one spine at the left anterolateral angle of the second abdominal somite is clearly discernible; another spine at the left anterolateral angle and two at the right angle are greatly reduced and only indicated by minute, hardly discernible tubercles. The armature of the second abdominal somite has been considered to be useful in discriminating *Munida* species (cf. Baba, 1988; Macpherson and Baba, 1993; Macpherson, 1994). It would be desirable to examine more material to better understand variability in the development of the spines on the second abdominal somite.

Munida pherusa Macpherson and Baba, 1993

Munida pherusa Macpherson and Baba, 1993: 408, fig. 15 [type locality: south of Luzon, the Philippines]; Wu et al., 1998: 122, figs. 28, 35B.

Material examined. TRV *Toyoshio-maru*, 2001–11 cruise: stn 9, off Hagi, Yamaguchi Prefecture, 79–83 m, 1 male (cl 5.6 mm), 1 ovig (cl 7.0 mm) (CBM-ZC 6157); stn 12, off Kawajiri-misaki, Yamaguchi Prefecture, 84 m, 1 female (cl 7.1 mm) (CBM-ZC 6172).

Coloration. In formalin (47 days after fixation). Carapace and first to fifth abdominal somites generally light orange-red; striae on postcervical carapace dark red; dark red spot at base of first postcervical tooth; striae and posterolateral parts of first abdominal somite dark red; striae on lateral parts of second to fifth somites (including pleura) also dark red. Cheliped generally light orange-red; dactylus with narrow dark red band slightly distal to midlength; palm and carpus each with tinge of red distally, margins of squamiform protuberances darkened with red; merus with red-margined squamiform tubercles in distal 0.25, and with spot of dark red basally; ischium with dark red line on mesial face. Ambulatory pereopods also generally light orange-red; propodi each with 2 transverse rows, each composed of 1 or 2 rows of dark red margined squamiform tubercles on lateral face; meri each with 3 transverse rows, each composed of 3–4 rows of dark red

margined squamiform tubercles on lateral face. Fifth pereopod with dark red spot at base of carpus and midlength of merus respectively. Stiff, non-plumose setae on body and appendages with strong iridescent sheen.

Distribution. Japan, the Philippines, Indonesia and Taiwan, at depths of 73–152 m (Macpherson and Baba, 1993; Wu *et al.*, 1998).

Remarks. This species was recently described by Macpherson and Baba (1993) from the Tsushima Strait, Japan, the Philippines, and Indonesia, and subsequently recorded from Taiwan by Wu *et al.* (1998). The present specimens are referred to *M. pherusa* on account of the following features: carapace with posteriormost striae uninterrupted medially; distal spines of basal segment of antennular peduncle subequal in size; distomesial spine of first segment of antennal peduncle not reaching distal margin of third segment; merus of third maxilliped with distal spine on dorsal (=extensor) margin; third thoracic sternite as wide as anterior margin of following sternite; fourth to seventh thoracic sternites with numerous striae; lateral parts of seventh thoracic sternite without granules; second abdominal somite unarmed on anterodorsal margin.

Infraorder Brachyura
Family Pilumnidae
Subfamily Rhizopinae

***Typhlocarcinops takedai* Ng, 1987**
(Figs. 17, 18)

Typhlocarcinops transversa-Takeda and Miyake, 1968: 569, fig. 8a, b, pl. 6A; Takeda, 1973: 54; Dai and Yang, 1991: 413 (key). Not *Typhlocarcinops transversa* Tesch, 1918.

Typhlocarcinops takedai Ng, 1987: 90 [type locality: East China Sea].

Material examined. TRV *Toyoshio-maru*, 2001–11 cruise: stn 11, off Kawajiri-misaki, Yamaguchi Prefecture, 86–88 m, 3 males (cl 3.0–5.1 mm by cw 4.1–7.1 mm), 2 females (cl 4.2, 4.9 mm by cw 6.5, 7.4 mm), 1 ovig (cl 5.1 mm by cw 7.6 mm) (CBM-ZC 6168); stn 12, similar locality, 84 m, 1 male (cl 2.7 mm by cw 4.2 mm) (CBM-ZC 6176).

Description. Carapace (Figs 17A, 18A) not markedly vaulted, quadrate in general outline in dorsal view, 1.39–1.53 times broader than long, with greatest breadth across third or fourth anterolateral lobe (level of about midlength of carapace). Dorsal surface strongly convex anteriorly and posteriorly, transversely flat, with minute granules most pronounced adjacent to anterolateral to lateral margins and numerous very short, thin setae; margins fringed with sparse short plumose setae. Regional definition not obvious except for very shallow, longitudinal gastric and cardiac grooves. Frontal margin deflexed, faintly bilobed, laterally produced as small lobe; frontal region with shallow, but distinct median groove confluent with gastric grooves, width of frontal region 0.25–0.27 of carapace width. Supraorbital margin smooth, continuous with anterolateral margin; infraorbital margin also smooth, sinuous, without notches or incisions. Anterolateral margin strongly arched, minutely granular, divided in 4 confluent broad lobes (including outer-orbital lobe) separated by 3 distinct, U-shaped notches; outer-orbital lobe longest; first anterolateral lobe longer than second anterolateral lobe; third anterolateral lobe very small. Posterolateral margins slightly converging posteriorly; posterior margin broadly arched.

Orbits (Fig. 18A) 0.55–0.60 as wide as front. Ocular peduncles (Figs 17A, 18A) filling orbital space, immobile, dorsal surface with row of short setae continuing from anterolateral margin of carapace, anteroinferior surface minutely granular; corneas small but distinct, not faceted, with dark pigmentation, not visible in dorsal view.

Antennular fossa (Fig. 18A) moderately wide, occupying most of space inferior to frontal margin, septum separating antennular fossae well developed. Antennular peduncle (Fig. 18A) with basal segment transversely broad, filling inferior half of antennular fossa; distal 2 segments folded transversely; ultimate segment somewhat inflated. Antenna (Fig. 18A) with basal segment movable, reaching level of inferior orbital margin; penultimate segment lying in notch between lateral margin of frontal lobe